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Psychometric profiling of students at risk for academic underachievement at a university of technology

by

Shafeeka Yusuf Dockrat

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Supervisor: Emeritus Professor Piet de la Rey
Co-supervisor: Dr Malose Makhubela

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DECLARATION

I, Shafeeka Yusuf Dockrat, declare that this thesis is my original work except where I used or quoted another source, which has been acknowledged. I further declare that the work I am submitting has never been submitted before for another degree to any other university or tertiary institution for examination.

Signature: _____

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ABSTRACT

Poor results on academic performance indicators at South African institutions of higher education have significant implications for institutions, requisite graduate skills and the country's economy. Institutions are, therefore, confronted with a need to be proactive in implementing strategies to deal with underprepared students and the challenges of articulation to higher education.

To enhance student success, Alan Seidman's (2005) formula for retention was used as a basis for structuring the provisioning of student support initiatives at a university of technology. The formula provided for the early identification of students at risk, and the provision of early, intensive and continuous interventions.

As a component of an early warning system to identify students at risk for academic underachievement, 4718 first-year students at the institution were assessed with a battery of instruments at the beginning of the academic year. The battery comprised the English Literacy Skills Assessment, Career Choice Questionnaire, Learning and Study Strategies Inventory, and Emotional Skills Assessment Process. The results of these instruments were used to refer students for relevant interventions. The study analysed the relationship between the results obtained in the instruments and three measures of first-year academic performance, namely, retention, percentage of subjects passed and average mark. Demographic variables and intervention programmes were also included as independent variables. The sample was grouped into two categories, first-time entering students and students who were repeating the first year.

Using Pearsons Chi-square tests of independence, most of the independent variables indicated a significant relationship with at least one academic performance indicator for the first-time entering students. This finding supports the use of the instruments in the risk profiling evaluation for first-time entering students. Self-Testing, Study Aids, Empathy, and Self-esteem did not have a significant relationship with any academic performance measure. Amongst the students repeating, there were much fewer variables that had significant relationships with academic

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performance measures. The variables predicting academic underachievement were substantially reduced when entered into stepwise logistic regression models for both first-time entering students and students who were repeating. The models and associated tables may be utilised for profiling students to identify those at risk of academic underachievement and for using the profiles for the recommendation of necessary interventions.

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SUMMARY

Poor results on academic performance indicators at South African institutions of higher education have significant implications for institutions and the country's economy. Institutions therefore, are confronted with a need to be proactive in implementing strategies that deal with underprepared students and the challenges of articulation to higher education.

To enhance student success, Alan Seidman's (2005) formula for retention was used as a basis for structuring the provisioning of student support initiatives at the Tshwane University of Technology. The formula provided for the early identification of students at risk, and the provision of early, intensive and continuous interventions.

As part of an early warning system for the identification of students at risk for underachievement, 4 718 first-year students at the institution were assessed with a battery of instruments at the beginning of the academic year. The battery comprised the English Literacy Skills Assessment (ELSA), the Career Choice Questionnaire (CCQ), the Learning and Study Strategies Inventory (LASSI), and the Emotional Skills Assessment Process (ESAP). The results of these instruments were used to refer students for relevant interventions. The study analysed the relationship between the results obtained in the instruments and three measures of academic underachievement, namely, retention, percentage of subjects passed and average mark. Biographical variables and the interventions were treated as independent variables. The sample was grouped into two subsamples, first-time entering students, and students who were repeating the first year.

Using Pearson's Chi-square tests of independence, all the biographical variables and most of the independent variables had a relationship with at least one academic performance indicator for the first-time entering students. Self-Testing and Study Aids, Empathy and Self-esteem did not have a significant relationship with any academic performance measure. This finding supports the use of the instruments in the risk profiling evaluation for first-time entering students. Interventions that had a significant relationship with at least one academic performance indicator were the

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English programme, Academic and Personal Life Skills workshops, and study skills workshops.

Amongst the students who repeated the first year of academic study, there were much fewer variables that had significant relationships with academic performance measures.

The variables predicting academic underachievement were substantially reduced when entered into stepwise logistic regression models. For the first-time entering students, Language, English Proficiency, Career Orientation, Time Management, Attitude, Concentration, Commitment Ethic, Comfort, and Decision Making were included in the models. For the students who were repeating, Time Management, Anxiety, Leadership, and Gender were included in the models. The models and associated tables may be used for profiling for the identification for students at risk of academic underachievement.

Recommendations linked to the assessment, development and remediation of the competencies focused on in the study are provided. Additional suggestions include the use of the institutional student tracking system to manage the results, deriving faculty-specific, department-specific or qualification-specific profiles from existing risk profiling data to facilitate more customised and greater accuracy in risk profiling models, implementing a policy making the risk profiling evaluation compulsory, and the expansion of the conceptual model to incorporate “Appropriate Career Choice” into Seidman’s formula.

The primary limitations of the study are that only a single institution was sampled and the academic performance criteria were limited to the first year only.

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KEY TERMS

At-risk students

Psychometric profiling

Student success

Academic underachievement

Academic achievement

Academic performance

English Literacy Skills Assessment

Career Choice Questionnaire

Learning and Study Strategies Inventory

Emotional Skills Assessment Process

Seidman Retention Formula

Higher education

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DEDICATION

I dedicate this work to my children, Alisha, Zaheen, and Muhammed Ayaan.

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I thank Almighty Allah. If not for His will, I would not have completed this degree.

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LIST OF ACRONYMS

CCQ	Career Choice Questionnaire
CHE	Council on Higher Education
DHET	Department of Higher Education and Training
DoE	Department of Education
ELSA	English Literacy Skills Assessment
ESAP	Emotional Skills Assessment Process
ESL	English as a second language
FYE	First Year Experience
GPA	Grade Point Average
HE	Higher Education
LASSI	Learning and Study Strategies Inventory
NSC	National Senior Certificate
OECD	Organisation for Economic Cooperation and Development
SADEM	Student Academic Development and Excellence Model
SAQA	South African Qualifications Authority
SDS	Student Development and Support
TUT	Tshwane University of Technology
UoT	University of Technology

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CHAPTER 1
INTRODUCTION

1.1 Introduction

This study aimed to derive a profile for the early identification of students at risk for academic underachievement at the Tshwane University of Technology in South Africa. This chapter contextualised the problem of academic underachievement. The primary, secondary and supplementary objectives of the study were outlined, and an overview of the research methodology employed in this study was provided. This chapter also outlined the research process in the dissertation.

PROBLEM STATEMENT

1.2 Research Problem

Academic performance at institutions of higher education globally is a major concern. Factors that affect student achievement, success and retention are the mostly widely researched subjects in higher education. Research in this field has included studies ranging from macro-variables like particular systemic factors (Carnoy, Ngware, & Oketch, 2015; Valero, et al., 2015) to micro-level variables which include specific interpersonal factors (Abdulghani et al., 2014; Csikszentmihalyi & Wong, 2014; Mega, Ronconi, & De Beni, 2014; Sommer, 2013). A substantial proportion of these studies have focused on the role of counselling, academic development, and similar co-curricular student development and support activities. Yet, despite the plethora of research in the field, student success rates have not increased noticeably.

Professional staff at the Tshwane University of Technology (TUT) noted three trends of their institution's academic input, throughput and output, namely: (a) sizeable amount of students who underperformed academically; (b) high attrition rate amongst first-time entering students; and (c) slow graduation amongst undergraduates. Although the Tshwane University of Technology's 2013 graduation rate of 18% at undergraduate level was above the country's national average of 15%, it still did not approximate the international norm of 25% (Management Information System, 2014; R.S.A. Department of Higher Education and Training, 2013a). High student attrition rates, reduced student

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retention and students who are slow to graduate generated a multitude of undesirable side effects. Disruptive side effects were evident in teaching and training staff who had to cope with distraught students, academic and administrative counterbalancing of a sizeable loss of government subsidies and slow delivery of much needed skilled graduates who could have expanded South Africa's labour force.

A substantial portion of South Africa's annual national budget is spent on education. The allocation for education exceeds that of any other item in the national budget. The Minister of Finance allocated 2.3% or ± R30 billion of the 2014 budget to university education (R.S.A. National Treasury, 2014). Naidoo (2008) discussed the Student Pathway Study conducted by the Human Sciences Research Council which reports that annually, 50% of South African students terminate their studies. This state of affairs is undesirable as lost grants and subsidies cost tax-payers R4.5 billion. South Africa's traditional universities and universities of technology have to account for and manage two disturbing concerns: the rate at which students drop out of the country's higher-education system and the slow throughput of graduates.

South Africa's Department for Higher Education and Training asserted that the complexity of causes of academic underperformance is difficult to understand and assess. The Department mentioned the scarcity of early warning systems at universities that permit university personnel to rapidly track and identify students who potentially are at risk for academic underperformance as one of the factors inhibiting student success (R.S.A. Department of Higher Education and Training, 2013). Psychometric profiling of students at the beginning of an academic year was an early warning system that aimed to identify those at risk of academic underachievement, permitting early referral for relevant interventions that enhanced the propensity for academic success.

1.3 Two Contexts of the Research

An understanding of the psychosocial-economic dynamics of student underperformance mandated an assessment and analysis of this educational concern in a narrow or localised context that is embedded in a wider or national context. Even though participants were drawn from a single institution's subpopulation of students, the majority of these sampling units would have completed their secondary education

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at South African schools prior to being admitted to TUT for further study. Viewed from this point of departure, the narrower context, TUT, was firmly embedded in the wider South African (national) context of the country's educational system. The two contexts can also be explained in terms of nexuses, or a series of connections, that link things. In the narrow context the research focuses on the secondary education-higher education nexus (learner input-student throughput). The second nexus is inclusive and thus quite complex. This higher-order nexus encompasses the primary education-secondary education-higher education-skilled workforce interconnection.

The logical conclusion is that the majority of the learner, student and trainee output of South Africa's education and training system eventually is destined to be taken up in the country's workforce. Employment of all graduates, however, is not guaranteed. The harsh reality is that fluctuations in a country's employment rate is the result of complex patterns of gains and losses that are attributable to varying levels of labour efficiency (Mankiw, 2010). The antithesis of labour efficiency simply is labour inefficiency.

The primary education-secondary education-higher education-workforce nexus is a key contributor to economic prosperity. The objectives of higher education are closely linked to South Africa's workforce and the country's prosperity. It is questionable if the South African education system is yielding adequate numbers of skilled workers who can be readily employed. A nation's real gross domestic product describes its total output of goods and services and therefore, its ability to satisfy the needs and desires of its citizens. The real gross domestic product of a nation grows when its factors of production, namely, capital and labour, increase or when the economy becomes better at turning these inputs into outputs in the form of goods and services (Mankiw, 2010).

The skills level of a country's labour force is an essential component if economic growth is to be achieved. Mankiw (2010, p. 222) used the term "efficiency of labour" as a mediating factor between capital and labour and defined this key term as society's knowledge about production methods. Mankiw mentioned that as current technology improves, the efficiency of labour rises and therefore, contributes more to the production of goods and rendering of services. Students at TUT are in a position where their education can contribute to what Mankiw calls "labour-augmenting technological progress" (2010, p. 223).

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The Adcorp Employment Index (2011) reported that South African human resource directors had to factor in and manage vacancies for 432 100 technicians, 216 200 managers and 178 400 professionals. The data also indicated that 967 000 South Africans, judged on their job skills levels, were classified as elementary workers while 247 000 were employed as domestic workers. Adcorp calculated that there were 829 800 vacancies for high-skilled workers indicative of a shortage of high-skilled workers in South Africa (Adcorp, 2011). Another investigation reported that 5.9% of South Africa's graduates were unemployed as were 16% of its diplomates (van Broekhuizen & van der Berg, 2013). In reality, the slow delivery of much-needed skilled workers is synonymous with a slow-to-graduate student.

The nature of the current study's data created an opportunity for an interactive study of the quality of secondary school learner output as first-year student input that had enrolled for TUT's courses. The shortcomings of the country's secondary schooling are highlighted in Section 2.2.1.2.

The current researcher, accordingly, made several assumptions in conceiving the present study. When institutions of higher education pursued their academic mission, they invariably encountered three challenging sets of circumstances that called for stringent accounting of and oversight. The first was that of exercising quality control of student input, student throughput and student output. The second challenge was the timely identification of students who were at risk for academic underperformance in higher education due to the premature termination of undergraduate study (dropping-out of an institution), failing prescribed subjects that prevented progression to second- or third-year courses (repeating courses or dropping out as consequences), and/or needing more than the stipulated three years (or four years) to comply with institutions of higher education's requirements for graduation in undergraduate studies (slow-to-graduate students). The third challenge was that of preventing or limiting student attrition by countering a sizeable and ongoing reduction of the number of registered students at an institution of higher education as a result of the loss of students who for whatever reasons were unable to continue their studies and who were also not replaced during the course of the academic year in which the loss occurred.

South Africa's current public education system produces a substantial number of learners who have attained a National Senior Certificate and who subsequently are

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endorsed for higher education, but in practice have acquired substandard cognitive skills and limited knowledge bases that hinders their high-level reasoning and problems solving ability as well as their capacity to generate new ideas, methods, products and services. It is hypothesized that students' underperformance may be attributed to the acquisition of substandard skills development in language and emotional intelligence that is counterproductive to human traits and behaviours, nurturing of negative study strategies and uninformed career choices. It is likely that these underdeveloped skills and limited stored knowledge predestine underachievement in educational institutions and workplaces. If this argument also holds for first-time students at the Tshwane University of Technology, student throughput would be reduced. Appropriate support, remedial and developmental interventions are then required to mitigate these risks.

Globally, student output is a function of fluctuations in a country's economic prosperity. Matters such as payoff of education, economic opportunity, state of the economy, rising cost of living, personal income and insufficient finances for scholarships all impact negatively on higher education (Lauer & Lauer, 2011).

CONCEPTUALISING THE RESEARCH

1.4 Thesis Statement

First-year students at the Tshwane University of Technology may be identified as being at risk for academic underachievement based on a psychometric profile derived from results obtained on the English Literacy Skills Assessment (ELSA), Career Choice Questionnaire (CCQ), Learning and Study Strategies Inventory (LASSI), and Emotional Skills Assessment Process (ESAP).

1.5 Objectives of the Study

The researcher's key objective was to derive a profile for the identification of first-year students who were at risk for academic underachievement at the Tshwane University of Technology. This primary objective was addressed using three different academic underachievement criteria namely, retention, average mark and percentage of subjects passed, with each criterion constituting a secondary research objective. The study aimed to determine which variables measured by a battery of instruments would be

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included in the profile for a student at risk, with the battery constituting the ELSA, CCQ, LASSI and ESAP.

The supplementary aims of the study included:

- Reviewing theoretical models of and factors related to student success;
- Evaluating and adapting Alan Seidman's (2005) Retention Formula for the research context;
- Examining the practical and logistical considerations in the implementation of the retention model;
- Evaluating the reliability of the instruments within the research context;
- Determining the role of student development and support interventions related to the risk variables; and
- Providing suggestions for future policies and student success strategies.

1.6 Conceptual Framework

Alan Seidman (2005, p.296) proposed the following formula for retention:

RET = EID + (E + I + C) IV

RETention = Early Identification + (Early + Intensive + Continuous) InterVention

The essence of the Seidman Formula and Success Model proposes the early identification of students that may require assistance academically and/or socially. The needs of the students have to be evaluated and the requisite interventions prescribed. The interventions need to be monitored, assessed and modified as required, but also have to be sufficiently intensive to produce the requisite changes (Seidman, 2012).

The present study was based on the Seidman Formula and Success Model. Specific components of the model were made operational and evaluated in this study. Early identification of students at risk was executed through a "risk profiling evaluation" assessing English proficiency, career orientation, learning and study strategies, and emotional skills. Based on the results of the assessments the students were referred to a relevant intervention programme.

The study did not only use retention as a dependent variable, but two additional academic performance criteria, namely percentage of subjects passed and average

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mark. The independent variables were the constructs measured by the four instruments in the risk profiling battery, the intervention programmes, as well as demographic variables (age, gender and population group).

1.7 Overview of Research Methodology

There was one primary research question: Which variables need to be included in a psychometric profile to predict a first-year student's risk for academic underachievement at a university of technology?

The primary research question was addressed utilising three secondary research questions. The secondary research questions differed in terms of the criterion used to measure academic underachievement. The secondary research questions were:

(1) Which variables need to be included in a psychometric profile to identify first-year students at risk for not reregistering in the subsequent year?

(2) Which variables need to be included in a psychometric profile to identify first-year students at risk for passing less than half the subjects they have registered?

(3) Which variables need to be included in a psychometric profile to identify first-year students at risk for obtaining average marks of less than 50%?

The research questions were answered for two categories of students: first-time entering students and students who were repeating the first year of their studies. Figure 1.1 illustrates how the research questions were addressed.

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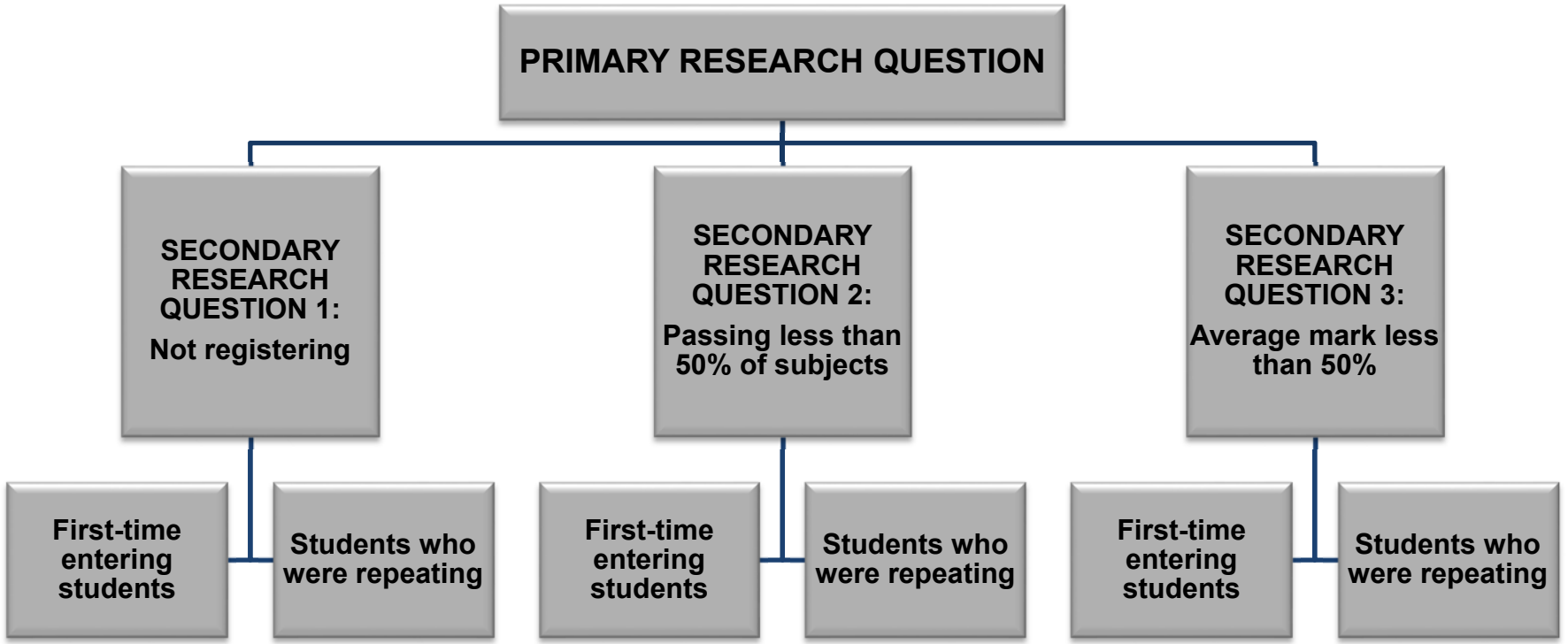
Figure 1.1 Structure of research questions



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This was an applied research project utilising a quantitative research approach. A correlational design was used.

First-year students were evaluated at the beginning of the academic year using the ELSA, CCQ, LASSI and ESAP. Based on the results of the evaluation, they were referred for a relevant intervention. Not all the students who were referred for interventions attended the relevant programmes. The independent variables were the scores obtained on the four instruments, namely the ELSA, CCQ, LASSI and ESAP, four demographic variables, that is, age, gender, population group and language, and the intervention programmes, specifically the English proficiency program, reading program, career counselling, study counselling, study skills workshops, academic life skills workshops, personal life skills workshops, and personal counselling. These interventions were linked to the constructs evaluated in the risk profiling evaluation. The dependent variable was academic underachievement. Academic under-achievement was quantified using three indicators: First-year retention, (i.e., reregistering or not reregistering in the subsequent year), percentage of subjects passed, and average mark for all the subjects registered for during the first year. The measurement instruments were first investigated. Product-moment correlation coefficients were calculated for the ELSA, LASSI and ESAP, and contingency coefficients were computed for the CCQ.Internal consistency reliabilities of the measures were also computed. Thereafter, the descriptive statistics were presented for all the variables. Pearson's Chi-square tests of independence was utilised to analyse the association between the independent variables and the dependent variables. Finally, multivariate logistic regression analyses were conducted to derive the risk profiles for each of the subsamples.

1.8 Evolving Research Process

Figure 1.2 presents the current study's research process that evolved through seven phases.

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Figure 1.2 Evolving Research Process

PHASE	CHAPTER	SECTION
PROBLEM STATEMENT	1. INTRODUCTION	• Research Problem • Two Contexts of the Research
CONCEPTUALISING THE RESEARCH		• Thesis Statement Objectives of the Study • Conceptual Framework • Overview of Research Methodology • Evolving Research Process
JUSTIFYING THE RESEARCH ENDEAVOUR	2. REVIEW OF LITERATURE	• South Africa's Higher Education System in Context • Assessment of Academic Achievement • Factors Related to Student Success
DESIGN CONSIDERATIONS	3. CONCEPTUAL FRAMEWORK	• Theories on Student Success • Models for Identifying Students at Risk at South African institutions • Conceptual Model • Definition of Core Terms • Delineation of the Study
MAKING THE RESEARCH OPERATIONAL	4. RESEARCH METHODOLOGY	• Research Strategy and Design • Measurement instruments • Sample and Biographic Profile
PRELIMINARY ANALYSES	5. DATA PRESENTATION AND INTERPRETATION	• Measurement Instruments: Measured Constructs and Subconstructs • Reliability of Instruments • Descriptive Statistics
TEST OF HYPOTHESES		• Pearson's Chi-Square Tests of Independence • Multivariate Logistic regression
CLOSURE OF RESEARCH ENDEAVOUR	6. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS	• Interpretation and Discussion of Research Outcomes • Examination of the Thesis Statement • Conclusions • Recommendations • Limitations of the Study • Contribution of the Study • Formal Closure of the Research

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In Phase 1, the prospective study was contextualised and substantiated (Chapter 1). In Phase 2, the research was conceptualised (Chapter 1). In the third phase, an extensive survey of literature was presented. Its purpose was to provide convincing evidence that verified the urgency and need for the present study (Chapter 2). In Phase 4, the current investigation was theoretically embedded (Chapter 3). In Phase 5 (Chapter 4), the conceived study was made operational. From this point forth, the examination was no longer prospective, but a full-scale scientific investigation that was systematically and logically realized. First of all, the research strategy and design were set out in detail Secondly, the psychometric properties of the measuring instruments and chosen criteria of academic performance were defined and evaluated. Thirdly, the target sample was discussed and the biographic profile of the sample was presented. Phase 6 constituted the first subphase of the analyses. In Phase 6, the results of the preliminary analyses were provided. In Phase 7, the results of the scientific effort or scientific outcomes were presented and analyzed (Chapter 5). In Phase 8, the scientific endeavour was formally terminated (Chapter 6). This was done by means of the presentation of conclusions and recommendations that were derived from the analysis of data and the contents of the dissertation. The researcher next revisited her initial resolve (refer to Chapter 1) to determine to what extent she had realised the stated objectives and adequately answered the research questions. This intervention of quality assessment would determine the excellence of the researcher's scientific endeavour.

1.9 Conclusion

Occurrences such as academic failure, underachievement, and slow graduation of students have dire socio-economic consequences and negative effects (Lauer & Lauer, 2011). While methods of enhancing student success and retention are by no means novel, it is perturbing from a business and educational perspective that more effective methods of improving student success have not been found. Part of the dilemma is that the nature of students attending university has changed over time. With the massification of higher education, the profile of students attending university has also changed. The risk profiling evaluation was an attempt to identify the constituents of this profile in terms of English proficiency, career orientation, learning and study strategies, and emotional intelligence, and how these variables related to academic

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underachievement. Considering the resources deployed in administering the evaluation, the necessity of the prospective investigation was essential to evaluate whether the test battery reliably and plausibly identified first-year students who were at risk for academic underachievement.

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CHAPTER 2
REVIEW OF LITERATURE

JUSTIFYING THE RESEARCH ENDEAVOUR

2.1 Introduction

A literature overview has many primary and secondary functions (Hofstee, 2010). It, for example, permits a researcher to establish and describe the scope of available literature on the study topic and theme in his or her chosen study discipline or one of its subdisciplines. This phase also provides the researcher with guidelines and options that are available given the nature of the prospective inquiry (qualitative, quantitative or a combined approach thereto), awareness of latent difficulties and dangers that threaten the integrity of data generation, analysis, and interpretation, sound theoretical grounding of a study, formatting the dissertation and so forth. This phase of the evolving research process had two major objectives. The first is the provision of convincing scientific evidence that substantiates the need for the study that the researcher envisages. The second major consideration is the development of an optimal research design and well-grounded selection of advanced methodology with which to conduct future research that will permit the generation of innovative scientific outcomes that expand the existing body of scientific knowledge in the chosen study field. Key definitions that are relevant for evaluating students' academic achievement or underperformance, first-time or later-year student dropout, factors that predict the academic levels at which students perform and the application of psychometric profiling for identification of students who are at risk for academic underachievement are discussed.

Hofstee (2010) provided several pointers for the presentation of an overview of literature that promotes research of excellence; these include (a) selecting scientifically significant textbooks and journal articles as primary sources; (b) categorising these textbooks and journal articles according to common and meaningful themes; (c) ordering categorised works according to the principles of major theories that have relevance for the scientific endeavour; (d) the proper placement of and referral to

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secondary sources; and (e) ensuring that direct quotations capture the key points that the author makes.

The literature review embraced three broad themes. Firstly, the context of the South African higher education system was discussed as the apartheid history of South African education impacted on present-day higher education. The second focus area is the assessment of academic achievement which relates to the dependent variable. The third focus area is factors related to student success. Considering the surfeit of literature on factors associated with student success, this section was limited to the factors that were independent variables in this study.

2.2 South Africa's Higher Education System in Context

The World Economic Forum, in its *Global Information Technology Report*, published its grading of the education systems of 144 countries. The international organisation ranked South Africa's education system 140th (Phakathi, 2013). Although the ranking certainly was dismal, a better understanding of the complexities, problems and challenges that underlay South Africa's higher education mandated a contextual assessment of the country's existing education-based predicaments. The quality of inputs into any country's primary and secondary school systems, sizably but certainly not exclusively, jointly co-determine the quality of the outputs of its systems of higher education. This statement also held for South Africa's higher education systems.

2.2.1 Functions of education

In this early phase of conceptualising the forthcoming study the researcher queried the purpose of education. The effects of the sensitive linkage between primary, secondary and tertiary education, fluctuations in the growth in the country's economy, employment opportunities, unemployment and job performance were discussed. These issues are often also controversial.

Sloan (2012) traced the purpose of education over the past century. Dewey (1938) regarded the purpose of education as providing individuals with what was required to develop in a systematic manner into members of society. Martin Luther King Jr. in a speech in 1948 believed that learning to think intensively and critically was the function

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of education, with the ultimate aim being intelligence with character. Ammons (1964) emphasised the change from creating a literate society to a learning society. Foshay (1991) proposed a broad function that embraces the human experience in its totality, that is, to optimise the essence of being human. Cohen (2006) contended that education should not only prioritise the academic realm, but also social, emotional and ethical competencies. Sloan (2012) also cites James Harvey's view that the most significant function of education in the 21st century is for an individual to learn to think (Sloan, 2012).

Lauer and Lauer (2011) also rephrased the leading question: Why education? The two authors stated that in the United States of America education had three functions. The first function of education is to develop good and effective citizens who transmit culture from one generation to the next by socialising the youth into basic values, beliefs and customs of the society. Education's second function is to provide the individual with the possibility for upward mobility. The third function of education is that of personal development, including a sense of personal control.

The intention of the first function is to equip citizens to reshape their society by eliminating intrinsic flaws and inequalities. Lauer and Lauer explained the second function thus: "Most students in colleges and universities are there to prepare for the better-paying and more prestigious jobs, not for the love of learning. Education achieves this function when it instructs the young in knowledge and skills" (2011, pp. 318-319). They further stated that education generally improves learners and students' quality of life. The third function liberates people from the bonds of ignorance and prepares them to maximise their intellectual, emotional and social development.

Lauer and Lauer (2011) pointed out that higher education equips learners and students with knowledge and skills. Sternberg (2008) mentioned the critical interface between cognitive skills, knowledge and problem solving with acquired expertise as the end product. Expertise is superior skills or achievement that is embedded in a well-developed and well-organised knowledge base that enables human beings to solve problems optimally and efficiently. Lauer and Lauer, nonetheless, cautioned against idealistic expectations for academic attainment of higher-level education. Institutions do not have sufficient money to provide scholarships and loans for all students who would

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like to go to college. Furthermore, the cost of attending college has risen sharply. Another concern raised was that educational attainment outstripped the capacity of the economy to absorb the graduates into jobs commensurate with their training. Even when the unemployment rate is very low, many workers cannot find employment that utilizes the skills and training they have. The disparity between educational attainment and the skills demands of the workplace mean that some workers are underemployed (Livingstone, 2004).

2.2.1.1 Primary education

Primary education has indirect but significant implications for South Africa's workforce. The Organisation for Economic Co-operation and Development (OECD, 2008) decided to establish the highest level of education that South African citizens aged 20 years or more had attained. The Organisation found that in 2007, 10.3% of the subpopulation of South Africans in this age category were not schooled at all, 16.0% had some primary schooling while 5.9% had completed their primary education (OECD, 2008). The observed trends are reflected in South Africa's unemployment rate.

2.2.1.2 Secondary education

A further analyses of the same OECD (2008) data established that in 2007 approximately 40.1% of South Africa's citizens who were 20 years or older had received some secondary schooling. A further 18.6% had passed either Standard 10 or Grade 12. Noteworthy shortcomings in both South Africa's secondary school population and the country's educational system were also reported. The average national learner-educator ratio was 32:1. Learners' levels of achievement were predominantly poor. In 2002, Grade 3 learners scored 68% for listening comprehension, 39% for reading comprehension, 30% for numeracy and 54% for life skills. In 2004, Grade 6 learners, on average, got 38% for language, 27% for mathematics and 41% for natural science. Educators and learners experienced difficulty in managing and coping with English as a language of tuition in secondary school environments. Many school buildings were in disrepair. The number of learners who were annually endorsed for university study declined from 18.2% in 2004 to 15.1% in 2007 (OECD, 2008).

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2.2.1.3 Higher education

The Centre for Higher Education Transformation (CHET) considers South Africa's higher education effort as a national priority. The organisation disseminated key data for the South African public higher education. The CHET, firstly, pointed out that the Government had approved 42 776 additional university places for the academic year 2013. This figure was derived by subtracting the actual number of students who had enrolled at public universities in 2010 from the State's ideal student enrolment figure that was set at 935 712 students. The centre, secondly, expressed its concern about the welfare of 2 781 185 South Africans in the age category of 18-24 years who had not received any education or training or were unemployed. The centre, thirdly, released data on academic progression trends that were observed among South African undergraduates from 2005 up to 2010 which showed that only 48% of the original student intake graduated within three to five academic years while 46% of the students dropped out during the five years of monitoring (CHET, 2012).

2.2.2 The beginning of higher education in South Africa

Higher education commenced in South Africa in 1873 with the establishment of the University of the Cape of Good Hope. Several colleges were later established from which most of the historically White universities emerged prior to and particularly during the apartheid era of the early 1960s. This academic development embedded South Africa's higher-education system firmly within an ethos of a racially segregated society. Admission, tuition, and staffing were organised in terms of population groups entrenching the racist ideology of separate development of various racial groups. The geographical location of campuses, university environments and cultures, language, and sources of funding were all aligned with the apartheid policy (Mdepa & Tshiwula, 2012). The post-1994 democratic government did much to establish institutions of education that had the capacity to accommodate students from non-White population groups. However, the endeavours to eradicate the academic inequalities and amend the socio-economic wrongs of the distant and recent past will be laborious and long-lasting as there are no quick fixes for this immense challenge. In this regard, the higher education sector and government needed to take note of the Council for Higher

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Education's (CHE) stern conclusion, that: "The South African higher education system is a low-participation, high attrition system" (CHE, 2013b, p.8).

Local institutions of higher education were mandated to provide non-White students with opportunities to access higher education. But access had to be restricted. Discrimination was clearly evident in race-based unequal resourcing of educational facilities and a narrow band of career opportunities from which non-White students could select training for future appointments in workplaces (CHE, 2010). Furthermore, many non-White students were unable to access educational structures of their choice as a result of the racial divide. Higher education participation rates, overall, were low and not representative of the country's demographic composition. However, subsystems were not adequately equipped to deliver non-White students with scarce skills that South Africa's workforce needed to sustain socioeconomic development and effect economic growth in real terms (Lange, 2006).

2.2.3 The evolving education system

The complexities, problems, and challenges that the pre-and post-1994 South African political regimes and their respective Departments of Education had to face and adapt to, judged from a historic perspective, evolved through four turbulent epochs in which the country's educational system was exploited for political gains. These historical eras have had a profound impact on the South African current higher education system.

2.2.3.1 The apartheid era

After having won the national election of 1948, the National Party, South Africa's first fully bilingual government, created a new political dispensation. Legislation was enacted that firmly grounded the new nation state's governmental systems and institutions in socioeconomic and political theories of apartheid. Race differentiation was intended to advance the political, economical and other interests of 'all South Africans' in a political system of race-based segregation. In reality, the enactment of the South African Citizenship Bill of 1949, Mixed Marriages Act of 1949, Population Registration Act of 1950, Bantu Authorities Act of 1951, Bantu Education Act of 1953 and the Bantu Homelands Citizenship Act of 1970 were aimed at entrenching the Afrikaners' hegemony of the state's affairs (Davenport, 1991).

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The new government was acutely aware of the complexity of the consequences of the racial, ethnocentric, linguistic and cultural differences among substrata of the population. The major challenge was the development of a political system that guaranteed citizens both equipartition and peaceful co-existence. The apartheid ideology was deemed a practical solution with which to accommodate and manage the country's diverse subpopulations. Apartheid, as both policy and a governance system, was unjust and discriminatory. In reality, a "slender dividing line" distinguished racial differentiation from racial discrimination. The Unlawful Organizations Bill was enacted on the 7th April 1960. The following day the African National Congress was banned (Jeffery, 2009).

The Bantu Education Act of 1953 entrusted control over all African schools to the Department of Native Affairs. The management of Black schools was delegated to Bantu school boards. Vernacular instruction was enforced in junior schools and English and Afrikaans were made compulsory subjects at the higher primary level. Furthermore, a differential syllabus was introduced for Bantu schools that accounted for African educational needs (Davenport, 1991). Schooling was free and mandatory for learners categorised as "white", while learners from the remaining population groups were subject to school fees (Mdepa & Tshiwula, 2012). White people had access to a higher quality of education and employment opportunities, while educational and career opportunities for non-whites were restricted (Fiske & Ladd, 2004).

2.2.3.2 Soweto riots of 1976

Many organisations advised the National Party not to insist on Afrikaans as a medium of instruction in Black schools, but the Party ignored the warnings. The South African Students' Organization and the South African Students' Movement were launched to instil self-pride in Black communities while effectively resisting White rule (Jeffery, 2009). On June 16, 1976, 20 000 Soweto children participated in a peaceful protest march that turned violent. The Soweto revolt had positive but limited outcomes. Per capita spending on Black education was as a result significantly increased, but the budgetary disparity remained intact. In many parts of the country, large numbers of

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pupils embarked on prolonged school boycotts while others retaliated symbolically by burning down government buildings and libraries (Jeffery, 2009).

2.2.3.3 Mass mobilization from 1985 onward

The National Party attempted to counter the mobilization of Blacks by opting for a tricameral parliament with separate houses for the country's White, Coloured and Indian citizens. The African National Congress forthwith rejected this initiative. From 1981 onwards, the Congress weighed up the effects of a protracted campaign of civil disobedience that eventually would ensure the toppling of the ruling regime. To this end, the United Democratic Front was launched in 1983 (Jeffery, 2009).

In January 1984, the African National Congress embarked on a strategy that aimed to make South Africa ungovernable. The United Democratic Front was mobilised to destroy Black local governments. Street, block, area and zone committees were formed to control access to township households. Other initiatives were a consumer boycott of shops in White suburbs, neutralising the influence of the "impimpis" (turncoats) in Black townships, kangaroo-courts and the countrywide use of "Molotov cocktails" to subvert counteractions by the then South African Defence Force and the Police's patrols of rioting communities (Jeffery, 2009).

One consequence of what later was known as the People's War was disruption, if not near destruction, of core parts of the country's education systems. In parts of the country, the 1976 Sowetan call for schools' boycotts continued intermittently until the beginning of 1985. In the latter year, the dormant United Democratic Front was activated to instigate the envisaged mass mobilisation. The comprehensive campaign of boycott of schools was reintroduced and directly linked to the process of mass mobilisation with the introduction of the slogan, "No education before liberation". In practice, this strategic intervention afflicted millions of Black youths who had lost years of schooling. These youngsters forfeited a range of life and job skills that were essential for upward career mobility. These shortcomings made many young people unemployable. More seriously still, they also failed to gain the habits, attitudes and knowledge that were essential for successful socialization and education (Jeffery, 2009).

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2.2.3.4 Democracy of 1994

Prior to 1994, the primary and secondary school systems, like the higher education system were the means with which the superiority of Whites had to be entrenched. As was the case with the higher education system, this was accomplished by disproportionate allocation of human and financial resources within the school system and thus, making it difficult for non-Whites to get access to quality educational opportunities. Since 1994, reformation (or transformation) of school systems has focussed on structures, facilities, resources and curricula. The outcomes of these initiatives were evident in the higher education results of 2008 or the first year in which all Grade 12 learners in the national school system had been exposed to the same curriculum (OECD, 2008). The student cohort that initially was admitted to higher education in 2009 was criticised as being unprepared for higher education (Mentz, 2012; Paton, 2009; Prince & Yeld, 2010; R.S.A Government Parliamentary Monitoring Group online, 2009).

Substantive evidence confirmed the underperformance of learners from the local school system when internationally benchmarked. A few specific examples are mentioned below. South Africa was amongst the lowest ranked countries in the 2011 Trends in International Mathematics and Science Study (TIMSS) which assessed Grade 9 Mathematics and Science skills (Human Sciences Research Council, 2012). Forty-three percent of Grade 5 learners did not meet the requirements that were set for the “Low” International benchmark in the 2011 Progress in International Reading Literacy Study (PIRLS) (Howie, van Staden, Tshele, Dowse, & Zimmerman, 2012). The results of standardised assessments like the Monitoring Learning Achievement study which is part of the UNESCO Education for All project also indicated underperformance (Mentz, 2012). This dire educational state of affairs, evaluated in conjunction with low pass rates in Grade 12 and the small proportion of high school graduates that obtained a university endorsement, implied that approximately 20% of the learners who qualified for higher education continued to study further for at least a year after matriculation (Breier & Mabizela, 2007; Subotsky, 2003).

Prior to 1994, the country had 36 institutions of higher education of which 21 were universities and 15 were technikons. The pre-1964 set-up was radically transformed by

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South Africa's newly-elected democratic political regime. The 2001 National Plan on Higher Education mandated a sizable restructuring of the higher education system. A process of mergers and incorporations reduced the number of tertiary institutions to 23 that were classified as universities, comprehensive universities or universities of technology (CHE, 2010).

In the post-1994 period, higher education policy was primarily guided by the National Commission on Higher Education (NCHE) which proposed a single higher education system that had to activate and advance increased participation, elicit greater responsiveness, increase cooperation and stimulate the formation of significant partnerships (NCHE, 1996).

To address the issues of equity and skills gaps, greater participation in higher education had to be enforced by changes in curricula and qualifications as well as the prudent financial management of South Africa's tertiary institutions. The Education White Paper 3 (R.S.A. Government, Department of Education, 1997) envisaged a transformation of the country's higher education system that had to be managed in accordance with the principles of equity, redress, democracy, personal development, quality, efficacy and public accountability (CHE, 2010).

2.2.4 Access, participation and graduation rates

Participation in higher education systems are significant benchmarks of institutional efficiency as they serve as indicators of access to higher education, and are also essential for understanding and evaluating the overall performance of a system of higher education. Globally, there is a link between a country's rates of participation in higher education and the level of economic development that the nation state has achieved (World Bank, 2000; CHE, 2013a).

Using participation rates as an indicator, South Africa's higher education system has expanded. There had been a steady increase in participation rates from 14% in 1996 to 18% in 2010. A target participation rate of 23% has been set for the year 2030. The increase in supply of skilled employees, nonetheless, was too small to meet South Africa's human resource needs, particularly the need for high-level workplace skills (CHE, 2010; 2013a; OECD, 2008).

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The proportion of African students who had enrolled at tertiary institutions undoubtedly increased, but their participation rates, like those of Coloured students, were consistently very low. The participation rates of White and Indian students were equitable with developing countries (CHE, 2013a).

One intervention that could stimulate participation in higher education is funding. Whereas funding in the apartheid regime perpetuated inequality, after 1994 it focussed on facilitating access for previously disadvantaged groups and promoting student involvement on a massive scale (Steyn & De Villiers, 2007). The National Plan on Higher Education acknowledged the role of funding in efforts to achieve national education priorities and in 2003, a new goal-orientated funding framework was introduced. The framework linked funding to the setting of national goals for performance assessment. This was intended to ensure accountability for the attainment of teaching and research outputs by means of the subsidy formula and by aspiring to facilitate institutional and social redress via various forms of designated funding (CHE, 2004). The new formula shifted the focus of mere funding of study access to the broader notion of funding successful study access (Mentz, 2012).

While the issue of access to higher education is reflected in participation rates, the concept of successful study access is evident in graduation rates. Participation rates reflect enrolment patterns, but are not necessarily commensurate with increases in higher education output. Conversely, a rapid expansion that is not proportionally resourced can negatively influence graduation rates (Steyn, 2009).

Graduation in regulated (or stipulated) time reflects the level of productivity and the internal efficiency of a higher education system. This concept factors in the number of years within which a full-time student is expected to comply with the academic requirements set for a degree or other qualification. An analysis of the 2006 first-time entering cohort at South African contact institutions of higher education (Table 2.1) emphasized poor graduation rates among students who had registered for undergraduate programmes with commensurate significant differences in racial composition. More students, compared to those who graduated, had actually failed or dropped out of the education system (CHE, 2013a).

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Table 2.1

Graduation in regulation time for 3-year diplomas

Graduation in regulation time					Attrition at the end of regulation time				
African	Coloured	Indian	White	All	African	Coloured	Indian	White	All
16%	27%	27%	38%	20%	45%	45%	39%	38%	44%

Note. From "A proposal for undergraduate curriculum reform in South Africa: The case for a flexible curriculum structure," by the Council of Higher Education, 2013, p. 43.

The duration of study provides for the normal minimum period of three years for graduation plus two extra years of study. A total of 32 178 applicants who in 2005 sought admission to South African universities were accepted as first-time undergraduates for the 2006 academic year. Approximately 30% of the original intake dropped out during their first year of study (2006). At the end of the third year of study (in 2008) 27% of the initial student intake had graduated while a further 12% had dropped out. During 2009 and 2010, after four to five years of study, a further 21% of the original intake had graduated while another 4% dropped out. Thus, 48% of the original student intake graduated within three to five academic years while 46% of the students dropped out during the five years of monitoring (CHET, 2012).

2.2.5 Underpreparedness

Taking into consideration all contentious matters and issues that have been discussed, all tertiary education institutions face the challenge of having to admit students that are underprepared and inadequately equipped to comply with the academic demands of higher education (Hunt, Rankin, Schoer, Nthuli, & Sebastiao, 2009; MacGregor, 2010). Dzubak (2007) conceptualised students' underpreparedness for successful higher education in terms of a lack of critical academic skills, being unaware of prerequisite skills for academic performance and being unreceptive to academic culture. Specific comments in the White Paper for Post-school Education and Training (R.S.A. Government, Department of Higher Education and Training, 2013, p.32) ustified the assumption that "school leavers are generally not well-prepared for university study" as a major contributing factor to substandard academic performance.

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It has been proposed that optimization of the potential for and facilitation of academic success of the current student corps mandated prioritizing fundamentals. It, however, still was unclear if existing policies and resources had adequately accounted for this process of prioritisation (Scott, Yeld, & Hendry, 2007).

2.2.6 Student development and support

The role of student development and support is central to the achievement of the objectives that were discussed earlier. Student development and support services are broadly conceptualized as curricular and co-curricular programmes and activities that directly support, augment and improve learning within an institution of higher education. This definition includes developmental actions such as skills programmes and supportive inputs such as counselling. Furthermore, student development and support services include proactive initiatives that support reactive and remedial strategies (van Heerden, 2009).

As a consequence of the aims of the National Plan on Higher Education and massification, there has been an increase in the proportion of students who are unprepared or underprepared for higher education. The role of student development and support units would be crucial in promoting positive change within universities. Challenges at educational institutions can only be adequately overcome once specialist expertise in student development and professional support can be provided. Such specialist services would include, but are not restricted to facilitation of admission practices, critical skills development and the provision of remedial programmes (higher-order thinking, academic literacy, classroom skills, study skills, self-management and interpersonal skills), as well as access to support programmes and interventions.

A theoretical framework for student development and support is presented in Figure A1 in Appendix A. The model proposed progression from traditional paradigms in higher education to a contemporary paradigm underpinned by constructivism and holistic development of students within a context of educational, political and economic reform. The newly constructed reality for higher education mandated establishment of higher education environments characterized by transactional learning and development. The suggested context intended to promote student development and render academic

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support at universities while simultaneously providing these institutions with an opportunity to redefine the role of these services within their own ranks. The framework also recommended core services that ought to be and should be rendered by such a unit (van Heerden, 2009).

One of the primary challenges that student development and support units have to confront is inadequate resources. Financial constraints imply capacity constraints and restricted expansion that affect the quality of service delivery and impact thereof (Jones, Coetzee, Bailey, & Wickham, 2008). Badat (2010) argued that academic development programmes had be funded adequately in order to contend with the many challenges that underprepared students pose and to ensure that all members of the diverse student subpopulations are adequately and timely prepared to achieve academic success.

2.3 Assessment of Academic Achievement

Several factors complicate the assessment of performance in higher education contexts. Complexities include complicated promotional systems, a diversity of study fields, varying academic standards in fields of academic study, large differences in the number of subjects registered for courses and course subjects, and varying student populations. It is questionable if evaluation of academic performance in higher education is a unitary or compound construct (Swanepoel, 2002).

Oswald, Schmitt, Kim, Ramsay, and Gillespie (2004) identified a number of criteria that permit identification of students who are at risk of academic underperformance. This included first-time dropout, first-year dropout, dropout from the second year onwards, students who fail course subjects and have to repeat first- or later-year courses and who take more than the stipulated three to four years to graduate, and percentage of subjects passed or failed. Grade point average (GPA) and accumulative grade point average are also used as criteria for the early identification of inadequate academic underperformance.

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2.3.1 The key constructs in academic performance

The discourse on academic performance is complicated by the lack of consensus on what constitute a measure of student success or failure. Furthermore, definitions of a single concept may vary depending on the perspective and stakeholder. Hence, these descriptions may vary when considered from individual, institutional, national or industrial perspectives (Bean, 2010). This section defines the dominant terms pertaining to the quantitative measurement of academic performance.

2.3.1.1 Retention

A retained student is one who reregisters each semester until graduation. Bean's (2010) definition differs somewhat from the South African retention formula which calculates retention as the proportion of students who reregister in a subsequent year (Sibanda & Lourens, 2003; Glossary of higher education planning terms, 2005). Within the context of the present study retention will be defined as reregistration at the same institution in the subsequent year. This is the one end of the retention continuum.

At the other end is *attrition*. Attrition encompasses students who leave an institution without having attained a qualification and do not reregister at that or any other institution for consecutive semesters (Berger & Lyon, 2005). Along the continuum are dropouts, stopouts, transfers and slowdowns (Bean, 2010).

A *dropout* is a student who discontinues studies without obtaining a qualification (Bean, 2010). Summers (2003) narrowed this definition by specifying the duration within which one fails to reregister for two consecutive semesters. A student is regarded as a dropout irrespective of the reason. Some of the reasons for dropping out include academic exclusion and personal reasons. Within the South African context, the inability to afford to continue studies or financial exclusion are also key factors.

A *stopout* is a student who discontinues studies but returns to complete the qualification at another point in time. The status of a dropout changes to stopout if one had discontinued studies with no intention of ever continuing again, but then returns to complete the course (Berger & Lyon, 2005; Zuritha, 2005). The problem with institutional reports is that most often stopouts are not immediately identifiable and are

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regarded as dropouts (Bean, 2010) and this distorts the institutional dropout statistics (Porter, 2003).

Transfers are students who commence their studies at one institution, but transfer to another institution where they also graduate. From an institutional perspective, the first institution where the student commenced studies would regard the student as a dropout, but from an individual perspective, the student would regard himself or herself as successfully having obtained the qualification (Bean, 2010).

Slowdowns are students who change from being full-time to being part-time students or substantially decrease their course load (Bean, 2010).

2.3.1.2 Success rate

The success rate is computed by dividing an institution's degree credit totals by its total full-time equivalent (FTE) enrolled students for the year (R.S.A. Department of Education, 2005). The shortcoming of the success rate as a measure of academic achievement is that it does not take into account retention from year to year. The formula only factors in enrolled students within a given year.

2.3.1.3 Graduation rate

The graduation rate refers to the number of students that graduated as a percentage of the number of students that registered in the same year (CHE, 2013a). The negative characteristic of this formula is that it does not examine the graduation of the same cohort of students.

2.3.1.4 Throughput rate

The throughput rate is the percentage of students from a baseline cohort who graduated within the minimum or extended period (Lewin & Mawoyo, 2014). The advantage of this computation is that it longitudinally tracks the same cohort from initial enrolment to graduation. Conversely, this prevents short-term research projects on student throughput.

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2.3.1.5 Assessment results

Assessment results are also referred to as marks, symbols or grades. At a higher education level, subjects often have different credit weightings, there is not a precise promotional system indicating a progression from the first to the second academic year, diverse study fields and course loads prevail, and there are disparities in standards across different programmes. These factors complicate using a single score as a measure of achievement. Most of the research on academic achievement uses assessment results as the only performance criteria. Although assessment scores do not entirely indicate academic progress, articulation and adjustment, it is the most vital component of these processes. As formative and summative assessments are intended to cover the content of a subject, meant to be systematically and methodically compiled and scored, it is considered reasonable to accept that assessment results are supposed to be a valid and reliable academic performance criterion (Swanepoel, 2002).

Swanepoel (2002) furthermore asserted that it is essential to establish certain assumptions or points of departure when utilising assessment results. Firstly, a final mark in a subject should be assumed to be an objective measure of academic performance. Secondly, marks in all subjects are assumed to be equivalent. Thirdly, the level of difficulty of the different subjects is assumed to be similar.

Even when using assessment results, there are various configurations that may be used. These include grade point average, cumulative grade point average and number of subjects passed.

2.3.1.6 At-risk students

Numerous definitions have been used for classifying students at risk. Most of these definitions centre around the notion of students who are underprepared to adjust to the higher education context and therefore unable to cope with academic requirements (Eiselen & Geyser, 2003).

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2.3.2 The essential determinant of academic success and failure

Bean (2010) sketched a profile of a successful student as follows: a successful student is likely to have an advantaged socio-economic and educational background; the student will enrol at a higher education institution immediately after completing high school; will register as a full-time student at a residential institution; be White or Asian; is not a first-generation student; would have attended a good secondary school; has a clear career path; engages in several extracurricular activities; likes being a student; and experiences the institution, staff, programme, and the academic and social life positively. In addition to the student's profile, institutions that are likely to retain students tend to be more elite, older, have mostly full-time students residing on campus, and its students are of a traditional age (18 – 23 year olds).

Gleaning from the multitude of factors researched and acknowledged as influential in academic performance, there is a tendency to lean towards the notion that there is no simple solution when it comes to ensuring student success. Bean (2010) asserted that the impact of these multiple characteristics and background variables are cumulative.

2.3.3 The institutional criteria of academic success and failure

Academic success and failure within an institutional context are also not simplistically defined. Conceptualization of these concepts depends on the context. Academic performance is defined in the TUT prospectus as "the relative success or failure of a student to pass the prescribed academic programme for undergraduate study within the specified academic period of an approved programme which the student is registered for" (Tshwane University of Technology, 2013, p.117). The specified academic period is double the minimum period in which the qualification may be obtained. With regards to exclusions and continuation of studies, the number of credits is the essential criterion. Each subject/module carries a specific amount of credits and a student has to acquire a predetermined number of credits to avoid academic exclusion (Tshwane University of Technology, 2013). While the maximum duration allowed is by no means the ideal, national norms indicate that only 27% of students graduate in the minimum time for a three-year qualification (CHE, 2013b).

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In terms of national reporting to the Department of Higher Education and Training, the success rate is the primary performance indicator.

2.3.4 Academic achievement criteria in the present study

The ideal criterion for the present study would have considered retention until graduation, and assessment results for the complete duration that the students were registered for the qualification. However, this would have necessitated a longitudinal study which was not feasible as the research project was for qualification purposes and linked to shorter timelines. Hence, only the first year was taken into consideration.

Defining “first year” was not clear-cut. Within the context of the present sample, “first year” could have been defined in two ways. Firstly, it was the first time that the student had registered at the institution. These students were referred to as “first-time entering students”. The second conceptualization referred to students who were repeating first year subjects. The subjects that they were repeating were prerequisites for progression to the second year of study. The sample constituted both categories of students, and the data was disaggregated for the two groups. The two groups were analysed separately as the researcher hypothesized that a student who was repeating the first year had potentially already been exposed to developmental and support interventions, subject content, and was more likely to have been well engaged with the institution.

Considering the complexity of each of the different academic achievement indicators, selecting a unitary performance indicator was challenging. Intuitively, some of the predictor variables like English proficiency, and learning and study strategies appeared to impact more directly on assessment results, while the other independent variables like career orientation and emotional skills are more likely to have affected retention. Language proficiency and study skills impact on a student’s ability to effectively comprehend, process and retain content, and demonstrate those abilities within assessment contexts like tests and examinations. Career orientation, on the other hand influences a student’s decision to continue with a specific qualification or remain within a particular field of study. Emotional skills embrace the intrapersonal and social realm, and may possibly affect persistence with studies.

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Instead of limiting the academic achievement criteria and potentially missing out on significant risk indicators, more than one academic achievement criteria was used. Assessment results and retention were utilised. Two measures of assessment results were used. Firstly, the average mark of all the subjects registered for within that year was used. However, the average mark is subject to being influenced by very low or very high marks in certain subjects and this may cause the average mark to be pulled towards the very low or very high mark (Black, 2012). Secondly, the percentage of subjects passed was used. Using Swanepoel's (2002) preliminary assumptions that marks in all subjects were assumed to be equivalent and the difficulty level of all subjects was assumed to be similar, the number of subjects passed provided an indication of the overall academic performance.

2.4 Factors Related to Student Success

In Figure A2 (Appendix A), an overview of factors that research have shown to have some association with academic achievement have been provided. The illustration is by no means an exhaustive indication of the variables related to academic performance and underachievement. Considering the extent of the literature and research on factors related to student success, this section focused only on the factors that were independent variables in the study. The specific variables that were selected as risk factors for inclusion in this study were delineated based on the portfolio of constructs addressed by the Student Development and Support (SDS) division at TUT. The risk profiling was not only conducted for research purpose or to obtain baseline data. It was imperative that if a potential risk was identified, an appropriate intervention could be provided. In addition to the risk factors, demographic variables are also highlighted.

The factors discussed are the demographic variables of age, gender and population group, and the primary independent variables, more specifically, English proficiency, career orientation, learning and study strategies, and emotional skills. Language as a biographical variable is reviewed in the section on English proficiency.

2.4.1 Demographic variables

Age, gender and population group are the demographic variables reviewed in this section. These specific variables were selected for inclusion because of the relative

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ease with which they could be defined and measured. These variables are included on most psychometric instruments for norming purposes.

2.4.1.1 Age

Pokorny and Pokorny (2005) suggested that there is a complex relationship between age and academic performance, in that most studies have failed to provide any conclusive results on the association between the variables. Most studies support the prevalence of a positive relationship between age and academic performance (Hall, 2003; McCarey, Barr, & Rattray, 2007; Ofori, 2000; Ofori & Charlton, 2002). However, Ali and Naylor's (2010) and Ostrye's (2001) research failed to find any significant relationship between the variables.

McGivney (2004) stated that there is evidence indicating that students below 21 years did not perform as well as students aged 26 to 30, with performance after 30 declining as one got older. There appears not to be many differences amongst students in their early- to mid-twenties. This age group still had many similarities with students in their late teens. Students in their thirties, forties and fifties had qualitatively different lifestyles and learning objectives. Mature students tend to utilise more effective study strategies and tend to have a deeper approach to learning. When compared on the Approaches to Studying Inventory, mature students scored higher on "Meaning Orientation" and lower on "Reproducing Orientation" than non-mature students (Richardson, 1995).

Research conducted with mature students indicated no differences in performance when compared to traditional school leavers. However, there was a lower completion rate amongst over 35s (Smith & Naylor, 2001). Reasons for dropping out included personal factors such us work, home, family and caring responsibilities, health, a sick child, occupational stress or redundancy, lack of family or partner support, financial problems, course- and institution-related factors, inadequate pre-course information and guidance, poor time management, adjustment issues and institutions not being sufficiently 'adult-friendly'. Factors contributing to persistence amongst adult learners included effective tutors, supportive learner groups and prompt follow-up of those at risk of non-completion (McGivney, 2004).

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2.4.1.2 Gender

DeBerard and Julka (2000) found gender to be a statistical correlate of academic warning, and DeBerard, Spielmans, and Julka (2004) used gender as a demographic risk factor in their longitudinal study on academic achievement. Research by Insah, Mumuni and Bowan (2013) and Jaeger and Eagen (2007) suggested that there is a relationship between gender differences and academic performance. Findings show that female students tend to outperform male students (Ali & Naylor, 2010; Cole & Espinoza, 2008; Huang et al., 2000). Table 2.2 displays the South African undergraduate graduation and success rates from 2005 to 2010. For both performance indicators, there was a greater percentage of women than men.

Table 2.2

South African undergraduate graduation and success rates by gender

		Year					
		2005	2006	2007	2008	2009	2010
Graduation rates	Women	16%	16%	16%	16%	17%	17%
	Men	13%	13%	13%	14%	14%	14%
Success rates	Women	74%	74%	74%	74%	75%	76%
	Men	68%	68%	69%	70%	71%	72%

Note. CHE. Council on Higher Education. (2012). *VitalStats. Public higher education 2010.* Pretoria: Council of Higher Education., p.10 and p.13

While the previous studies mentioned indicated a definite association between gender and academic achievement, Newman-Ford, Lloyd, and Thomas (2009) found that gender had only a minor impact on academic achievement.

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2.4.1.3 Population group

Within the South African higher education literature, various phrases denoting population group have been used interchangeably despite the subtle differences in the definitions. These terms include race, population group and ethnic group. Within this study, the term “population group was used as it aligned with the South African governmental employment equity guidelines (van Zyl, 2010). This is a noteworthy variable in education research considering the history of the country and the disproportionate allocation of resources to education for different population groups during the apartheid era.

Van Zyl, Gravett, and de Bruin’s (2012) investigation of pre-entry attributes at an urban South African university found that “population group” was one of the demographic variables with the strongest predictive value. They contended that this reflects the persisting inequalities and the resultant impact they have on student success. Similarly, Beneke and Beeming’s (2011) research at the University of Cape Town showed that a students’ ethnic group played a significant role in academic performance. White students performed strongly compared to Black and Coloured students. Section 2.2 on the South African Higher Education context discusses the issue of population group in more detail and presents comparative national statistics for the different population groups and their respective academic performance.

2.4.2 English proficiency

Language skills may be considered "the currency of academic participation and success" (Francis & Kelly, 1994, p. 525). Webb (2002) contends that there are at least two reasons for language being a critical component of educational development. Firstly, language is an essential tool in an individual's cognitive, social and affective development. Secondly, it is a vital teaching tool as adequate academic training requires learning to use the language of a particular science aptly in professional contexts, and using language correctly and appropriately for conventional day-to-day functions.

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With the onset of a democracy in South Africa in 1994, eleven languages were officially recognised. While only 9.6% of the South African population use English as a home language (R.S.A. Government, Statistics South Africa, 2011), English has, however, emerged as the academic lingua franca in the South African education system (Eiselin, 2006). Despite English being the academic lingua franca, South Africa's illiteracy levels are in the range of 11% to 20% (Maps of World, 2015). The Language in Education Policy (R.S.A. Government, Ministry of Education, 1997) promotes retention of the home language for teaching and learning purposes, especially in the initial stages of formal learning, while providing access to supplementary languages. The language policy for schools is steered by principles in the Constitution of the Republic of South Africa (R.S.A. Government, 1996a) and the South African Schools Act (R.S.A. Government, 1996b; Howie et al., 2012).

The education system is confronted with the dilemma of upholding the constitutional rights of individuals while having to contend with the practicalities in classrooms. The nature of the schooling experience of many learners is debilitative for the optimal development of language proficiency. Many attended schools which placed little emphasis on reading and writing (Probyn, 2006). A study by Pile and Smythe (1999) found that school teachers failed to distribute textbooks to learners either because the teachers' knowledge of the content in the textbooks was inadequate for them to comprehend the textbooks, or the teachers believed that the textbooks would not be beneficial to scholars who had poor English proficiency. Exacerbating the situation, the learners did not have sufficient access to books in English or their mother tongue (Pretorius & Matchet, 2004).

The PIRLS study (Howie et al., 2012) indicated that South Africa was one of the lowest ranking countries in reading ability of school children. Consequently, these learners enter the higher education system without having sufficiently developed their reading and writing skills in neither their mother tongue language nor English (Parkinson, Jackson, Kirkwood, & Padayachee, 2008). When entering university, these learners experience difficulties with language, specifically reading, writing and communicating concisely. This is one of the most serious problems confronting higher education in South Africa, as language is a skill that enables learners to successfully complete their studies. Furthermore, learners cannot be given quick fixes in English as language

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acquisition and proficiency requires years of constant practice and usage. Since the official academic language at TUT is English most learners are disadvantaged as English is their second or even third or fourth language. A previous study revealed that 71% of TUT students' functional English literacy was below the Grade 8 level and a mere 5% at the requisite Grade 12 or 12+ level (Dockrat, 2007). These results necessitated the inclusion of a language proficiency screening assessment in the present study.

The crucial role of language in learning has been discussed by Barton and Neville-Barton (2003), Bohlmann (2001), and Rollnick (2000), Research reports a significant relationship between English proficiency and academic achievement (Butler & van Dyk, 2004; Eiselin, 2002; and Deka, Mukhopadhyay, Srivastava & Ramaswamy as cited in Padma, 2003). Smith, Terry, and Whale's (2012) model for identifying first year Accounting students at risk of failure found English as a second language to be one of the predictors of performance. There was a significantly higher pass rate for English First Language students compared to those with another first language.

Grebennikov and Skaines's (2009) study investigated the characteristics of students that academically had performed poorly and/or did not complete their studies and found a non-English speaking background to be amongst the characteristics. Logie (2010) discussed Zaaiman's research results which indicated a high predictive validity of a language proficiency test that was used to select students at the University of the North. Webb's (2002) study at the University of Pretoria revealed that unsatisfactory language proficiency impeded on students' ability to constructively participate in class and to take notes adequately. In a study at another South African university of technology, Hendrich (2008) investigated the relationship between prior learning, English proficiency, cognitive potential and academic achievement. The English proficiency score as measured by VaalScan was the best predictor of first-year grade point average (GPA).

The significance of language was further highlighted by Celliers's (2000) research which indicated that academic development practitioners considered language as the most important skill required to enhance learners' academic success. Gerber, Engelbrecht, Harding and Rogan's (2005) study provided somewhat contradictory

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results. When Calculus students were divided into two groups, tuition for one group took place in their home language and for the other group, tuition was in English, a second or a third language. No statistically significant difference was found between the academic performance data of the two groups.

Sections 2.4.2.1 to 2.4.2.5 provide a brief discussion on some of the strategies that may address the problem of limited English proficiency of tertiary students.

2.4.2.1 National legislation

The prevailing dilemma is whether to continue attempting to operationalise the idealism legislated in the National Constitution and relevant policies or consider more practicable alternatives. The incongruity between national legislation, realities in school classrooms and the demands of primarily monolingual higher education institutions has placed students entering higher education in a situation where they are at risk for underachievement due to low levels of functional English literacy.

Despite the creation of policies and the establishment of language planning agencies and policy implementation institutions, linguistic transformation in education has not occurred. Pre-apartheid conventions are still prevalent in many public schools with primary school learners changing from their home language to English as the language of learning in Grade 5. Despite the social justice and pedagogical arguments for maintaining African languages, many Black parents prefer that their children be educated in English as early as possible due to their notions of the socio-economic advantages linked to proficiency in English (R.S.A. Government, Department of Basic Education, 2010; Manyike & Lemmer, 2014).

Advocates of the pragmatic perspective assert that the usage of any language in education should be determined by practical factors and do not necessarily regard the inclusion of African languages in education as essential as English is a pragmatic option (Alidou & Mazrui, 1999). Mphahlele (2004) argued that compared to colonial languages like English, the African languages are relatively underdeveloped and do not have vocabularies “indispensable for discourse in modern life” (Mphahlele, 2004, p. 133). At the opposite end of the continuum is the nationalistic perspective which purports that African languages should be used for the entire educational system

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(Prah, 2009). The researcher in the present study is inclined towards Madiba's (2012) model of complementary language use which allows for the use of English and indigenous African languages in teaching and learning. As South Africa is a multilingual country, languages need to be perceived as flexible and need to be utilised complementary to other languages to facilitate the development of academic language proficiency.

2.4.2.2 Curriculum reform

Heugh (2000) provided suggestions on structuring school curricula. One of the alternatives was a multilingual approach to education which promotes the maintenance of the home language in conjunction with high-quality English instruction. This requires updating and extending indigenous terminology, textbooks including content in the African languages and teacher education on bilingual teaching strategies. Statistics on the pass rates of learners whose home language is replaced by English as the language of learning are displayed in Table 2.3.

Table 2.3

Pass rates of learners whose home language is replaced by English as the language of learning

Model	Resources	Possible Matriculation Pass Rates
English Mainly Education	With adequate reading materials and resources in schools and the teacher ratio is no more than 1:30, teachers proficient in English	40% (maximum for students writing in other than home language), 80% (maximum for students writing in home language)
	With poor resources and a teacher ratio in primary school of 1:40 or more and teachers not sufficiently proficient in English	20%-30% (pass rate for students writing in other than home language irrespective of whether or not discrete curriculum changes are implemented)
Bilingual Schooling for All	With adequate resources	60% Aggregate (70%-80% pass rate)

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Note. Ramirez et al, 1991, and Collier & Thomas, 1997, cited in Heugh, K. (2000). The case against bilingual and multilingual education in South Africa. Rondebosch: PRAESA.

Another alternative would be to follow the pragmatist perspective and adopt an English mainly approach. This would demand in-service teacher education to enhance the English proficiency levels of up to 95% of teachers. However, poor success rates in the USA, Canada and Britain, where education is based on a primarily second language approach, suggests that there is no increase in levels of literacy or academic success. If an additional two years of schooling are provided, this approach may have some impact. In South Africa, increasing schooling by two years would need to be done for 83% of pupils (Heugh, 2000).

2.4.2.3 National Senior Certificate

One of the requirements for passing the National Senior Certificate is to obtain at least 40% in an official language at the Home Language level. Amongst the minimum requirements for admission to a Higher Certificate or Diploma qualification is to obtain at least 30% in English (or Afrikaans) at the first additional language level (Independent Examinations Board, 2011). The Department of Basic Education has recommended that the minimum requirement for admission to a Higher Certificate be increased to 40% and for Diploma qualifications to 50% (R.S.A. Government, Department of Basic Education, 2014). TUT had already set its minimum admission requirement for English (home language or first additional language) at 50% (Tshwane University of Technology, 2010) so the implementation of this recommendation does not really affect the university involved in this study. Considering the low mark for English that is required for admission to a university of technology, it is not unreasonable to expect students to have limited academic English proficiency. While raising the minimum threshold could potentially facilitate the enrolment of students with higher levels of English proficiency, it also decreases the pool of prospective students.

Enhancing the Grade 12 minimum requirement in order to enhance academic success is based on the presumption that the NSC English scores have a relationship with academic performance. However, Mashige, Rampersad, and Venkatas (2014) found a weak correlation between Grade 12 English scores and all the first-year modules in a sample of 84 optometry students. Research by Van Rooy and Coetzee-Van Rooy's

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(2015) also indicated that matric language marks were not good predictors of academic success within a university context.

2.4.2.4 Pedagogical factors

Lecturers should endeavour to use a host of teaching and communication strategies adapted to the needs of English as a second language (ESL) students. Relevant strategies include speaking clearly, avoiding the use of colloquialisms, abbreviations and long convoluted sentences, utilising visuals and graphic aids for aural comprehension, providing comprehensive lecture notes, providing definitions of key terms and a lecture outline prior to class, ensuring that guidelines for all tasks and assessments are clear and comprehensible, and providing model answers that illustrate good practice (Grebennikov & Skaines, 2009).

2.4.2.5 Additional strategies

Further initiatives include peer study groups, connecting students from different linguistic backgrounds and study experiences, and discipline-specific study skills interventions (Grebennikov & Skaines, 2009). The use of high-impact academic literacy modules is an additional intervention. Van Rooy and Coetzee-Van Rooy (2015) found that the scores obtained in the first-year academic literacy module at the North-West University to be the best predictor of academic success compared to additional measures like the Grade 12 English marks and scores on tests like the National Benchmark Test (NBT) and Test of Academic Literacy Levels (TALL).

2.4.3 Career orientation

Career orientation is another predictor variable. Informed, empowered career choice is a significant aspect that can positively impact on an individual's life experience (McIntosh, 2000). In the present study, a low degree of career orientation was regarded as a risk factor that might be detected in the early identification phase. It is even suggested that the Seidman (2005) formula be extended to:

"RET = ACC + EID + (E + I + C)IV + ExS
RETention = Appropriate Course Choice + Early Identification +
(Early + Intensive + Continuous) InterVention + External Support"

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(Simpson, 2005, p.42).

There are numerous reasons why one should make an informed career decision. A person's occupation has a major impact on one's quality of life. McIntosh (2000) stated that at an individual level, making an informed, empowered career choice is a significant aspect that can positively impact on an individual's life experience. On the other hand, a hasty and uninformed career decision could potentially have a very negative impact on quality of life. Dissatisfaction with one's career can create feelings of distress, sadness and a sense of purposelessness that can pervade all aspects of one's life. Most people not only work for financial remuneration, but also for personal and emotional satisfaction and rewards. Maree and Beck (2004) stressed that the personal and subjective meaning that people give to their careers should not be underestimated.

At an institutional level, the degree of students' informed career choice has been associated with institutional objectives of student success. Oswald et al. (2004) asserted that having a well-defined awareness of the career one aims to enter and pursuing pertinent goals are facets of college performance.

Oswald et al. (2004) contended that having a vivid sense of the career one aims to enter into is one of the twelve dimensions of college performance. Research identifies career orientation as one of the main the reasons for student attrition (Gibson & Walters, 2002; Tomkinson, Warner, & Renfrew, 2002). In South Africa substantial attention has been focused on the high drop-out rate in higher education. Students are deemed to be in the “wrong” course if the course content was inconsistent with their expectations, if the difficulty level of the content did not match the students' abilities, knowledge or background, or if there was an institution-student mismatch. Folsom and Reardon (2003) reported numerous studies indicating that career choices have a positive impact on retention.

A lack of interest in a specific course can also have an impact on academic success. Krapp, Hidi, and Renninger (1992) equated personal interest to academic success. Linnebrink and Rintrich (2002) stated that personal interest in a subject can have an effect on academic performance as individuals who are interested tend to be more

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motivated, and consequently, they study and achieve due to this interest. Van Schoor and Potgieter's (2011) investigation into the reasons for the early cancellation of courses revealed that selecting the incorrect course contributed to 13% of the cancellations.

Students' lack of career awareness and orientation is a significant problem at TUT particularly amongst students who only commence with their enrolment processes at the beginning of the academic year that they register in without having done any prior career research. This has been coined the 'Where's space?" syndrome, where late applicants are willing to enrol for any course that has not registered its maximum intake of students (Dockrat & Malan, 2010). The timing of entry into the higher education system is a crucial element in retention. Late entrants may have special needs in terms of their course or institution expectations. Research in the higher education sector has indicated that the later the application, the stronger the possibility that the student would not attain the qualification (Martinez and Munday, 1998).

Possible reasons for this include an absence of career maturity, career indecision, career desperation and career adaptation. Career maturity refers to an individual's level of preparedness to make informed career decisions and manage career development tasks appropriate to one's age (Savickas, 1984). Career indecision is the developmental state a person passes through prior to making a career decision (Osipow, 1999). Career desperation refers to the willingness to adopt any occupation irrespective of one's interests, abilities and aptitudes for the sake of having a career per se. Career adaptation implies responsiveness to environmental demands (Savickas, 1997).

Several strategies are utilised to empower learners to make an informed career choice. At a national level, this is addressed by the inclusion of career guidance as a theme within the subject Life Orientation at school level. The learning outcomes for the career and career choices topic is that "the learner should be able to demonstrate self-knowledge and the ability to make informed decisions regarding further study, career fields and career pathing" (R.S.A. Government, Department of Basic Education, 2014, p.91). While the curriculum is suitable, there are numerous challenges with the subject. This includes not being taken seriously by learners and schools, insufficient time

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dedicated to or utilised for the subject, being taught by teachers who are ill-equipped to do so, internal assessment and substandard quality of assessment (Umalusi, 2013). However, the ministerial task team report on the national senior certificate proposed removing Life Orientation from the NSC examination, but still retaining Career Planning as a non-assessed component of the Grade 12 curriculum. The report further recommended that appropriately qualified and trained educators be deployed to schools to teach this subject area (R.S.A. Government, Department of Basic Education, 2014).

Another national initiative by DHET and SAQA is the development of the Framework for Cooperation in the provision of Career Development (Information, Advice and Guidance) Services in South Africa (R.S.A. Government. Department of Higher Education and Training, and South African Qualifications Authority, 2012). The framework endeavours to set forth guidelines for the delivery of sustainable career development services. DHET's (2014) survey of career development activities found the prevalence of the following career development initiatives for Grade 9 to 12 learners: career exhibitions; booklets, guides and resources made available by various government departments, agencies and SETAs; career videos developed by some SETAs; provision of career advice and counselling, and guidance centres; buses and trucks equipped with computers which are utilised for outreach programmes; bursaries; and support for Life Orientation teachers through curriculum development and training of teachers. The report included gaps in the provision of services and provided recommendations for the enhancement of existing services.

2.4.4 Learning and study strategies

There is a substantial body of research based on the worth of learning strategies and study skills as predictors of academic performance. Studies in this field have generally adopted one of the two approaches: 1) co-relations between academic performance and scores from a study skills questionnaire, or 2) attendance at a study skills course as a criterion for better academic results. The former approach is used in the present study.

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Weinstein, Husman, and Dierking (2000) define learning strategies as “any thoughts, behaviors, beliefs or emotions that facilitate the acquisition, understanding or later transfer of new knowledge and skills” (Weinstein, Husman, & Dierking, 2000, p. 727). Weinstein and Mayer’s (1986) early taxonomy of learning strategies distinguished between those that focus on information (rehearsal, elaboration and organisation) and the strategies that facilitate affective and metacognitive support for learning (affective control and comprehension monitoring) (Cano, 2006).

Yip (2007) contended that there was still no single absolute definition of what a “study strategy” entailed. Several researchers agree that an appropriate study strategy should take into account the nature of the tasks and materials, the cognitive and affective characteristics of the student in question, and motivation levels (Albaili, 1997; Armbruster & Anderson, 1981; Entwistle & Waterston, 1988).

The variables discussed in the subsequent sections are the specific learning and study strategies that are variables in the present study.

2.4.4.1 Academic achievement and learning and study strategies measured by the LASSI

2.4.4.1.1 Anxiety

Within the context of this study, anxiety entails the extent to which students are concerned and nervous about their studies and academic performance. Anxiety as measured by the LASSI embraces a broader concept than test anxiety, but is more refined than trait anxiety (Weinstein & Palmer, 2002). Spielberger (1966) distinguished between trait anxiety and state anxiety. Trait anxiety refers to a predisposition to experience certain situations as intimidating while state anxiety is an immediate emotional state typified by apprehension and tension (cited in Roberts, Spink, & Pemberton, 1999). Evaluative states is the key factor in test anxiety. Test anxiety is consistent over time and prevalent during evaluation situations irrespective of the format, namely, in-class closed-book examinations, take-home assessments or online tests (Cassady, 2001; Cassady & Gridley, 2005). Hence, anxiety in this study refers to an ‘academic anxiety’, a persistent anxiety prevalent across all academic processes including studying and evaluation and evaluation outcomes.

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Ozan, Ercan, Irgil, and Sigirli (2010) investigated the risk factors related to anxiety amongst university students. Academic factors predicting anxiety included difficulty understanding lectures, challenges adapting to university life, independent problem solving, dissatisfaction with the field of study, and exam periods.

In Figure A3 (Appendix A) a theoretical model to explain the relationship between study anxiety and academic performance is depicted (Vitasari, Wahab, Othman, Herawan, & Sinnadurai, 2010). According to this model, study anxiety has two dimensions, namely physiological arousal and cognitive anxiety (Vitasari et al., 2010). Martin cited in Robb (2005) suggested that cognitive anxiety has an inverse correlation with performance while physiological anxiety has a curvilinear relationship with performance. The cognitive anxiety dimension is the element that more strongly affects performance (Ingurgio, 1999).

While a moderate amount of anxiety may be motivating, a high level may be detrimental to performance (Strnad, 2005). Motivating stress is associated with higher mental alertness and zeal, and may lead to enhanced academic performance. However, stress can be negative too. Paralysing stress may be detrimental to health and may result in a decline in academic performance (Beaty & Barling, 1982).

El-Anzi (2005) and Hamzah (2007) found a negative correlation between academic achievement and anxiety. Pekrun, Goetz, Frenzel, Barchfeld, and Perry (2011) using the Achievement Emotions Questionnaire (AEQ) found an inverse correlation between anxiety and university GPA. Hassan, Sulaiman, and Ishak (2009) also found a strong negative relation between anxiety and academic achievement amongst rural area students.

2.4.4.1.2 Attitude

Attitude refers to students' attitudes and interest in their studies (Weinstein & Palmer, 2002). Attitude comprises three components, namely, the affective, cognitive, and conative or behavioural component (Sikhwari, 2004).

Mcquire (cited in Rajecki, 1990) stated that there are four functions of attitudes. Firstly, attitudes have a utilitarian or adaptive function. One develops positive attitudes

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towards things that may contribute to the accomplishment of goals. Conversely, one is likely to have negative attitudes to things associated with failure. Secondly, they have an economy or knowledge function as people tend to classify objects and their behaviour towards those objects is based on their assumptions about the properties of the category. Thirdly, attitudes have an expressive, self-realising function. Fourthly, attitudes may have an ego-defensive function.

Mattern and Schau (2002) conceptualised attitude as comprising of three subconstructs (affect [liking the subject], cognitive competence [perceived self-competence] and value [practical utility of the subject]), in their research on the association between attitude and achievement. These three subconstructs are consistent with the current achievement motivation theories.

Four models of possible relationships between attitude towards a subject and achievement have been postulated (Appendix A, Figure A4). In Mattern and Schau's (2002) cross-effect model, achievement directly affects later achievement as well as attitudes and later attitudes. In the achievement predominant model, previous achievement has a direct impact on later achievement and later attitudes, with prior attitudes only impacting on later attitudes. In the attitudes predominant model, prior attitudes influence subsequent attitudes and achievement, but previous achievement only has an effect on later achievement. In the fourth model, the no cross-effects model, prior attitude has no bearing on later achievement and neither does previous achievement have a direct effect on later attitudes. Eleven structural equation modelling studies have supported one or more of these models (Mattern & Schau, 2002). According to McCoach (2002), research has consistently shown that individuals who achieve academically have a tendency to be interested in learning whereas underachievers tend to have more negative attitudes towards school.

2.4.4.1.3 Concentration

Weinstein and Palmer (2002) defined concentration as a student's ability to focus and maintain attention on academic tasks. Studies on the validity of attention as a predictor of academic performance have yielded mixed results (Steinmayr, Ziegler, & Träuble, 2009). Colom, Escorial, Shih, and Privado (2007) reported a poor relationship between

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attention and school performance. However, Luo, Thompson, and Detterman (2006) concluded that basic cognitive tasks like attention are good predictors of academic performance.

2.4.4.1.4 Information processing

According to Weinstein and Palmer (2002), information processing refers to the manner in which students utilise imagery, verbal elaboration, organisation strategies and reasoning skills in the learning process to connect existing knowledge with the new information that they are learning.

Living in an information era, one of the key challenges for 21st century higher education institutions is to teach students effective information processing skills to be able to judge the quality of information, select relevant information and utilise it appropriately to create meaningful knowledge. However, the challenge facing higher education is that many students entering the system lack these skills. Since the termination of apartheid, the schooling system has witnessed serial curriculum changes which have had a destabilisation effect. School quantitative performance targets have led to teachers gradually coaching learners to pass the examinations instead of teaching and learning per se (CHE, 2013b). Hence, conceptualisation, information processing skills and higher order thinking skills are underdeveloped

Research has illustrated the significance of information processing in learning (Cukras, 2006; Fenollar, Román, & Cuestas, 2007). In Cukras's investigation of study strategies that maximize learning for underprepared students, "organising" was one of the variables investigated which included techniques for organising materials like outlines, maps and notes. Fenollar, Román and Cuestas's conceptual model of factors influencing academic performance at university indicated that active learning strategies such as deep processing were related to higher academic achievement.

2.4.4.1.5 Motivation

Terrel Bell, former United States Secretary of Education, emphatically stated: ''There are three things to remember about education. The first is motivation. The second one is motivation. The third one is motivation'' (Maehr & Meyer, 1997, p.372). Weinstein

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and Palmer (2002) conceptualised motivation as students' discipline and eagerness to do what is necessary to attain academic success.

The literature on motivation presents two distinctly different views on achievement motivation. The first conception is that motivation is an internal drive that propels one into action. The alternate view regards motivation as goals that thrust one into motion. According to the latter conception, goals determine the meaning, direction and purpose of all behaviours, and the quality and intensity of the behaviours will adjust as a goal alters (Covington, 2000).

Marrs, Sigler, and Hayes (2009) investigated the relationship between academic performance and study skills using the LASSI. Using a discriminant analysis, the results indicated that the Motivation subscale was the most important discriminator between successful and unsuccessful students. Diperna (2000) explored variables predicting academic achievement, specifically prior achievement, motivation, interpersonal skills, study skills, participation and behaviour problems using a sample of 102 students. Motivation and prior achievement were the only variables that had large total effects with present academic achievement.

2.4.4.1.6 Self-testing

Self-testing refers to students' utilisation of reviewing and comprehension-monitoring strategies to identify their level of understanding of the information (Weinstein & Palmer, 2002).

West and Sadoski (2011) explored the relative contribution of academic aptitude, undergraduate grade point average and LASSI scores as contributors to first semester academic performance of 106 medical students. Self-testing was one of the two study strategies that significantly predicted academic performance. Cukras (2006) found monitoring to be one of the two study strategies significantly related to academic performance. In this study, monitoring was defined as Self-testing and examining progress using identification and concept cards, question and answers, and identifying possible essay questions.

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2.4.4.1.7 Selecting main ideas

Selecting main ideas is the skill of differentiating important information that needs to be studied from less important material and supporting points (Weinstein & Palmer, 2002). Cukras's (2006) study examined 'encoding' as a strategy. In Cukras's study, encoding referred to selecting important concepts reflected in students' study behaviours by underlining, encircling keywords and brief organised notations in the text's margins. Although this strategy was utilised most frequently, it was not significantly correlated to test performance.

2.4.4.1.8 Study aids

"Study aids" refer to students' use of support techniques, materials or resources to assist them to learn and recall new information (Weinstein & Palmer, 2002).

One of the most effective study aids when learning is the elaborative process that encourages the students to elaborate on their knowledge. This process can be stimulated by offering students richer and more diverse learning resources. Enhancing the learning materials assists students in learning, remembering and applying information (Te Winkel, Rikers, Loyens, & Schmidt, 2006). Some researchers preferred students to have access to as many learning resources as possible (e.g., Hannafin, Land, & Oliver, 1999, Koschmann, Kelson, Feltovich, & Barrows, 1996;). One of the reasons is that it enables students to construct their own meaning shaped by their own beliefs, experiences and previous knowledge. However, Miflin, Campbell, and Price (2000) favoured restricting the amount of learning resources as having too many resources without any guidance may lead to students being overwhelmed and anxious.

2.4.4.1.9 Test strategies

"Test strategies" encompasses students' use of test preparation and test taking strategies (Weinstein & Palmer, 2002). The purpose of tests is to evaluate students' knowledge of specific content. When additional factors impact on students' performance, the test scores no longer remain valid measures of students' knowledge or ability. Test-taking strategies may enhance the validity of test scores so that they

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may be a more accurate reflection of what the students really know. Given equal ability levels, students who perform better than other students are regarded as test-wise. Test-wise students employ test-taking strategies and skills which are cognitive abilities that enable them to aptly engage in any testing situation and they are aware of what to do before, during and after the test (Dodeen, 2008).

In a qualitative study, Hong, Sas, and Sas (2006) compared the test-taking strategies of high-achieving and low-achieving mathematics students. Test-taking strategies were categorised into three groups: cognitive strategies, environmental and structural management, and motivational awareness. Appendix B1 indicates the specific test-preparation strategies in each of the categories and provides examples of the strategies, while Appendix B2 points out the test-taking strategies. Compared to the low- achieving group, high-achievers used cognitive strategies in test-preparation and test-taking more frequently. They also managed their study environment more often and were more concerned about structural organisation when solving test problems. Low-achievers were more passive with regard to the use of their test-taking strategies.

Besides achieving better grades, students with test-taking strategies also have more positive attitudes towards tests and experience lower levels of test anxiety (Dodeen, 2008). Kitsantas (2002) used a self-regulation interview questionnaire that aimed to identify the self-regulatory strategies before, during and after test-taking. Students that scored high on a test used these strategies more frequently and consistently than those who obtained low scores.

2.4.4.1.10 Time management

Time Management is the ability to organise activities into a productive time schedule and utilise time efficiently in order to complete a particular task (Nelson, Low, & Vela, 2003). Within an academic context, time management refers to dexterous academic scheduling (Weinstein & Palmer, 2002). Rice (2006) used the Personal Skills Map to examine associations between academic performance and time management. A significant correlation was found between time management and grade point average.

Vela (2003) investigated the role of emotional intelligence in the academic achievement of first year college students using the Exploring and Developing Emotional Intelligence

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Skills as a measure (Nelson & Low, 1998). The results indicated a significant correlation (r = .21) between time management and GPA. Using the same assessment instrument, Williams (2004) also found a significant correlation between time management and retention (r = .17), as well as cumulative GPA (r = .22). The correlation between CGPA and time management was the strongest correlation compared to the other emotional skills.

In George, Dixon, Stansal, Gelb, and Pheri's (2008) study, time management skills was the strongest predictor of GPA. They went as far as to suggest that time management skills be utilised as an admission criterion. The challenge with utilising scores from self-report measures in high stakes testing is that testees are much more likely to be dishonest when responding, and provide what they perceive to be the most desirable answer. A contradictory result was found by Swart, Lombard, and Jager (2010). Their study failed to find any significant relationship between time management and the academic performance of African engineering students.

With regard to the quantity of time, Gortner-Lahmers and Zulauf (2000) explored factors related to academic time use and academic achievement of college students. The Time Management Behavior Scale and a time diary were used in the investigation. The results indicated that time management skills and study time correlated positively with academic achievement. Furthermore, GPAs increased by only 0.025 points per additional study hour per week, recommending that the duration of study has to be considerably increased for there to be a noticeable increase in GPA.

2.4.4.2 Learning and study strategies interventions

The most popular method of rendering learning and study strategies is through extra-curricular study skills courses offered by student support units (Paczuska, 2002; Thomas, 2002). Bennett, Dunne, and Carré (2000) referred to this as the bolt-on approach, while Cottrell (2001) called it a remedial approach. This type of offering is different from the "built-in" or embedded approach where learning and study strategies are developed and enhanced through subject teaching. Schreiber and Davidowitz's (2012) project demonstrated that a life skills programme with science foundation students was effective as it was a part of the student's academic lives. Jones et al.

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(2008) also emphasised that institutions should integrate support initiatives and academic work. The primary reasons for the utilisation of the bolt-on method are challenges in implementing the progressive development of skills across the duration of the qualification, the unwillingness of lecturing staff to teach these skills and study skills not being conceptualised as an exit level outcome (Wingate, 2006). Wingate discussed the limitations of the bolt-on approach which include non-attendance of extra-curricular skills courses (Durkin & Main, 2002) and study skills as not being linked to subject content.

On the other hand, a positive conclusion was reached by Hattie, Biggs, and Purdie (1996) who conducted a meta-analysis of over 50 study skills interventions. They deduced that there was a significant effect of study skills interventions on academic achievement for college students. This finding was upheld by a more recent study by Bail, Zhang, and Tachiyama (2008).

2.4.5 Emotional intelligence

Emotional intelligence, has recently gained substantial attention amongst psychologists (Law, Wong, & Song, 2004). Low, Lomax, Jackson and Nelson (2004) defined emotional intelligence as a learned ability to recognize, feel, comprehend and communicate human feelings in a healthy and constructive manner. Many leading researchers have concluded that emotional intelligence and related non-traditional measures of intelligence and performance are as predictive (if not more so) of success as conventional intelligence tests and other standardized measures of scholastic ability and achievement. Low et al. (2004) mentioned Cooper and Saway (1997), Dryden and Vos (1994), Gardner (1983, 1993 & 1997), Goleman (1995 & 1997), Nelson and Low (studies conducted between 1976 and 2003), Salovey and Mayer (1997), Sternberg (1985 & 1990), Townsend and Gephardt (1997), and Weisenger (1985 & 1998) as researchers who upheld this opinion. Interdisciplinary research clearly links emotional intelligence and emotional skills to achievement and success (Low et al., 2004). However, Newsome, Day, and Catano (2000) reported emotional intelligence to be a poor predictor of academic success.

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The Emotional Skills Assessment Process (ESAP) was selected as the assessment instrument for measuring emotional skills in the present study as it was intended particularly for an educational context, being the first step in the intervention and personal change (Nelson et al., 2003). Stottlemeyer (2002) and Vela (2003) found a significant relationship between ESAP skills subscales and academic performance. Wilkins's (2004) study had confounding results. She found a significant relationship with nine ESAP skills and retention, but no significant relationship when all the subscales were considered in combination.

2.4.5.1 Academic achievement and emotional skills measured by the ESAP

2.4.5.1.1 Assertion

Assertion refers to the ability to communicate personal thoughts and feelings to another person clearly, honestly and comfortably promoting understanding, caring and respect. Communicating assertively enables communicating strong and intense emotions in a respectful manner. This is a crucial skill in developing and sustaining healthy relationships (Nelson & Low, 2008).

Rice's (2006) study indicated that students who were weak in assertiveness, empathy and stress management also tended to be weak academically. Similar findings were reported by Tataker (2003) and Güven (2010) who examined audaciousness and academic success. On the contrary, research by Sahin (2001), Kapanci (2006) and Dinçyürek, Güneyli, and Çağlar's (2011) did not find any significant relationship between assertiveness and average grade.

2.4.5.1.2 Comfort

Comfort, as an emotional skill, indicates the ability to judge social, emotional, and physical distance in verbal and non-verbal relations with others. It includes the ability to establish rapport and build trust in relationships by using appropriate attending skills and being sincere and self-assured (Nelson & Low, 2008).

Comfort was one of the EI skills correlated with CGPA and retention in William's (2004) study. Rice (2006) included interpersonal awareness as a possible correlate of academic achievement in her study. Interpersonal awareness also refers to the ability

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to judge appropriate distance in interpersonal interactions. No significant correlation was found between interpersonal awareness and academic performance in Rice's study.

2.4.5.1.3 Empathy

Empathy encompasses accurate understanding and constructive reacting to feelings, thoughts, behaviours and needs expressed by others. It entails active listening, compassion, being non-judgmental and genuine (Nelson & Low, 2008). According to Rice (2006), students who had strong empathic skills had a tendency of being strong academically. However, Barchard (2003) and William (2004) did not find a significant relationship between empathy and academic performance.

2.4.5.1.4 Decision making

Decision making refers to the ability to plan, formulate, initiate and implement valuable problem solving skills. Decision making strategies includes being aware of and utilising a systematic model to approaching problems and decisions in everyday situations. It involves utilising problem solving and conflict management strategies in order to cope with challenges, and a skills approach when required to make decisions. Decision making skills are crucial to conceptualise and perceive choices when confronted with dilemmas (Nelson & Low, 2008).

Wilkins (2004) found a positive association between decision making and the retention of online community college students. Rice's (2006) study found that students who are not very decisive are inclined to not be very strong academically.

2.4.5.1.5 Leadership

Leadership is the ability to positively influence and convince others, and make a constructive difference. It is a set of personal and goal-directed actions that create impetus, agreement and support in working with others. It is a key skill in providing vision, drive and focus for others in a manner that is appreciated and revered (Nelson & Low, 2008).

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Sanchez, Rejano, and Rodriguez's (2001) study which investigated the personality traits related to academic failure suggested that poor leadership is one of the traits related to academic failure. Shiveley and Wang-Dahlback's (2011) report on student leadership at the California State University indicated that club leaders were more likely to graduate and obtained a higher grade point average than other students.

2.4.5.1.6 Drive strength

The ability to successfully focus personal energy and motivation in order to attain personal, academic, career and life goals is referred to as drive strength. It is revealed in goal achievement and the ability to accomplish significant goals that lead to personal satisfaction and positive emotions. Drive strength requires goal setting strategies that can be applied and implemented in everyday activities. This is an indispensable skill for high performance, attaining goals and achieving success (Nelson & Low, 2008).

Rice's (2006) and Vela's (2003) research found a significant correlation between drive strength and academic performance, while Wilkin (2004) and William (2004) reported a positive relationship between drive strength and retention.

2.4.5.1.7 Commitment ethic

Being able to complete homework, assignments and personal responsibilities successfully despite difficult circumstances reflects a commitment ethic. It entails a personal standard for attaining goals (Nelson & Low, 2008).

The results of Vela's (2003) study indicated a significant relationship (r = .17) between commitment ethic and GPA. In Rice's (2006) study, there was a significant relationship between commitment ethic and GPA (r = .23). William's (2004) results indicated a positive correlation with CGPA (r = .17) and retention (r = .20).

Several researchers have explored the relationship between hardiness and academic achievement. Hardiness has been defined as the combination of the three attitudes (3Cs) of commitment, control and challenge. Commitment is typified by dedication to and deep involvement in an activity. Highly committed individuals engage themselves in an activity rather than withdrawing from it, regarding it as exciting, meaningful and important irrespective of how difficult or stressful the circumstances become (Maddi,

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2006). In Lifton, Seay, and Bushke's (2000) study, hardiness was found to be a better predictor of retention than the Scholastic Aptitude Test and class rank in high school. Sheard and Golby's (2007) study found a significant positive correlation between academic achievement and commitment. This result was upheld in Sheard's (2009) later study which examined factors differentiating university performance, with the 3Cs of hardiness being amongst the factors investigated. The results indicated that commitment was the most significant positive correlate of academic performance compared to the other variables considered in the study.

A closely related concept is persistence. Persistence implies the willing continuance in a challenging academic situation (Lens & Vansteenkiste, 2008; Peterson & Seligman, 2004).

2.4.5.1.8 Self-esteem

Self-esteem refers to the ability, belief and skills to see oneself as positive, competent and successful in attaining personal objectives. It is revealed in genuine self-confidence and a high regard for others (Nelson & Low, 2008).

Reasons for assuming that high self-esteem may lead to an improvement in academic performance imply that students with high self-esteem may set higher goals than those with low self-esteem. They may be more prepared to persevere when confronted with difficulties or failure and less likely to concede to debilitating feelings of incompetence, hopelessness and self-doubt in the learning process (Baumeister, Campbell, Krueger, & Vohs, 2003). Petersen, Louw and Dumont (2009) perceived the reason for this to be the tendency of students with high self-esteem to believe that they have the ability to complete particular activities satisfactorily and therefore, utilise effectual coping skills and manage their resources efficiently to complete those activities. These students were able to adjust to university and academically performed well.

Hansford and Hattie (1982) conducted a comprehensive meta-analysis of the relationship between self-esteem and academic performance. The compilation included 128 studies and covered more than 200 000 participants. These studies examined different measures of self-regard (mostly self-esteem) and various objective performance measures, the majority of which were achievement tests. The

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correlations spanned a wide range from -.77 to +.96, averaging between .21 and .26. Hansford and Hattie concluded that overall there was a significant positive association between self-esteem and academic achievement, with self-esteem contributing from 4 to 7% of the variance in academic performance. More recent studies by Bowles (1999), Davies and Brember (1999), and Rice (2006) have also found a significant correlation between self-esteem and academic performance.

Regarding the direction of this relationship, Ross and Broh's (2000) longitudinal project supported the finding that earlier academic achievement increased self-esteem, but self-esteem did not affect subsequent academic performance. Baumeister et al. (2003) corroborated these results stating that initiatives aimed at enhancing self-esteem have not indicated a subsequent increase in academic performance and may be counterproductive at times. Albert Ellis goes as far as to state that "self-esteem is the greatest sickness known to man or woman because it's conditional" (cited in Epstein, 2001, p. 72). Ellis believes that individuals would be better off if they stopped trying to convince themselves that they are of value. Some are of the view that the emphasis on self-esteem is specific to Western cultures. Many other cultures emphasise humility and modesty as essential elements of personal growth (Baumeister et al., 2003).

2.4.5.1.9 Stress management

The ability and skill to select and exercise self-control and self-management in reaction to stressful occurrences is referred to as stress management. It involves controlling and managing stored strong emotions in different situations. It includes self-regulation of emotional intensity, and employing relaxation and cognitively derived strategies in stressful situations (Nelson & Low, 2008).

William's (2004) study failed to find a correlation between stress management and academic achievement. However, several studies have found contradictory results. A significant relationship between stress management and GPA was found in Vela's (2003) research as well as in Rice's (2006) study. Parker, Summerfeldt, Hogan, and Majeski (2004) also examined the relationship between stress management and university performance, using the short form of the Emotional Quotient Inventory (EQ-i: Short). A significant positive correlation (r= .33) was found between stress

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management and first-year GPA. In Parker, Hogan, Eastabrook, Oke, and Wood's (2006) research project, students who persisted had significantly higher stress management levels than the students who withdrew from their studies.

2.4.5.1.10 Aggression

Aggression is the extent to which one uses personal communication styles that infringe upon others' rights. It is revealed in communication that is too intense or overwhelming, resulting in negative emotions and outcomes. Aggression involves anger and may impact negatively on relationships. Aggression encompasses anger and needs to be recognised and draw upon anger management and control skills which enable an individual to constructively express anger to oneself and others (Nelson & Low, 2008).

In a study by Rice (2006), a significant inverse correlation was found between aggression and academic performance. Nelson, Benner, Kathleen, and Smith's (2004) research indicated that students with emotional and behavioural disorders were confronted with large deficits in academic achievement. Furthermore, students who displayed the externalising problem behaviours of aggression, delinquency and attention problems had a greater propensity to face deficits in academic achievement than students who experienced internalising ones (i.e., withdrawn, somatic complaints, social or thought problems).

2.4.5.1.11 Deference

The degree to which one exhibits an indirect and self-inhibiting communication pattern is denoted by deference. Deference involves unclear and ambiguous communication and is related to the emotion of fear (Nelson & Low, 2008).

In Rice's (2006) study, deference did not correlate significantly with academic achievement. Furthermore, there was not a significant correlation between deference and GPA in Bayram, Deniz, and Erdoğan's (2008) study in a web-based environment.

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2.4.5.1.12 Change orientation

Change orientation measures an individual's level of satisfaction with the status quo and the amount of change required for developing personal efficacy. It is an indication of a person's motivation and readiness for change (Nelson & Low, 2008).

The results of Wilkin's (2004) study indicated a positive relationship between retention and change orientation.

2.4.5.2 Development of emotional skills

Zins, Weissberg, Wang, and Walberg (2004) asserted that particularly within the education context there were well-validated emotional intelligence programmes aimed at enhancing emotional functioning. While facilitating personal development, these courses are also related to enhanced grades. However, Smith's (2004) emotional intelligence programme with at-risk eleventh and twelfth grade students failed to have the same impact. No significant improvement in GPA was found at the end of the ten-week programme. It was argued that the time frame was insufficient to effect the cognitive and behavioural changes necessary to improve academic performance. Zeidner, Roberts, and Matthews (2008) questioned the extent to which emotional intelligence could be developed and trained. Their scepticism was based on the lack of a clear theoretical, methodological and psychological basis of programmes and the EI programmes being too short to effect the requisite reprogramming for enhancement (Cherniss & Adler, 2000).

2.5 Conclusion

The South African higher education system has undergone massive transformations since its inception 141 years ago. Every transformation poses a particular challenge. A challenge that universities presently face is institutional preparedness to timely identify, support, further educate and manage students who are underprepared for academic success. If institutions of higher education are to achieve these vital objectives, they need to acknowledge the decisive importance of the mechanisms that can timely identify and direct underprepared students to gain access to facilities that specialize in student development and educative support. When and wherever student

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development and support strategies are implemented, irrespective of how they are made operational, successful interventions are predetermined by the model of student success that the specific tertiary institution has adopted.

The present chapter reported on the current body of scientific knowledge on the topic of academic performance and related activities, approaches to, key definitions and considerations in the measurement of student success, and factors that have been linked to student achievement. Studies indicating the predictive validity as well as evidence implying the contrary have been presented for each of the variables under examination in this study. The key criteria in the selection of variables for inclusion were the degree to which deficits were subject to remediation and the availability of the requisite resources for remediation thereof. These variables served as the independent variables in the study.

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CHAPTER 3
CONCEPTUAL FRAMEWORK

DESIGN CONSIDERATIONS

3.1 Introduction

This chapter provides a theoretical grounding of the study. The dominant models of student success as well as existing student profiling strategies at South African universities are discussed. The conceptual model upon which this study is based, namely, the framework for the early identification of students at risk for academic underachievement is explicated.

3.2 Theories on Student Success

Theories elucidate the relationships between concepts and constructs, establishing the tenets of a profession. An awareness of student development theory provides consistency and structure to professionals in this field. Theory provides a medium through which individuals, groups, and institutions may be understood. This facilitates the creation of an educationally purposeful environment (McEwen, 2003).

Multiple classifications of student development theories prevail in the literature. Cross (1975) distinguished between humanistic, developmental, and multidimensional theories. Pascarella and Terenzini (1991) differentiated between developmental models and college impact models. Wawrzynski, Barlow, Doyle, and Hill (2008) categorised the theory families into psychosocial, cognitive-structural, typology, and student success theories.

This section presents an outline of six leading models of student success in higher education. There are two main categories of models discussed in this section, namely, deficit models and sociological models. Deficit models attribute student underachievement and social problems at university to low levels or a lack of specific individual skills or attributes. Examples of such characteristics include poor motivation, low interest, low ability levels and poor language proficiency. Adopting a deficit approach leads to policies and funding being targeted towards the development of

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these skills (Cooper, 2013; CRAMLAP, 2013). The models, predominantly sociological in nature, have certain commonalities. Consistent across these frameworks is that the context in which a student functions and thinks has a prominent role. Variables such as institutional structures, policies, programmes and services, and attitudes, values and behaviours of others engaged with and defining the institutional environment are all regarded as contributing to student behaviours and change. Although the students are perceived as active participants, the environment is also regarded as a dynamic factor that may provide opportunities for change and may also generate specific types of reactions (Pascarella & Terenzini, 2005).

A brief overview of one deficit model, that is, the Seidman (2005) Retention Formula, and five sociological models, specifically Astin's (1993b) Input-Environment-Output (I-E-O) model and theory of involvement, Tinto's (1975; 1987; 1993) theory of student departure, Kuh's (2005) theory of student engagement, Pascaralla's (1985) general model for assessing change and Weidman's (1989) model of undergraduate socialisation are provided.

3.2.1 Astin's I-E-O model and theory of involvement

Astin's (1993b) input-environment-output (I-E-O) model (Appendix A, Figure A5) postulates that college outcomes are the result of the three sets of variables. Inputs refer to the personal characteristics the student initially brings to the educational programme, the environment refers to the student's actual experiences during the programme, while outcomes refer to what is expected to develop out of an educational programme. While inputs directly impact outcomes, they also do so indirectly through the manner in which students engage with the institutional environment (Astin, 1993b).

In addition to Astin's (1985; 1993a) theories addressing the effect of college on student outcomes, he also put forward a "theory of involvement" to explain students' development. His theory postulates that "students learn by becoming involved" (1985, p.133). His theory has five propositions, that is: (a) involvement necessitates investing psychological and physical energy in specific or general objects like tasks, people or activities; (b) involvement is continuous with different students investing different amounts of energy in the various objects; (c) involvement has quantitative and

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qualitative characteristics; (d) the quality and quantity of involvement is directly proportional to the amount of learning or development; and (e) the educational efficacy of any policy or practice relates to its ability to generate student involvement.

Astin's (1984; 1985) model bridges the psychological and sociological views on student change. He asserts that the institutional environment is critical in providing students with a broad spectrum of academic and social activities that enable students to engage with new ideas, people and experiences. However, the student remains paramount to change and development occurring as it remains the student's prerogative to take advantage of the opportunities provided.

Astin's I-E-O model and theory of involvement provide the conceptual and analytic foundation for a substantial volume of research on the impact of higher education (Pascarella & Terenzini, 2005). The I-E-O model encapsulates the longitudinal nature of the retention process, the interaction between students' background characteristics and the institutional environment, and supplies an expansive context for the investigation of institution-specific reasons for attrition (Kelly, 1996).

Astin contends that the key advantage of his model over conventional pedagogical approaches is that the focus is on the motivation and behaviour of the student. Hence, all institutional policies and processes may be evaluated by the extent to which these facilitate involvement by the student. This implies that initiatives by management, academic and support staff should be implemented with the uniform aim of getting the students more involved in the institution's environment to ultimately develop better learners (Astin, 1984).

His theory has been criticized for focusing on the life of traditional students and for not considering non-traditional students that began to enter higher education in increasing numbers from the beginning of the late 20th century (Burkholder et al., 2013). In South Africa, this is a key consideration. With the elimination of apartheid and the democratisation of South Africa in 1994, educational reform included the massification of higher education which saw a marked increase in the number of non-traditional students entering the higher education system.

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Cavote and Kopera-Frye (2007) identified seven traits that could be used to define a student as non-traditional: first-generation student, delayed entry into higher education, studying part-time, being employed off-campus, financial independence, having dependents or being a single parent, and not having a school completion certificated.

3.2.2 Tinto's theory of student departure

Tinto's (1975; 1987; 1993) model of student departure attempts to provide a longitudinal explanation for college student attrition. Evolving from Spady's (1970) work, Tinto contends that students enter an institution with different patterns of personal, family, and academic characteristics as well as predispositions regarding attendance and personal goals. These inclinations are modified on a continuous basis as the student interacts with the various structures and members of the institution's academic and social systems. Tinto theorizes that positive and rewarding interactions facilitate greater integration in institutional systems and therefore, there is higher student retention. Conversely, negative experiences reduce integration, distancing the student from the respective communities within the institution, fostering marginalization and eventually withdrawal from the institution. Within the context of this theory, integration is defined as the extent to which the student shares the normative values and attitudes of peers and faculty staff in the institution and adheres to the membership requirements of communities in the institution of which he/she is part.

To a large extent, this model (Appendix A, Figure A6) is concerned with intra-institutional influences on students and the influence others exert on the student. Factors like institutional structure, organizational characteristics and student effort play a small role in this theory (Pascarella & Terenzini, 2005).

The core essence of Tinto's (1997; 1987; 1993) model is comparable to Astin's (1985) "involvement" and Pace's "quality of effort". However, the significance of the investment of psychological and physical effort is tacit in Tinto's model of integration. In comparison with the two abovementioned conceptions, Tinto provided a more explicit theoretical structure and provided variables for researchers who intend to investigate the college-student change process, and for higher education personnel designing

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academic and social programmes aimed at facilitating students' educational development (Pascarella & Terenzini, 2005).

A substantial body of research supports Tinto's theory of academic and social integration. Research findings indicate that the importance of academic integration supersedes that of social integration. About 8 of the 11 multi-institutional studies linking academic integration and persistence supported the theory. However, 19 out of the 40 single institution studies examined by Braxton, Sullivan, and Johnson (1997) failed to find a relationship between integration and persistence (Kuh, Kinzie, & Buckley, 2006). Studies have also shown that ethnicity plays a significant role in both academic and social integration. Tinto's original theory was formulated on traditional students. However, several researchers including Nora (2002), Metz (2005), Longwell-Grice and Longwell-Grice (2008) and Saenz, Hurtado, Barrera, Wolf, and Yeung (2007) have extended his theory to other types of students like first-generation, minority and older students (Burkholder et al., 2013).

3.2.3 Kuh's theory of student engagement

Kuh, Kinzie, Schuh and Whitt (2005) contended that high levels of student engagement are essential to college success. Engagement has two primary components. The first focuses on what the student does, specifically the quantity of time and effort students dedicate to their studies and other activities contributing to outcomes and experiences associated with student success. The second focus is on the institution, that is, the manner in which an institution manages human and additional resources, learning opportunities and services to facilitate optimal student participation in these activities. A high degree of student engagement is associated with a broad spectrum of educational practices and conditions. These practices are explained in Figure A7, Appendix A. They include purposeful contact amongst students and faculty staff, active and collaborative learning, and an institutional environment that students perceive as inclusive, supportive, and encouraging, where academic expectations are communicated unambiguously and reasonably high standards have been set.

The South African Survey of Student Engagement (SASSE) based on the National Survey of Student Engagement (NSSE) developed in the USA, addressed Kuh's

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benchmarks of effective educational practices (Strijdom, 2009). The survey was administered to 1996 TUT students during 2009. Compared to the overall South African sample, TUT students reported significantly lower levels of academic challenge, participating in significantly fewer enriching educational experiences than students in the overall sample surveyed. Positive aspects of engagement included TUT students indicating significantly greater participation in active and collaborative learning, higher levels of interaction with staff and support from the campus environment when compared to the overall sample (Student Development and Success, 2009).

3.2.4 Pascaralla's general model for assessing change

Pascarella's (1985) general causal model (Figure A8, Appendix A) encompasses an explicit description of an institution's structural characteristics as well as its environment.

Pascarella's model draws on his own work (Pascarella, 1980) and the works of Lacy (1978), Pace (1979) and Weidman (1984). Pascarella proposed that growth is a function of the direct and indirect effects of five main sets of variables as indicated in Figure A5 (Appendix A). The two sets, namely, student background and precollege traits, and structural and organizational characteristics of institutions together impact on the third set, the institutional environment. These three variables affect the frequency and nature of students' interactions with agents of socialisation on campus. Change is then a result of the students' background, relations with socializing agents, and the effort expanded in learning and developmental activities. According to Pascarella, the structural qualities of an institution have an indirect impact on student development with its effects mediated by the institutional environment, student effort, and students' relations with peers and faculty staff (Pascarella & Terenzini, 2005).

Although Pascarella's model was originally designed to provide an explanation for changes in students' learning and cognitive development, the model is also well suited to investigating other student outcomes (Pascarella & Terenzini, 2005).

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3.2.5 Weidman's model of undergraduate socialisation

Weidman's (1989) model of undergraduate socialization (Appendix A, Figure A9) includes psychological and social-structural factors affecting student change. The model pays specific attention to noncognitive aspects like career choices, lifestyle preferences, values and ambitions (Pascarella & Terenzini, 2005).

Compared to the Tinto, Astin and Pascarella models, Weidman's approach explicates to a greater degree the process of undergraduate socialisation. Weidman's model was founded predominantly on his own work (Weidman, 1984) as well as that of Chickering (1969), Astin (1977; 1984), Brim and Wheeler (1966) and Mortimer and Simmons (1978) sociological literature on adult socialisation.

Similar to Tinto and Pascarella, Weidman proposed that students enter college with a set of significant background characteristics as well as normative pressures from parents and other noncollege groups. These characteristics and individuals/groups represent predisposing and to an extent, constraining factors on students' choices in the institutional environment. These formal and informal normative contexts subject the students to the accompanying pressures. The mechanisms triggering these pressures include interpersonal interactions, intrapersonal processes and the normative institutional requirements (Pascarella & Terenzini, 2005).

More than Tinto and Pascarella, Weidman highlighted the impact of noncollege factors. His model emphasises a continuing socialising role for parents, irrespective of whether students live at home or away as well as other noncollege reference groups like peers, current and potential employers and community organisations. Weidman contended that the socialisation process facilitates students' evaluation and stabilization of competing normative forces in order to attain personal goals. The process also demands re-evaluation of existing values, attitudes and aspirations. This process is longitudinal and reciprocal with the prominence of the components fluctuating over time, and shaping as well as being affected by other elements of the socialisation structure (Pascarella & Terenzini, 2005).

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3.2.6 Alan Seidman's Retention Formula

The Seidman Retention Formula is based on Tinto's (1987, 1993) retention model. It is based on the concept of students' academic ability to integrate or engage academically with an institution. Furthermore, the Retention Formula provides an institution with a course of action (Seidman, 2012).

Seidman (2005) proposed the following formula for retention:

"RET = EID + (E + I + C) IV

RETention = Early Identification + (Early + Intensive + Continuous) InterVention"

Seidman (2005, p.296).

In Figure 3.1 a graphical representation of the retention model (Seidman, 2005) is provided.

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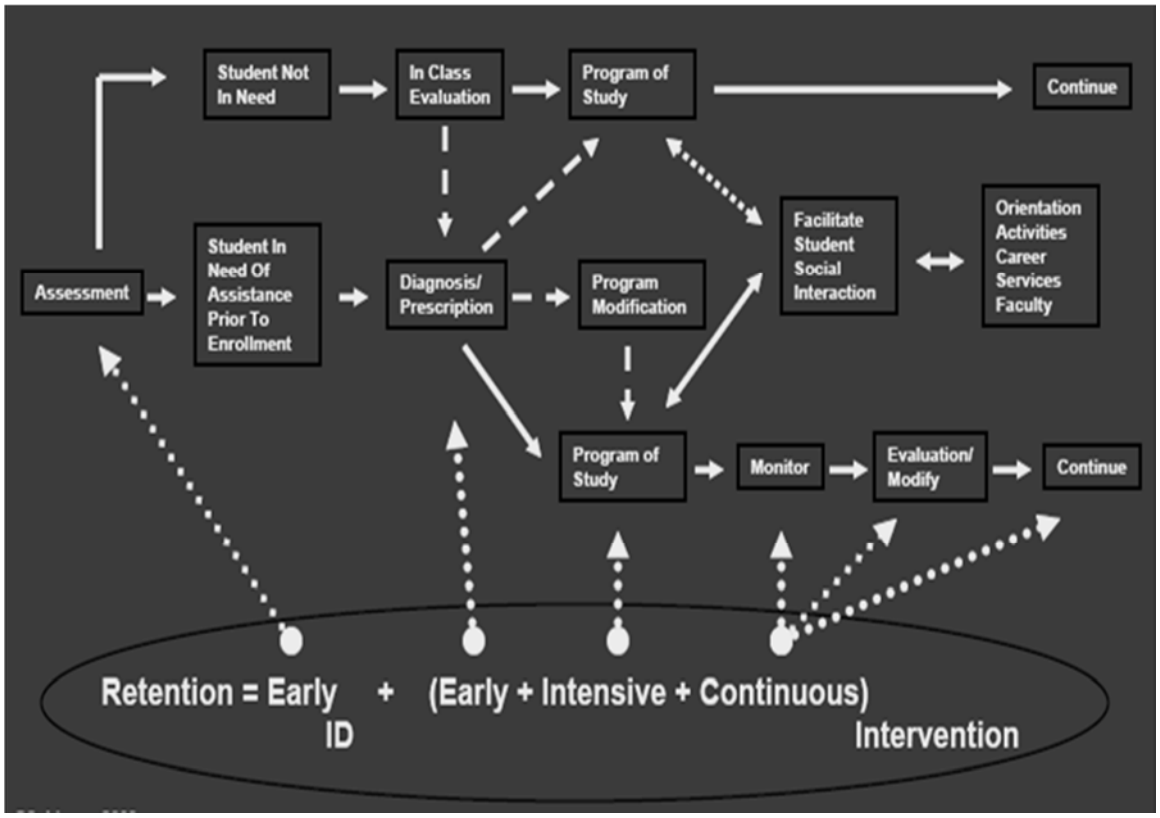
Figure 3.1 Seidman's Model for Retention



Note: From 'College Student Retention: A Primer', by Alan Seidman, 2006, slide 39. Copyright 2003 by Dr A. Seidman.

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Seidman (2005) defined retention as a student accomplishing his/her academic and/or personal goals. Students may reach their goals before graduating or may graduate without accomplishing those goals. Hence, it is imperative that an institution determines upon registration the reason for doing so as well as monitoring these reasons over the duration of university attendance.

Early identification is identifying a student who may be at risk academically or personally at the earliest possible time. This may occur when one applies by means of an analysis of high school marks and subjects or results on standardized tests (Seidman, 2005). Within the South African context, Grade 12 results may be an indicator. Several years have passed since the introduction of the National Senior Certificate. Results for cohorts of students who have completed a three-year diploma in minimum time are already available to construct predictive models on the predictive validity of Grade 12 results as an indicator of academic performance measures in higher education. It is likely that students at risk may not be identified as such prior to enrolment. Hence, it is necessary to try to identify these students as early as possible in the first term. A faculty staff's observance of student behaviours may assist in identifying a student at risk. Academic, personality or social assessments may be administered. It is vital that results are disseminated timeously so that the requisite intervention may commence at the earliest possible time. Interventions should be early, intensive and continuous.

Early intervention implies commencing with the intervention as soon as the presence of a risk factor has been detected, even if this means that an intervention has to commence prior to enrolment. Admission can then be provisional, depending on the student participating in the intervention programme. The intervention should be intensive enough to have the required effect. The experience must be effective enough to create the requisite change in academic or personal behaviour. Furthermore, the intervention should persist until the deficiency has been remediated irrespective of how long it takes. The institution may charge a fee if intervention is still required after graduation. Interventions should be mandatory. If a student fails to attend the interventions recommended, an appeals process may be instituted. Essentially, the Retention Formula aims to identify a student who requires help academically or socially as early as possible, evaluate the student's needs, prescribe the necessary

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interventions, and monitor, assess and modify interventions where required (Seidman, 2005).

To implement the formula, an institutional retention committee should be constituted and supported by senior management. The implementation depends on the nature of the data that is available upon enrolment, evaluation of academic and personal objectives and student development programmes that are available (Seidman, 2005). Seidman's model (2005) has been described as being inclusive and explaining persistence for all types of students including traditional and non-traditional, minority, and those attending contact and virtual universities (Burkholder et al., 2013).

3.2.7 Comparison of models

The strength of sociological models lies in the contextual factors affecting student development. Institutional academic and non-academic structures, policies, programmes and services are emphasised. A disadvantage of sociological models is the generic specification of student traits that are deemed significant. Engagement models do not attribute sufficient attention to intrapersonal characteristics like cognitive and emotional readiness for intellectual, academic or psychosocial transformation nor to the present levels of intellectual or occupational motivation. The student characteristics that are considered should embrace more than demographic and background characteristics (Pascarella & Terenzini, 2005).

There were two primary reasons that Seidman's Retention Formula was selected as the conceptual model for the present study. Firstly, the model was suited to the context in which the research project was administered, that is the student development and support unit. The "early identification" and "intervention" phases could be implemented, monitored and evaluated by the unit. Secondly, during the past few years, the education sector has noted an enhanced interest in data driven decision making (DDDM) to assist in enhancing student success and institutions (Marsh, Pane, & Hamilton, 2006). Seidman's Retention Formula provides a suitable framework for data-driven decision making within the student development and support context.

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3.3 Models for identifying students at risk at South African institutions

Subotzky and Prinsloo (2011) asserted that international models are only partly appropriate within a post-apartheid African developing country context. A substantial proportion of existing research on student success is contextualised in developed countries. While there are undeniable similarities, it still remains essential to consider student success models within the South African context.

3.3.1 University of South Africa Student Success Framework

While the University of South Africa (UNISA) has to cope with a slightly different demographic composition than the institution being investigated in this study, it is however a distance learning institution and the issue of student success is still a key concern. Furthermore, the two institutions' challenges overlap to a large extent. UNISA comprises approximately 340 000 older, part-time students, many of whom need to grapple with difficult socio-economic circumstances as well as with work-related and domestic responsibilities (Liebenberg, Subotzky, & van Zyl, 2011).

UNISA developed a student support and success framework comprising: (a) a conceptual model of factors affecting student success; (b) profiling, tracking and data gathering resulting in a predictive model; (c) student support interventions; and (d) evaluation of the impact of the elements within the framework over time. Making the model operational was required for the identification and definition of the academic and non-academic variables required for construct measurement, segmentation, profiling and predictive modeling. In Figure A10 (Appendix A) a diagrammatical representation of the predictive model is provided. The model employs appropriate means of data collection that provides reliable data and employs relevant statistical analyses that identify the multivariate dynamic relationships between variables and constructs (Liebenberg et al., 2011).

The challenges relating to the application of the UNISA model lies in making the model operational, specifically the conversion of the conceptual variables into pertinent constructs for profiling, tracking and predictive modelling of students at risk (Liebenberg et al., 2011).While the model is adequately generic for application to most South African institutions of higher education, numerous variables germane to open distance

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learning institutions (ODL) will complicate the replication and making this model at contact institutions operational.

3.3.2 University of Pretoria Student Academic Development and Excellence Model (SADEM)

The University of Pretoria developed its Student Academic Development and Excellence Model (SADEM) (Figure A11, Appendix A) in order to address four problem areas: (a) a systemic approach to the first year experience; (b) a process element that connected to mainstream academic activities; (c) relating the model to academic disciplines and academic staff; and (d) targeting diverse subpopulations and key performance indicators (Ogude, Kilfoil, & du Plessis, 2012).

Three conditions are essential for the utilization of this model in other contexts, namely, support from institutional leadership, a steering committee comprising all stakeholders but driven by academics so that the model is not perceived as peripheral, and the extent to which the model can accommodate faculty goals and the university's strategic aims (Ogude et al., 2012). A limitation of the model at this stage is that it is still evolving. Certain concepts still require refinement. Cohort studies investigating the impact of the interventions addressing High Impact Modules (HIM's) need to be conducted (Ogude et al., 2012).

3.3.3 University of Johannesburg (UJ) First Year Experience (FYE) Programme

The First Year Experience (FYE) is a key component of the University of Johannesburg's Teaching and Learning Strategy. It is an initiative comprising curricular and co-curricular activities that embrace all facets of the first year experience within the milieu of an invitational and equitable university, aiming to enhance the student experience and ultimately improving retention and graduation rates at the university (Proposal to senate, a first year experience at the University of Johannesburg, 2009).

UJ identified seven main strategies of the FYE, namely: (a) placement testing; (b) an initial two-week orientation and registration programme; (c) an extended orientation embedded within the core curriculum which emphasises strands of academic

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development skills, and orientation to the library and e-learning platform; (d) tutorial programmes; (e) co-curricular activities; (f) focusing on residences as centres of academic excellence; and (g) continuous tracking of academic performance and identification of students who appear to not be “engaging” with the institution and are therefore, likely to be at risk. These students are referred to relevant interventions (Proposal to senate, a first year experience at the University of Johannesburg, 2009).

3.3.4 Concluding comments on the models

Several international models of student success as well as South African models were reviewed in this section. During the past few years, the education sector has noted an enhanced interest in data driven decision making (DDDM) in an endeavour to assist in enhancing student success and institutions (Marsh, Pane, & Hamilton, 2006). Seidman’s Retention Formula is the model that assumes prominence within this study as this model provides a suitable framework for data-driven decision making within the student development and support context. Whereas the Seidman formula provides the overarching framework, several instruments populate the “early identification of students at risk” stage of his structure. The same constructs are thereafter subject to development and remediation in the “intervention” stage. The following section discusses the constructs evaluated by the instruments in more detail.

3.4 Conceptual Model

The conceptual framework for the present study is presented in Figure 4.2. The framework provided for the early and accurate identification of students at risk as well as intense and continuous support for them to reduce the risk of attrition, in accordance with Seidman’s model. The study did not evaluate the model in its entirety. The primary focus of the study was the risk profiling evaluation phase of the model. The intervention phase was also examined.

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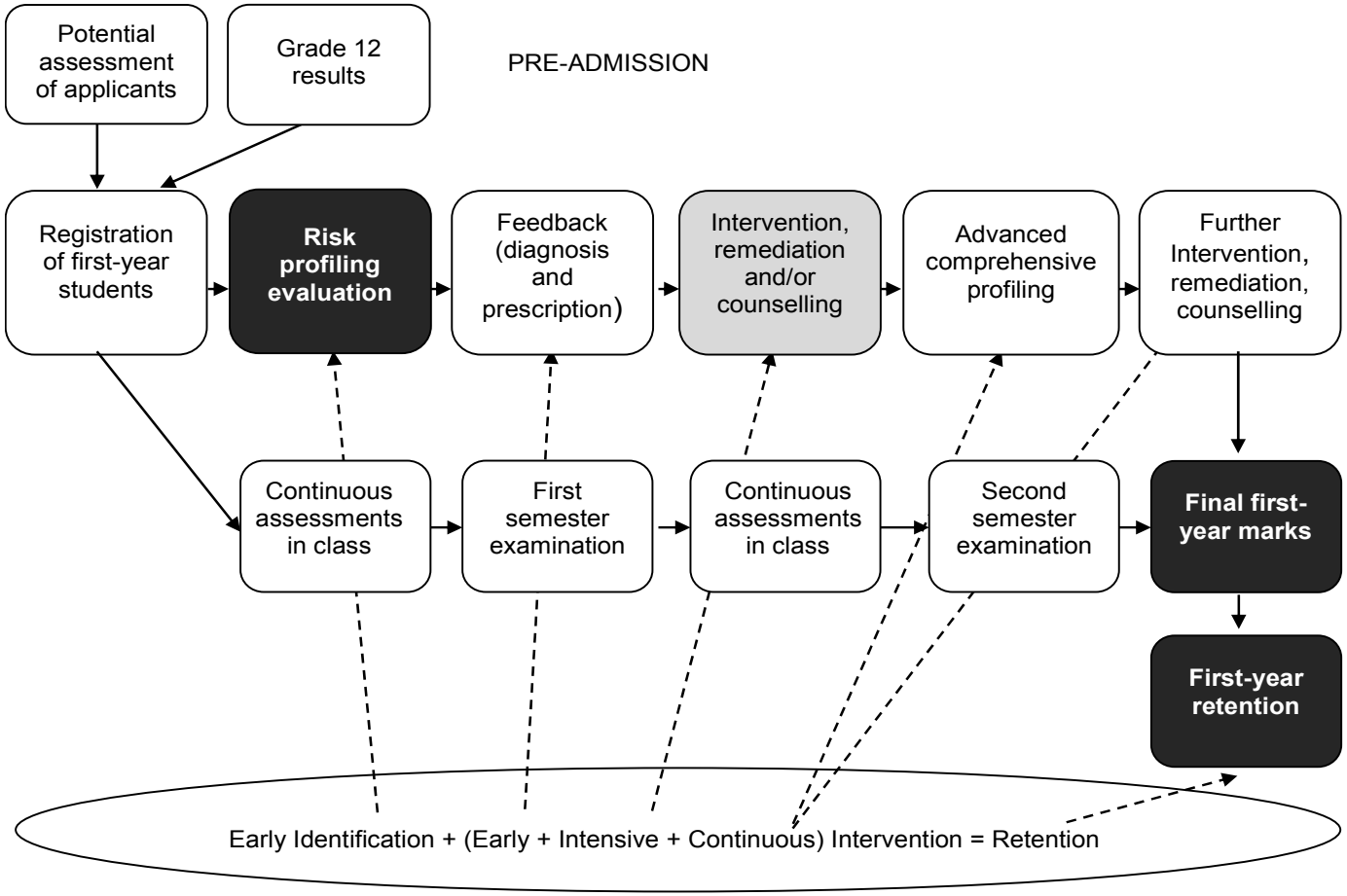
Figure 3.2 Conceptual framework for the early identification of students at risk



Note. The framework indicates the process for the early identification of students at risk and interventions with these students. The black and grey blocks indicate the stages in the process that were focused on in this study.

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The model provided for the early and accurate identification of students at risk as well as intense and continuous support for them so as to reduce the risk of attrition. Formal student assessment was done at two different levels: curricular and co-curricular. The curricular assessments comprised semester examinations, class tests and other forms of continuous assessment.

At the co-curricular level, applicants were assessed for selection purposes prior to admission, immediately after registration to identify risk areas, and thereafter were subjected to advanced comprehensive profiling if required. This pattern of involvement ensured intensive and continuous involvement of professional TUT staff in student assessment. Students that were identified early as being at risk could rapidly be referred to mentoring, guidance and counselling in the short-term for remedial purposes or for long-term intervention for part of or for the full duration of the study-term. It was assumed that study, personality and learning strategy profiles of students at risk would further determine problem assessment, referral, remedial and other intervention processes.

3.4.1 Grade 12 results

The earliest opportunity for identification of students at risk was by referring to information utilised for admissions decisions. At TUT, this referred to Grade 12 results and the Potential Assessment.

There is considerable debate on the utility of Grade 12 scores as a predictor of academic achievement. Studies by Barnes, Dzansi, Wilkenson, and Viljoen (2009), Eiselen and Geyser (2003), and Lourens, Ludeman, and Sibanda (2007) reported a significant relationship between these two variables while Huysamen (2000) and Fraser and Killian (2005) disagreed with using the Grade 12 results as a predictor. Huysamen contends that the quality of teaching affects matric results to a large extent (van Rooy & Coetzee-Van Rooy, 2015).

Nonetheless, Grade 12 results is the one admissions tool that is utilised at all higher education institutions. Different programmes have set different scores as the minimum admission requirement. Some programmes require a minimum mark in a particular

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subject. There is an assumption that the minimum admission requirements were data-driven, that is, they had been based on prior research determining the minimum grade 12 scores for academic success. However, further research is required to validate this assumption.

3.4.2 Potential assessment of applicants

The Potential Assessment provided an additional early opportunity for the identification of students at risk. This assessment was an admissions test used to evaluate cognitive potential. The instrument that was used was the Situation Specific Evaluation Expert (SpEEx) which is a culture-fair South African psychometric test. Programme-specific norms were generated for the Potential Assessment.

A potential assessment as opposed to a competency assessment was chosen as the former was less susceptible to environmental factors like quality of schooling and socio-economic status. Grade 12 results were different in this regard as these were strongly influenced by these confounding factors as shown in the National School Effectiveness Study (Taylor, 2011) which depicted a constant relationship with educational achievement across the school years. These two sets of data were available prior to enrolment. Both variables have minimum thresholds for admission to the university.

A study conducted by Opperman (2014) investigated the relationship of these two variables with the average marks of students registered for National Diploma courses. Even though significant relationships were found, small effect sizes and correlation coefficients were noted. Studies by Kriel (2001) and Kubayi (2003) upheld the value of the instrument in predicting the academic performance of technikons students, while Nagdee's (2011) research found no statistically significant differences in the SpEEx scores of students in three groups of students with differing levels of academic performance.

Psychometric assessments are still widely used within the education context in South Africa, even though such instruments are criticised as being culturally biased (Kotze & Griesel, 2008). In the post-apartheid era, great strides have been made towards

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developing appropriate assessments and generating relevant norms so as not discriminate against specific population groups (Laher & Cockcroft, 2014).

3.4.3 Risk profiling evaluation

The goals of the risk profiling evaluation were somewhat different from the Potential Assessment. The Potential Assessment was primarily a screening device for admission purposes focusing on cognitive abilities. The risk profiling evaluation was conducted post-admission and focused on competencies that were much more susceptible to short-term interventions.

Soon after registration, students underwent the risk profiling evaluation. The risk profiling evaluation comprised four instruments: ELSA, CCQ, LASSI and ESAP. Whilst there were a plethora of factors that could have predisposed a student to academic underachievement, there was a single rationale for the inclusion of the four specific variables in the profiling evaluation, that is, the risk could potentially have been mitigated by the provision of relevant interventions that had already been well-established. From a research perspective many additional variables could have been included that could have yielded valuable information. However, from a pragmatic perspective, it was unethical to subject students to the process for identifying risk factors without the provision of any means of addressing the risks given the existing resources. Furthermore, the provision of the relevant interventions was the mandate of the same division administering the risk profiling evaluation, which eased the monitoring and implementation of the model.

3.4.4 Feedback

Optimally, feedback was provided within a week after completing the evaluation. One of the complications of the model was the non-attendance of feedback sessions. This inhibited the impact of the evaluation as students were then unaware of what their developmental needs were and did not necessarily seek out the requisite interventions without being prompted to do so. Once students received their reports on the assessment, they were strongly recommended to attend the developmental or remedial programmes, interventions or counselling sessions.

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3.4.5 Interventions

3.4.5.1 Interventions for enhancing English proficiency

When students performed poorly on the ELSA, it was recommended that they attend an English programme comprising a computerised English program, English Word Power (EWP) and a reading enhancement program, Readers are Leaders.

The English Word Power (EWP) program focused on the development of English spelling and grammar skills. The criteria for completing the EWP Program was completing all the exercises and passing all the assessments in the program. The pass mark for the assessments was 60%. Shange (2015) conducted a multi-level analysis of the effectiveness of the program. She concluded that in terms of the program's pre- and post-test, EWP demonstrated possible effectiveness. However, there was insufficient evidence of particular skills that were enhanced by the program. She contended that the program was unsuitable for ESL learners as it did not improve listening and speaking skills. Shange's recommendations included utilising a hypermedia program that focused on listening, reading, writing, and speaking, using the program as a learning tool and not a tutor, and continuous training for program facilitators.

The Readers are Leaders program aimed to improve reading speed and comprehension. Completion of the reading program was dependent on attaining the requisite reading level for first-year students of 385 words per minute with 70% comprehension (Readers are Leaders, 2015).

3.4.5.2 Interventions addressing career orientation

For students who performed poorly on the CCQ, it was recommended that they consult a career counsellor for individual career guidance and counselling. Kidd (2006) defined career counselling as "a one-to-one interaction between practitioner and client, usually ongoing, involving the application of psychological theory and a recognised set of communication skills. The primary focus is on helping the client make career-related decisions and deal with career related issues" (Kidd, 2006, p.1).

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3.4.5.3 *Interventions addressing enhancement of learning and study strategies*

There were several options available for students who obtained low scores on more than two LASSI subscales. Students could attend a study skills programme where they individually worked through the learning areas covered by the LASSI and were assisted by a study skills counsellor. A second option was to attend study skills workshops where the learning and study strategies were taught in a small group context. The third option was that lecturers could schedule Life Skills as a subject for the entire class. The Life Skills programme comprised two modules, learning and study strategies, and emotional intelligence.

Moseki and Schulze (2010) used the LASSI as a pre- and post-test to evaluate a twelve-workshop learning skills intervention with 20 engineering students at TUT. Post-test scores improved significantly for seven out of the ten subscales. The improvement in scores for the remaining three subscales (Attitude, Information Processing and Self-Testing) was not significant. The students' academic performance also improved. Tisane and Chweu (2013) also used the LASSI in their mixed-method evaluation of the TUT study skills programme. The subscales that ranked the highest on the pre-test scores were Concentration, Test Strategies and Anxiety. They found a significant improvement in LASSI scores after attending the programme. However, application of the knowledge and skills learnt in the study skills programme were essential to succeeding in their studies.

3.4.5.4 *Interventions addressing emotional skills*

The emotional intelligence module of the Life Skills programme addressed the aspects contained in the ESAP. If a Life Skills programme had not been arranged for a class, students could individually address the requisite areas in the ESAP by consulting a counsellor at Student Development and Support (SDS).

A student could have also engaged in personal counselling to address these competencies at a deeper level. One of the conclusions emanating from Malan and Vermaas's (2013) research on students' perceptions of personal counselling at TUT, was that the process facilitated self-discovery and personal development. In terms of

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linking counselling to academic achievement, Brown and Trusty (2005) concluded that there is limited evidence that comprehensive school counselling programmes have an impact on academic achievement.

A major challenge with the process was students' failure to attend the recommended interventions or complete a programme.

3.4.6 Advanced profiling and interventions

Once enrolled in these programmes, additional comprehensive profiling could have been done to determine the most appropriate course of action. Additional profiling included further baseline assessments for English, a Visagraph or dyslexia evaluation for reading, relevant career psychometric assessments which would have included ability, interest, and personality assessments, The Neethling Brain Instrument (1998) was used to enhance the study skills process. Further psychological evaluations or any other diagnostic instrument that may have been perceived as being required were administered.

If advanced profiling identified a need for additional interventions, remediation or counselling, students were referred accordingly.

3.4.7 Curricular level

At the curricular level, assessment results were also utilised to identify students at risk. Assessments included continuous assessment measures, and scores obtained in the first and second semester examinations. When students failed assessments, they were referred to SDS for assistance.

3.4.8 Student success

The abovementioned steps were all part of the process to ultimately empower students to be successful in their studies, pass their subjects and return to university the following year. However, the current study did not evaluate the entire model. The primary focus of the study was the role of the risk profiling evaluation in predicting academic underachievement. The attendance of intervention programmes was also

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included in the analyses as they may have affected the relationship between assessment scores and academic achievement.

3.5 Definition of Core Terms

The following terms represent core concepts within the study:

Risk profiling evaluation: The process of being assessed using the ELSA, CCQ, LASSI and ESAP.

Feedback: Provision of a report and discussion of results obtained in the risk profiling evaluation.

Intervention programmes: Developmental, remedial and support programmes that include the English Proficiency Program, Reading Program, Career Counselling, Study Counselling, Study Skills Workshops, Academic Life Skills Workshops, Personal Life Skills Workshops and Personal Counselling.

Academic performance indicator: Measure of achievement at the end of the first year of study and represented within this study by retention to the second year, the first-year average mark and the proportion of subjects passed within the first year.

3.6 Delineation of the Study

The study did not examine all the elements of the model. It focused on the risk profiling data. Inclusion of the potential assessment results (Kriel, 2001; Kubayi, 2003) and the Grade 12 APS scores (Rankin, Schöer, Sebastiao, & van Walbeek, 2012) could have possibly enhanced the risk profiling model. However, only 0.05% of the sample completed the potential assessment, and the Grade 12 APS that were provided contained anomalies that prevented reliable use of the data.

Although the attendance of intervention programmes was part of the analyses, the interventions were not the primary focus of the research endeavour. Participation in an intervention may have potentially affected the relationship between assessment scores and academic performance, and were therefore included as variables.

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Class assessments, particularly the first assessment, could serve as indicator of a student at risk. However, results obtained from continuous assessments were not disaggregated to assess the impact of specific assessments. Lotkowski, Robbins, and Noeth (2004) recommended implementing an early-alert assessment and monitoring system which includes first semester college GPA as one of the variables.

The study was confined to first-year academic achievement and did not address retention until completion of the qualification. Furthermore, the study did not investigate academic performance in terms of results obtained during the entire programme.

3.7 Conclusion

This chapter presented a visual representation of the framework that formed the conceptual basis for this study and was supplemented by appropriate explanation.

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CHAPTER 4
RESEARCH METHODOLOGY

"All research is a practical activity requiring the exercise of judgement in context" (Hammersley & Atkinson, 1994, p. 23).

MAKING THE RESEARCH OPERATIONAL

4.1 Introductory Comments

This chapter discusses sections on research strategy and design. Research questions and objectives of the study are explicated in more detail, while the strategy and variables are also explained in detail. Practical considerations related to assessment, ethics and etiquette, and quality control are further explored. The section also presents preliminary analyses data (i.e., demographic data) and describes how the data was handled, captured and analysed.

4.2 Research Strategy and Design

The research questions and research objectives of the study are explicated in more detail. The research strategy and design are discussed. The variables are explained. Practical considerations related to assessment, ethics and etiquette, and quality control are further explained.

4.2.1 Research questions

This study was designed to answer the following primary research question:

> Which variables need to be included in a psychometric profile to predict a first-year student's risk for academic underachievement at a university of technology?

The primary research question was investigated by means of three secondary research questions. The secondary research questions differed in terms of the criterion used to measure academic underachievement. The three measures of underachievement were: not reregistering in the subsequent year, passing less than half the subjects for

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which he/she has registered, and obtaining an average mark less than 50%. The secondary research questions were:

1) Which variables need to be included in a psychometric profile that identifies a first-year student at risk for not reregistering in the subsequent year?

2) Which variables need to be included in a psychometric profile that identifies a first-year student at risk for passing less than half the subjects for which he/she has registered?

3) Which variables need to be included in a psychometric profile that identifies a first-year student at risk for obtaining an average mark less than 50%?

The research questions were answered for two categories of students: first-time entering students and students who were repeating the first year.

4.2.2 Research objectives

The present study aimed to derive a profile for the identification of first-year students who were at risk for academic underachievement at the Tshwane University of Technology by using three different academic performance criteria, namely, retention, average mark and percentage of subjects passed. Each criterion constituted a secondary research objective. The risk profiles were generated from results obtained on a battery of measures constituting the ELSA, CCQ, LASSI and ESAP.

4.2.3 Research design

A research design is a strategic blueprint that acts as a link between research questions and the implementation and realisation of the research. The design was the guide for managing the specifications for the data collection and analysis in a way that connected the goals of the research project with the most appropriate method (Terre Blanche, Durrheim, & Painter, 2011). It bridged the 'what' with the 'how' (Trafford & Leshem, 2008).

The type of research encapsulated by this project was applied research. In applied research, subjects are assessed by measuring variables that generate research

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outcomes, have practical implications and provide possible solutions for problem solving (Jackson, 2012).

An empiricist paradigm was used, more specifically systematic empiricism. Empiricism refers to knowledge acquired through objective observation. Empiricists contend that phenomena which "cannot be observed, directly or indirectly through instruments, ultimately cannot exist" (Mingers, 2006, p.11). Empiricism has been critiqued as not necessarily being logical or systematic. Systematic empiricism addresses the latter criticism. It entails observations being made systematically in order to test a theory or hypothesis. Systematic empiricism enhances the reliability and validity of conclusions (Jackson, 2008).

The nature of the research questions demanded a quantitative research approach. The basis of quantitative research is the measurement of variables for individual participants to obtain scores, frequently numerical values, which are subjected to statistical analysis for summarising and elucidation. Quantitative research investigates variables that differ in quantity (size, magnitude, duration or amount) (Gravetter & Forzano, 2009).

This research project fell within the domain of quantitative psychology. "Quantitative psychology is the study of methods and techniques for the measurement of human attributes, the statistical and mathematical modelling of psychological processes, the design of research studies and the analysis of psychological data" (American Psychological Association, 2012, paragraph 1). The data was managed in a quantitative manner. With reference to data collection, psychological constructs were measured in terms of scores, and with regard to data analysis, the data were analyzed through statistical processes.

The correlational design utilised in the study is a frequently utilised descriptive procedure that explores the relationship between two or more variables. Variables are not manipulated, only measured. A distinguishing feature of a correlational design is that research participants are not randomly assigned to a condition. A key advantage of correlational studies is that they may be conducted outside the artificial situation of a laboratory which may potentially enhance its ecological and external validity (Heinman,

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2001). However, the limitation of a correlational study is that it leans towards low internal validity. The third-variable problem may be operating where the relationship may not necessarily be due to the variables being investigated, but the result of a third unidentified variable. Alternatively, the issue of directionality is problematic. A correlational relationship establishes that changes in one variable are accompanied by changes in the other variable without indicating which variable is the cause and which variable is the effect (Gravetter & Forzano, 2009).

4.2.4 Variable typologies

The two types of variables in the study were independent variables and dependent variables.

4.2.4.1 Independent variables

Independent variables are variables considered as having some effect. They are often also referred to as predictor variables as they are potentially able to predict an outcome variable (Field, 2009).

This study had numerous independent variables (Table 4.1). The independent variables were the constructs measured by the four instruments. Demographic variables and interventions were also included in the study as they may have also had an impact on academic underachievement.

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Table 4.1

Independent variables

Measuring instrument	Variable
English Literacy Skills Assessment (ELSA)	English proficiency (Total)
Career Choice Questionnaire (CCQ)	Career orientation (Total)
Learning and Study Strategies Inventory (LASSI)	Anxiety Attitude Concentration Information processing Motivation Self-testing Selecting main ideas Study aids Time management Test strategies
Emotional Skills Assessment Process (ESAP)	Assertion Aggression Deference Comfort Empathy Decision making Leadership Drive strength Time management Commitment ethic Change orientation Self-esteem Stress management
Interventions	English Proficiency Program Reading Program Career Counselling Study Counselling Study Skills Workshops Academic Life Skills Workshops Personal Life Skills Workshops Personal Counselling
Demographic variables	Age Gender Population group Language

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4.2.4.2 Dependent variables

Dependent variables are variables that are regarded as being influenced by modifications to the independent or predictor variable. The dependent variable may also be regarded as the outcome variable (Field, 2009).

In this study, dependent variables are indicators of first-year achievement. National and global trends showed that most students that dropped out of higher education did so in their first year (ACT, 2010; Commonwealth of Australia, Department of Education, Training and Youth Affairs, 2000; MacGregor, 2007; Scott, 2009). Three first-year indicators were used:

- First-year retention, namely, reregistering or not reregistering in the subsequent year. This variable aimed to measure retention; in other words, evaluating students who did not drop out. The study did not differentiate between students who had reregistered for first-year modules, second-year modules or a combination of first- and second-year modules.
- Percentage of subjects passed. This was categorised according to students who passed less than 50% of the subjects and students who passed 50% or more of the subjects for which they had registered.
- Average mark. This was categorised into students who obtained an average mark less than 50% and students who obtained an average mark of 50% or more.

Thus, the “students at-risk” categories were designated as: not reregistering in the following year, students who passed less than 50% of their subjects, and students who obtained an average mark less than 50%. The “successful” categories were: reregistering in the following year, students who passed 50% or more of their subjects and students who obtained an average mark of 50% or more.

4.2.5 Data capturing

4.2.5.1 Independent variables

Assessments were scored using optical mark readers and the relevant software or Excel scoring templates. As the students were provided with feedback within a week of

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completing the assessments to allow sufficient time for completion of requisite interventions, assessments were processed immediately upon completion, not when all the data for the study had been gathered.

As data were processed by course, the following datasets were created for each course: a scanned delimited file containing the item responses for each questionnaire; a processed file with the ELSA scores that was generated using the ELSA software; an Excel file that contained a scoring template for LASSI; and an Excel file that contained a scoring template for ESAP. No additional file was created for CCQ. The scores were summed on the original spreadsheet of captured scores. Furthermore, all the scores were combined in an integrated spreadsheet report that could be submitted to the head of department. The intervention data and academic performance data were added to the spreadsheet. Student numbers were then removed.

The course data were integrated into the following files for analysis for this study: ELSA item responses, CCQ item responses, LASSI item responses, ESAP item responses and an integrated spreadsheet that contained the scores on all four assessments.

Intervention programme attendance data was captured within SDS on Excel spreadsheets.

4.2.5.2 Dependent variables

The academic performance data was requested from the relevant section that manages institutional data. The data was provided to the researcher in an Excel format.

4.2.6 Statistical methods

The Statistical Analysis Software (SAS) Enterprise Guide 4.2 and IBM Statistical Package for the Social Sciences (SPSS 22) software programs were used to analyse the data. The specific statistical analyses conducted are discussed.

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4.2.6.1 Correlation

Correlation coefficients were calculated to determine the associations between subscales of a measure. Correlation coefficients were also utilised for correlating the subscales of each assessment with the subscales in the other assessments. The reason for performing these analyses was to determine if there was a strong relationship between any of the variables. A strong relationship would have suggested that different indices were potentially measuring the same construct.

4.2.6.1.1 Pearson product-moment correlation coefficient (r)

The Pearson product-moment correlation coefficient (*r*) is an indicator of the direction and strength of the relationship between two variables. The sign (+ or -) indicates whether it is a positive or inverse relationship. The value of the correlation coefficient ranges from 0 to 1 and depicts the strength of the linear relationship (Aron, Coups, & Aron, 2011).

The Pearson product-moment correlation coefficient was computed for the following: the correlation between the two ELSA subscales, Cloze Procedures and Vocabulary in Context; the correlations between the ten LASSI subscales; and the correlations between the ten ESAP subscales.

4.2.6.1.2 Pearson's contingency coefficient

The Pearson's contingency coefficient is a measure of association between two categorical variables. Like the product-moment correlation coefficient, the value of the coefficient ranges from 0 to 1, but can never reach 1 (Everitt & Palmer, 2011).

Due to the categorical nature of the CCQ scores, Pearson's contingency coefficient was utilised instead of Pearson's product-moment correlation coefficient to determine the correlation between subscales.

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4.2.6.1.3 Interpretation

0 to .1 may be regarded as little or no relationship. A coefficient of .1 to .3 is considered a weak association, while .3 to .5 may be deemed a moderate association. If the value is greater than .5, it is considered a strong relationship (AcaStat, 2014).

4.2.6.2 Descriptive statistics

Descriptive statistics refer to the statistical procedures utilised to organise, summarise, and simplify the data that has been collected (Gravetter & Forzano, 2009). The specific descriptive statistics utilised were the measures of central tendency (mean, mode and median), measures of variation (standard deviation and standard error of measurement), and measures of shape (kurtosis and skewness) (Nestor & Schutt, 2012).

Descriptive statistics were presented for the ELSA, CCQ, LASSI, ESAP, the demographic variables (gender, population group, language and age), and the three academic performance indicators, namely retention, percentage of subjects passed and average mark. The descriptive statistics were structured and displayed as indicated in Figure 4.1.

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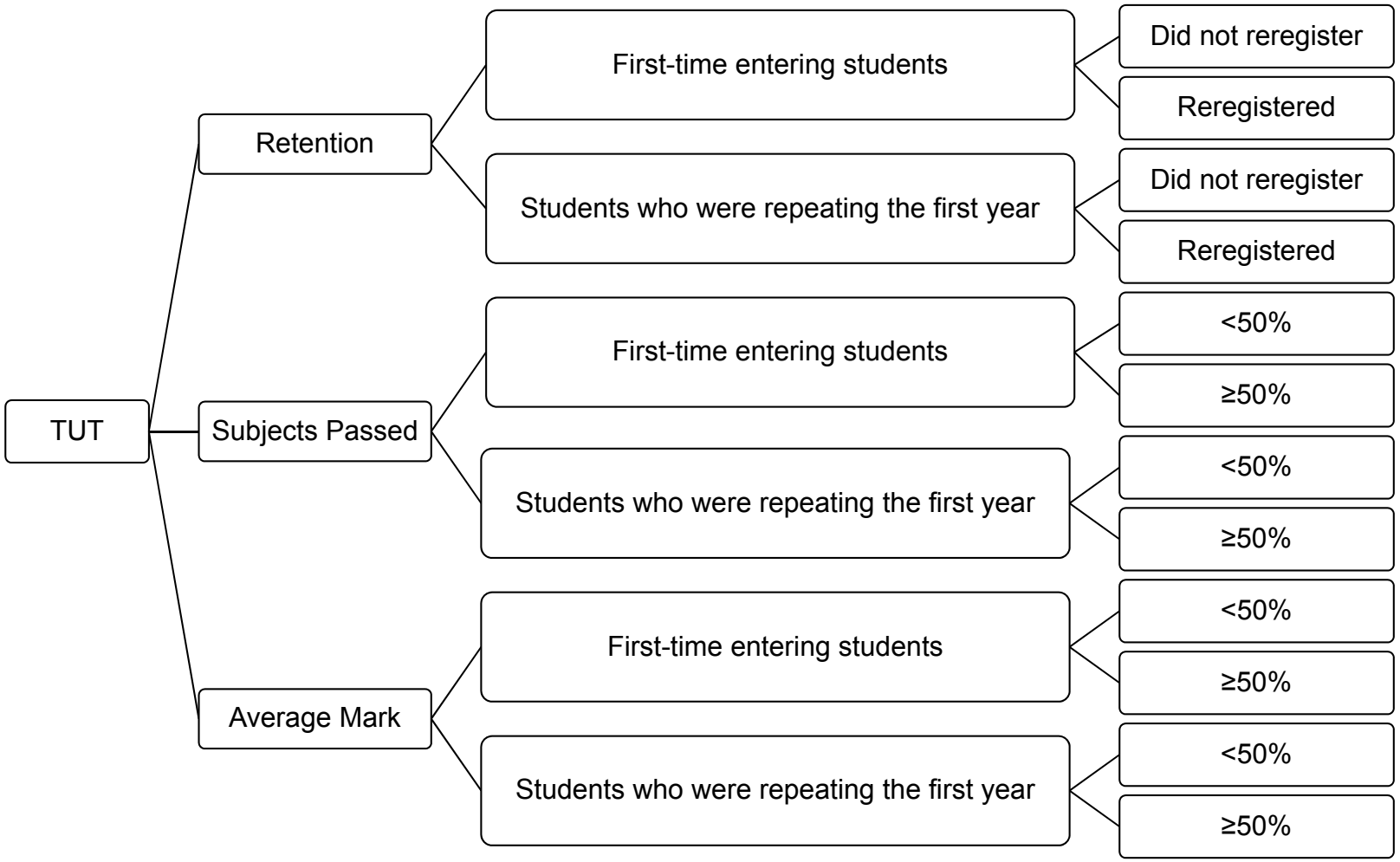
Figure 4.1 Format of the Presentation of the Descriptive Statistics



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4.2.6.2.1 Measures of central tendency

Measures of central tendency summarise group scores by utilising a single score to indicate the typical or average performance of the group. The three most frequently used measures are the mean, mode and median (Lodico, Spaulding, & Voegtle, 2010).

The *mean* is the arithmetical average of a group of scores. It is simply the sum of the scores divided by the number of scores. The mean can be somewhat misrepresentative as a measure of central distribution due to the skewness of the distribution. In a positively skewed distribution, the extreme scores will cause the mean scores to be higher than the central tendency of the group whereas in a negatively skewed distribution the extreme scores will result in a lower mean (Lodico et al. 2010). Certain samples represent the populations and yield statistics that are representative of the population values, while particular samples are extreme and those statistics do not approximate the population parameters. The average size of the sampling error is indicated by the *standard error of the mean* which represents the average or standard distance between the sample and the relevant population parameter (Gravetter & Forzano, 2012).

The *mode* is the score that most frequently occurs in a distribution. The mode is an inaccurate measure of central tendency as it merely summarises the frequency of an individual score. If a distribution is asymmetrical, the mode may not be an accurate measure (Lodico et al., 2010).

The *median* is the midpoint of the distribution. It is the score that divides a distribution in half when scores are arranged in order. The median is a relatively stable measure of central tendency that is not affected much by a few outlier scores (Lodico et al., 2010).

4.2.6.2.2 Measures of variability

The variance indicates the variability of a distribution with a single score. It is the average of the squared deviation scores. The deviation score indicates the distance of the score from the mean. Larger deviation scores indicate greater variability within the distribution. The *standard deviation* represents the square root of the variance and depicts the average distance between the scores and the mean. The standard

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deviation provides an indication of the dispersion of the distribution. The smaller the standard deviation value, the less dispersion and the closer the scores are to the mean (Lodico et al., 2010).

4.2.6.2.3 Measures of shape

A normal distribution forms a symmetrical bell-shaped pattern when plotted as a frequency polygon. It is symmetrical when the mean, median and mode are the same and are in the middle of the distribution. It is unimodal when most scores are in the centre of the distribution (Jackson, 2012).

Kurtosis indicates how flat or peaked a normal distribution is. In mesokurtic curves, peaks have medium height and moderate width, and a kurtosis value of 3. Leptokurtic curves are tall and thin with relatively few scores in the middle having high frequencies, and have kurtosis values of greater than 3. Platykurtic curves are flatter and wider with many scores around the middle score that have similar frequencies; the kurtosis value is less than 3 (Brown, 2011; Jackson, 2012).

A normal distribution is a theoretical construct that is not always observed in reality. In practical situations, most distributions do not approximate a normal distribution, but tend to lean to one side. Skewness denotes symmetry or asymmetry in a distribution. In a skewed distribution, scores are clustered at one end of the x-axis and the tail of the distribution in the opposite direction. In a positively skewed distribution, the peak is left of the centre of the distribution while in a negatively skewed distribution the peak is on the right (Jackson, 2012). Bulmer's (1979) rule of thumb for interpreting skewness values suggests that a skewness score less than -1 or greater than +1 is considered highly skewed. Values between -1 and -0.5 or between +1 and +0.5 are regarded as moderately skewed. If the value is between +0.5 and -0.5, the distribution may be considered approximately symmetric (Brown, 2011).

4.2.6.3 Internal consistency reliability

Internal consistency or interitem reliability refers to the degree to which all the items in an assessment measure the same construct (Nestor & Schutt, 2012). In order to evaluate the internal consistency reliability of the instruments, Cronbach's coefficient α

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(r_α) and the Kuder-Richardson formula 20 (KR-20) were applied. Cronbach's coefficient alpha was used when an instrument had more than two response options, that is, for the ELSA, LASSI and ESAP. KR-20 was used for the CCQ where the items were dichotomous. Both formulae yielded values between 0 and 1.00 (Gravetter & Forzano, 2009).

What is deemed as an acceptable level of reliability appears to be a contentious issue. Minimum reliability coefficients from 0.60 to 0.90 have been proposed. Foxcroft and Roodt (2011) asserted that interpretation of the reliability coefficient depended on the purpose of the assessment. Henson (2001) suggested interpreting cautiously, gauging the magnitude according to the context and how the scores are utilised.

Owen and Taljaard (1996) mentioned that a reliability coefficient of .60 can yield valuable information as long as the assessment results were interpreted aptly while Galpin (2001) maintained that a value under 0.6 is regarded as an indicator of poor reliability.

Hatcher (1994) discussed Nunnally's (1978) widely used rule of thumb of .70; many assessments with reliabilities of .70 have been shown to be valuable and measures with even lower reliabilities have been useful in research (Gregory, 2010).

Terre Blanche et al. (2006) accepted 0.75 as their standard, and Anastasi and Urbina (2009) suggested that standardised measures should have reliability values in the 0.80s and 0.90s range. Huysamen (1996) proposed that it should be at least 0.85 if the assessment is going to be used to make decisions about individuals while 0.65 is adequate for decisions regarding groups. Smit (1996) contended that standardised personality and interest questionnaires should have a reliability of 0.80 to 0.85 while aptitude and intelligence tests should be at least 0.90.

Internal consistency reliability was computed and reported for the four instruments (ELSA, CCQ, LASSI and ESAP).

4.2.6.4 Pearson's Chi-square test of independence

Pearson's Chi-square test computes the relationship between two categorical variables. This procedure compares the observed frequencies in specific categories to

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the frequencies one may expect to obtain in those categories by chance. The two assumptions of the Chi-square test are that each person/score/item contributes to only one cell in the contingency table and there should be more than five expected frequencies (Field, 2009).

Pearson's Chi-square test of independence was used to analyse the relationship between the independent variables and the dependent variables. The results of the Chi-square test was used to determine which variables should be entered into the logistic regression analyses. The variables that emerged as significant in this test were entered into the logistic regression analyses.

4.2.6.5 Logistic regression

Several studies utilised logistic regression when examining factors related to academic achievement. These include studies by Allen, Robbins, Casillas, and Oh (2008), Arbona and Nora (2007), Buchmann and DiPrete (2006), DeBerard, et al. (2004), French, Immekus and Oakes (2005), Germeijs and Verschueren (2007), Gurpinar, Alimoglu, and Aktekin (2010), and Munro, Vithal and Murray (2015).

Rodriguez and Coello (2008) conducted a study using grades in basic scientific courses and demographic variables to predict academic achievement. However, the primary purpose of their study was to compare the results obtained using linear and logistic regression in terms of goodness of fit and predictive power. Logistic regression was found to be a more suitable method as it yielded more stable estimates.

The primary reason for utilising logistic regression as opposed to multiple regression, was the categorical nature of the dependent variables. For each of the three secondary research questions, the dependent variables were classified in terms of risk categories: Reregistering and not reregistering; passing less than 50% of subjects registered for and passing at least 50% of subjects registered for; and obtaining an average mark less than 50% or obtaining an average mark of at least 50%.

4.2.6.5.1 Brief overview of logistic regression

Logistic regression combines contingency tables with multiple regression. When analysing contingency tables (crosstabulations or crosstabs), variables have a

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dichotomous, nominal or ordinal level of measurement, and relatively few distinct categories (usually less than 10 and seldom more than 20). Escalating from bivariate or trivariate contingency tables to multivariate contingency tables led to the creation of log-linear analysis to manage the intricacy of multiple variables (Menard, 2010).

Log-linear analysis examines the effects of several independent variables whose level of measurement is nominal or ordinal. It is a statistical method for exploring the relationship between cells in tabulated data (Kenny, Kashy, & Cook, 2006).

Multiple regression is a data analytic method that examines the association between a single dependent variable and two or more independent or predictor variables. It provides a measurement of the extent to which the independent variables jointly predict the criterion variable using the coefficient of determination (R^2) (Hanneman, Kposowa, & Riddle, 2012). In ordinary least squares (OLS) multiple regression, the level of measurement of the variables are interval or ratio (Menard, 2010).

The initial log-linear analysis do not adequately deal with predictor variables that are on a continuous interval or a ratio scale while ordinary least squares (OLS) regression do not manage dichotomous, nominal or ordinal variables effectively. Logistic regression analysis is compatible with dependent variables that are dichotomous, unordered polytomous or polytomous nominal. The predictor or independent variables may be interval, ratio or dummy variables (Menard, 2010).

4.2.6.5.2 Assumptions of logistic regression

The three main assumptions of logistic regression are linearity, independence of errors and multicollinearity. The categorical nature of a dependent variable violates the assumption of linearity. Transforming the data using a logarithmic transformation formulates the non-linear equation in a linear form in logarithmic terms (logit). Independence of errors refers to the individual cases of data not being related to each other. Multicollinearity should not be prevalent; this implies that the independent variables should not have a strong correlation with each other (Field, 2009).

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4.2.6.5.3 Assessing the model

Weiner, Schinka, and Velicer (2013) stipulated two criteria for evaluating the performance of the model, namely, empirical consistency and discriminatory power. Empirical consistency prevails if the response variable behaves in the manner predicted by the model. This is also referred to as goodness-of-fit. A frequently utilized test of empirical consistency is the Hosmer-Lemeshow test. In this test, a significant χ^2 suggests that the model is not empirically consistent. The sample size for this test should yield a minimum expected frequency of five in each cell. Discriminatory power is the degree to which the structural component of the model distinguishes between the various cases' scores on the response. One of the ways of determining how well the model predicts is to see if the predicted figures lead to accurate categorisation of the response. In logistic regression, a classification table is "a cross-tabulation of case versus control status based on model predictions, against whether or not observations are actually cases or controls" (Weiner et al., 2013, p. 555).

4.2.6.5.4 Methods of logistic regression

Methods of logistic regression that may be used are the forced entry method or stepwise methods. In the forced entry method, all the independent variables are entered into the model in one block and parameter estimates are computed for each block (Field, 2009).

Stepwise methods may be either forward or backward stepwise methods. With the forward method, the program commences with a model that only contains the constant and adds a single variable at a time to the model based on the value of the score statistic, starting with the most significant score statistic and adding one at a time until there are no variables with a significant score statistic. At each step the model is also evaluating if any variables should be removed (Field, 2009).

In the backward method, the model commences with the constant and all the predictor variables and the program tests with each step if any variable can be eliminated from the model without substantially altering the model fit. The first variable removed is the one that contributes the least to the model (Field, 2009).

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One of the key considerations in the selection of a method is whether the model is testing a theory or if it is an exploratory study. Stepwise is advisable for exploratory work. If stepwise is used, backward is preferred to forward as forward selection is more likely to exclude variables involved in suppressor effects. Suppressor effects occur when a predictor variable only has a significant effect when another variable is held constant (Field, 2009).

4.2.6.5.5 Logistic regression in this study

Logistic regression models were derived for the following:

- Variables that have a relationship with retention from the first to the second year of study;
- Variables that have a relationship with the average first-year mark; and
- Variables that have an association with the percentage of subjects passed in the first year.

Each of these models will be computed for two categories, namely, first-time entering students and students who were repeating the first year.

4.2.7 Complying with research ethics

Deplorable violations of human rights for research purposes in the United States led to the creation of a National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. The Commission's Belmont Report (U.S. Department of Health, Education, and Welfare, 1979) instituted three fundamental ethical tenets for the protection of human subjects: respect for persons, thereby treating people as autonomous and protecting those with reduced independence; beneficence, implying the minimisation of potential harms and maximisation of benefits; and justice, suggesting that the benefits and risks of research should be fairly distributed. The 2002 APA Ethics Code comprised five general principles and 151 enforceable Ethical Standards that encapsulated the moral vision of the profession of psychology and was congruent with the three principles of the Belmont Report. Fifteen of the Standards directly addressed research and publication, and several others had implications for research practice (Nestor & Schutt, 2012). Considering the importance

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attributed to ethics at a professional and humane level, this research project aimed to comply with professional protocols on maintaining ethical clearance.

As the researcher was employed at a different institution from the one where the study was conducted, clearance had to be obtained from both institutions. At the institution where the project was conducted, permission had to be obtained for the execution of the project and use of the risk profiling and intervention data. Permission was granted by the Director of the Directorate of SDS. At the institution where the researcher was registered, the completed application for ethical clearance, mandated by the Faculty of Humanities, was submitted to the Research Proposal and Ethics Committee, with the approved research proposal attached to it.

In terms of the data collection, the Assessment Centre at TUT supervised the ethical implementation of the research project. All participants were informed of the nature of the assessments and research project, and signed an informed consent form. The informed consent form contained information on risks, participants' rights, termination of participation and feedback on the results of the assessment. The anonymity of the students' identity in the reporting of the research results was guaranteed. Limitations to the confidentiality of the students' results were discussed. As the assessment results were also going to be used for planning support, developmental and remedial interventions, the results needed to be shared with relevant personnel. Students were given an opportunity to ask questions and then proceeded to sign the consent form. They were made aware that they could be provided with a copy of the signed informed consent form upon request.

All assessments were administered in compliance with the general ethical code for psychometric assessment. A comprehensive hard-copy report was printed for each student which was issued to the student during the feedback session. During the feedback session, the results and the intervention options were discussed at length. Relevant interventions were available to the students at no cost.

4.3 Measurement Instruments

The following instruments were used to assess the four broad areas of student functioning: English Literacy Skills Assessment (ELSA); Career Choice Questionnaire

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(CCQ); Learning and Study Strategies Inventory (LASSI); and Emotional Skills Assessment Process (ESAP). A brief overview of each assessment, the subscales and its psychometric properties are provided in the following sections.

4.3.1 Testing and assessment procedures

The assessments were administered by TUT's student Assessment Centre to first-year students at the beginning of the academic year. Students were assessed as a programme group on request of the course head of department, co-ordinator or lecturer. Assessments sessions were facilitated by psychologists and psychometrists registered with the Health Professions Council of South Africa (HPCSA) and conducted in accordance with ethical principles and codes pertaining to psychometric assessment.

The assessments were pencil-and-paper format that were able to be scored by an optical mark reader. The use of the pencil-and-paper format was chosen over the computerised format for the following reasons: it enabled testing of larger groups of students than a computer laboratory/electronic resource centre would accommodate; loadshedding, that is planned rolling blackouts, impacted on electricity supply for the computers in the assessment venues or server locations (Loadshedding, 2013); internet connectivity at the university computer laboratories was not fast enough and sufficiently stable to allow smooth uninterrupted completion of the tests; and the processing and integration of assessment results were much more efficient using a pencil-and-paper format.

4.3.2 ELSA

The ELSA is a norms-based measure of student's English language skills, comparing them to that of South African English mother-tongue users. It is in essence a prior-learning and ABET-placement guide for English (Horne, 2007).

The instrument is a South African instrument developed by Hough & Horne CC. The original norming sample in 1993 comprised 684 learners from 26 schools nationally. The norming process was managed by the HSRC's Centre for Statistics. The mother-tongue of all the learners was English, and the norming sample comprised learners

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from the following population groups: Asians, Blacks, Coloureds and Whites. In 1995, the norms were refined using a representative sample of 2439 learners. In 2008, the norms were verified with a sample of 145 learners (T.J. Horne, personal communication, July, 23, 2008).

The ELSA Intermediate comprises seven sub-tests: phonics, dictation, basic numeracy, spatial relationships (verbal), reading comprehension (elementary), cloze procedures (intermediate) and vocabulary in context (advanced) (Horne, 2004b).

The ELSA Scanner Intermediate that was utilised in the study is an abridged version of the ELSA intermediate. It is primarily for use with large groups of respondents where an indicator language competency-input level is needed. The raw scores are used to categorise the respondent's English level into one of following categories: Below Grade 8, Grade 8 or 9, Grade 10 or 11, Grade 12 or 12+. Unlike the complete ELSA Intermediate, the ELSA Scanner does not diagnose. It comprises only two subscales, Cloze Procedures and Vocabulary in Context (Horne, 2004a). The Cloze Procedures subscale assesses the competency to produce a semantic and intelligible whole, and comprises twenty items. The Vocabulary in Context subscale investigates if the testee is able to extricate information from a specific context to deduce the definition of particular words and phrases. This subscale comprises thirty items. The total score is 50, with a minimum score of 0 and a maximum score of 50 (Hough & Horne, 2006; van Dyk, 2005).

ELSA has a reliability of .86 and a predictive validity of 84% (Horne, 2007). The predictive validity of the ELSA was also estimated in Logie's (2010) study which found a significant difference in the academic performance of students in the different grade level groups. On the contrary, Nagdee's (2011) study reported no statistically significant differences in the ELSA scores of students in three groups of MBA students with differing levels of academic performance.

The constructs of the ELSA have been criticised in recent years as the ELSA construes language ability as knowledge of sound, vocabulary, form and meaning (van Dyk, 2005). Bachman and Palmer (1996), however, believed that tests of academic literacy

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should be founded on an interactional perspective of language ability which accentuates the negotiation of meaning within particular contexts.

4.3.3 CCQ

The CCQ is a five-item instrument that was designed to screen for students who were potentially at risk due to having made an uninformed career choice (TUT, 2008). The instrument investigates course awareness, career path awareness, perceived aptitude, course satisfaction and if the course is the student's first choice of course or not. The total score is 7 with a minimum score of 0 and a maximum score of 7. This instrument is reverse scored. Hence, a lower score is preferable on this instrument and indicates that the student has made an informed career choice.

4.3.4 LASSI

The LASSI was developed by Weinstein and Palmer (2002) and published by H&H Publishing Company. It is an eighty-item assessment of a student's awareness about and utilisation of learning and study strategies (Weinstein & Palmer, 2002). The inventory was conceptualised from two learning models, namely, Simon's (1979) general model of learning and cognition and Weinstein's (1994) model of strategic learning (Cano, 2006).

The ten subscales highlight covert and overt thoughts, behaviours, attitudes, motivations and beliefs relevant to successful learning in higher education: these behaviours can be modified or remedied through appropriate interventions like acquiring learning skills and study methods courses (Weinstein & Palmer, 2002). Table 4.2 provides an overview of the ten LASSI subscales and the component of strategic learning each subscale is primarily related to.

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Table 4.2

LASSI Components and Subscales

Skill	Will	Self-regulation
Information Processing	Anxiety	Concentration
Selecting main ideas	Attitude	Self-Testing
Test Strategies	Motivation	Study Aids
		Time Management

(Weinstein & Palmer, 2002)

The subscales in the Skill component evaluate students' learning strategies, skills and thought processes relevant to identifying, acquiring and constructing meaning for new information, and how they prepare for and reveal their new knowledge in assessments. The subscales in the Will component focus on the extent to which students are concerned about their academic performance, their receptiveness to acquiring new information, their attitudes and interest in their studies, conscientiousness, willpower and enthusiasm to make the effort required to be successful in their studies. The self-regulation component subscales evaluate how students manage and control the learning process through effective time-management, maintaining concentration over time, ensuring that they have met specific learning demands and using study supports (Weinstein & Palmer, 2002).

4.3.4.1 Interpretation of the LASSI

Scores are reflected in terms of percentiles. Scoring above the 75th percentile on a subscale indicates that a student does not have to give high priority to enhancing that area. If a student scores between the 50th and 75th percentile, he/she should consider improving the skills associated with that subscale. If a score on a subscale is below the 50th percentile, attention needs to be devoted to enhancing the relevant strategies in order to succeed in higher education (Weinstein & Palmer, 2002).

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4.3.4.2 Latent structure of the LASSI

Items for the LASSI were selected using a functional approach, where items were chosen as they were indicative of students' learning methods instead of the traditional correlational approach where items are selected because they correlate with learning and achievement, but do not necessarily provide information on the learning process. The items were classified according to a specific theme or factor (Cano, 2006).

The coefficient alpha values for the subscales are presented in Table 4.3. Each subscale comprised eight items. The coefficients range from .73 to .89. Attitude and Study Aids are the only subscales with values below .8.

Table 4.3

Reliability of the LASSI Subscales

Subscale	Coefficient Alpha
Anxiety	.87
Attitude	.77
Concentration	.86
Information Processing	.84
Motivation	.84
Self-Testing	.89
Selecting Main Ideas	.84
Study Aids	.73
Test Strategies	.80
Time Management	.85

Note. From " LASSI. User's manual for those administering the Learning and Study Strategies Inventory (2nd ed.)" by C.E. Weinstein and D.R. Palmer, p.26. Copyright 2002 of H&H Publishing Company.

A South African study by Seabi (2011) reported coefficient alphas ranging from .70 to .79. A study conducted by Van den Bergh and Burk (1998) examining the reliability and validity of the LASSI within the South African context concluded that the LASSI was an appropriate instrument within the context. However, the study utilised the 1987 edition of the LASSI, whereas the present study utilised the 2002 second edition of the LASSI.

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Except for Weinstein's (1994) studies, only a few studies have reported on a psychometric analysis of the LASSI using students at higher education level. Olejnick and Nist's (1992) principal component analysis of subscale scores yielded three factors labelled as "values-related activities" (Motivation, Time Management and Concentration), "goal orientation" (Information Processing, Study Aids and Self-Testing) and "cognitive activities" (Anxiety, Selecting Main Ideas and Test Strategies). Three subscales (Main Idea, Concentration and Attitude) loaded on more than one factor. Olaussen and Braten (1998) also found a three-factor solution, naming the three factors "effort-related activities", "goal orientation", and "cognitive activities". Melancon's (2002) study detected 18 factors, concluding that the LASSI subscales do not measure the 10 subscales indicated in the manual. Cano's (2006) research also yielded three factors which were named "affective strategies", "goal strategies" and "comprehension monitoring strategies". Cano's study also investigated the relationship between the latent constructs and academic performance. Only the first two factors contributed to the regression equation.

4.3.4.3 Predictive validity of the LASSI

Several studies have considered the predictive validity of the LASSI. Albaili (1997), Dill et al (2014), Nist, Mealey, Simpson, and Kroc (1990), Proctor Prevatt, Adams, Hurst, and Petscher (2006), Prus, Hatcher, Hope, and Grabiel (1995), Rugsaken, Robertson, and Jones (1998), and Yip (2007) utilised the LASSI in their studies on the prediction of academic performance.

A few South African studies have focused on the LASSI as a predictor of academic performance. In Hendrich and Schepers's (2004) study, six out of the ten LASSI subscales had significant correlations with GPA, with Attitude and Motivation being the most noteworthy. In Seabi's (2011) study, Attitude, Anxiety and Test Strategies predicted academic achievement of first-year engineering students. Van Aardt and van Wyk's (1996) research showed that increases in LASSI scores over a two-year period was correlated with an increase in academic achievement for chemistry and accounting students.

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4.3.5 ESAP

The ESAP was developed by Darwin Nelson, Gary Low and Robert Vela, and distributed by Emotional Intelligence Learning Systems, Inc. It was field tested with 2000 high school and college students in South Texas. The original norms were derived using 760 first-year students at the Texas A & M University. Research conducted in China supported the use of the instrument cross-culturally (Nelson et al., 2003). Local norms were derived by Dockrat (2010; 2011) using 1990 first-year students at the Tshwane University of Technology.

The ESAP assists students in identifying and understanding certain behaviours that are vital for their academic, personal and career success. The assessment concentrates on cognitive-behavioural skills and is regarded as the first step to emotional learning that connects interventions to the 'felt' or 'perceived' needs of the individual student. The ESAP enables students to identify their present level of emotional skills and plans enhancement of the skills in collaboration with a counsellor, lecturer or mentor (Nelson et al., 2003). An overview of the ESAP subscales is provided in Table 4.4.

Table 4.4

Overview of ESAP Subscales

Emotional skills				Potential problem areas
Intrapersonal	Leadership	Self management	Interpersonal	
Assertion	Comfort	Drive Strength	Self-esteem	Aggression
	Empathy	Time Management	Stress Management	Deference
	Decision Making	Commitment Ethic		Change Orientation
	Leadership			

(Nelson et al., 2003)

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4.3.5.1 Interpretation of the ESAP

As the ESAP is an American instrument, South African norms for the ESAP were generated (Dockrat, 2010). The norms are shown in Table 4.5.

Table 4.5

ESAP guidelines for Interpretation of scores

			Develop	Strengthen	Enhance
Emotional skills	Interpersonal	Assertion	0 – 18	19 – 29	30 – 36
	Leadership	Comfort	0 – 15	16 – 22	23 – 24
		Empathy	0 – 14	15 – 23	24
		Decision Making	0 – 11	12 – 20	21 – 24
		Leadership	0 – 12	13 – 21	22 – 24
	Self management	Drive Strength	0 – 31	32 – 44	45 – 50
		Time Management	0 – 12	13 – 21	22 – 24
		Commitment Ethic	0 – 14	15 – 21	22 – 24
	Intrapersonal	Self-esteem	0 – 31	32 – 44	45 – 50
		Stress management	0 – 24	25 – 41	42 – 49
Potential problem areas	Self management	Aggression	15 – 24	4 – 14	0 – 3
		Deference	24 – 36	11 – 23	0 – 10
		Change Orientation	15 – 24	4 – 14	0 – 3

Note. From "The standardization of the Emotional Skills Assessment Process (ESAP) for South African students of higher education" by S.Y. Dockrat, 2010, Slide *26.* Paper presented at the 7th Annual Institute for Emotional Intelligence, San Antonio, Texas.

4.3.5.2 Reliability of the ESAP

The reliability statistics for the ESAP are presented in Table 4.6. The ESAP alpha coefficients for the subscales ranged from .60 to .91. The split-half coefficients were somewhat lower, ranging from .56 to .82. The stability coefficients ranged from .47 to .77 with a two-month interval between the test and retest. The test developers considered the stability coefficients to be acceptable as they did not anticipate high levels of stability over extended periods of time due to learning, development of skills

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and stressors that could potentially impact on an individual's perception of his or her emotional skills Nelson et al. (2003).

Table 4.6

ESAP Reliability Coefficients

Subscale	α	Split Half	Stability
Assertion	.60	.56	.64
Aggression	.70	.61	.47
Deference	.75	.71	.77
Comfort	.74	.67	.45
Empathy	.79	.67	.50
Decision Making	.76	.75	.68
Leadership	.82	.82	.75
Self-esteem	.81	.78	.73
Stress Management	.81	.81	.60
Drive Strength	.81	.79	.64
Time Management	.82	.74	.57
Commitment Ethic	.76	.72	.66
Change Orientation	.75	.69	.65
Whole Test	.91	.72	

Note. From "ESAP. Emotional Skills Assessment Process. Interpretation and intervention guide ." by D. Nelson, G., Low,, & R. Vela, 2003, p.33. Copyright 2003 by Texas A&M University.

With regard to its construct validity, a study conducted by Nelson et al. (2003) supported a four-factor solution. This was also supported by confirmatory factor analysis with Nelson, Jin, and Wang's (2002) Chinese sample, suggesting that the ESAP factors were consistent across cultures. The skill subscales were significantly positively correlated and the potential problem areas correlated negatively with the skill subscales and presented as a distinct and separate factor.

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4.3.5.3 Predictive validity of the ESAP

Investigations conducted by Nelson et al. (2002), Stottlemyyer (2002) and Vela (2003) revealed a significant relationship between the ESAP skill subscales and academic performance.

4.3.6 Measures of student success

The measurement of student success in higher education is a complex concept which can by no means be crystallised in a unitary construct. Retention rates, success rates, throughput rates, graduation rates, success or failure in a subject, completion of the qualification within the minimum period, grade point average and cumulative grade point average are only some of the terms that have been used in measuring student success in related research. Some factors complicating the issue is that higher education has a complex promotional system, diverse study fields, varying academic standards in fields of study, differences in the number of subjects registered for, different faculty strategies and varying student populations (Swanepoel, 2002).

Two criteria for student success in higher education that are generally accepted in the literature are academic achievement and student retention. Frequently used measures of academic achievement include the percentage obtained in a particular module, subject, or course, successful completion of a particular course, number of subjects passed, persistence, graduation in minimum time and average percentage obtained during the first semester or the first year of study. Conversely, students at risk are conceptualised as those who dropped out before completing their qualification or those exhibiting academic underachievement. Each measure has its limitations (Eiselin, 2006; Grebennikov & Skaines, 2009).

The first semester average and the first year average are the most frequently used measures of academic performance as the first semester and year is a watershed year for many students. The first year is critical because being successful in the first semester and the first year increases the likelihood of success in subsequent years based on the “success breeds success” principle (Swanepoel 2002). Furthermore, the average mark attained during the first year correlates positively with academic performance in successive years (Huysamen, 1998). However, the watershed year for

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students may differ amongst faculties and institutions (Johnson, 1996; McGrath & Brauenstein, 1997).

Eiselin (2006) argued that the only legitimate measure of achievement in South African higher education is throughput as throughput is the criterion that determines funding from government. Throughput is a measure of the proportion of a cohort of students who completed their qualification within the prescribed or extended period of time (Lewin & Mawoyo, 2014). However, the measurement of throughput itself may be problematic as students do not necessarily exhibit linear pathways through higher education. Some may drop out from one university and complete their studies at another (Scott et al., 2007).

Due to the complicated nature of quantifying academic performance it was essential that specific points of departure or assumptions had to be demarcated as a foundation for devising a criterion for academic achievement in higher education. Firstly, it was assumed that a final mark in an examination was an objective indicator of academic performance. Secondly, the marks obtained in the different subjects were equivalent to each other. Variables like evaluation standards or different levels of difficulty between subjects were not considered, but disregarded as the pass mark for all subjects was 50%. Finally, there was an assumption that all the subjects on the same level have the same level of difficulty (Swanepoel, 2002).

The present study utilised three performance criteria. The first criterion was the percentage of subjects passed at the end of the first year. This was computed by dividing the number of subjects passed by the number of subjects registered for. The second criterion was the average first-year mark. This was calculated by summing the totals of all the scores and dividing the amount by the number of subjects registered for. The third criterion was retention from the first to the second year, that is, the student reregistered in the subsequent year.

4.4 Sample and Biographic Profile

This section presents the demographic profile of the sample. The variables discussed are gender, population group, home language and age.

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4.4.1 Defining the population and samples

In the present study a nonprobability convenience sample that comprised first-year students at a South African university of technology was used. The sample included first-time entering students, that is, students who were registered for the first time as well as students who were repeating the first-year. Students were deemed to be repeating the first year if the majority of the subjects that they were registered for were first-year subjects.

Participation was at course level. The course co-ordinator or a lecturer had the prerogative of deciding whether or not to have the students registered for a specific course evaluated.

In some faculties, deans strongly urged heads of departments and other relevant personnel to have the students in their divisions assessed while in other faculties there was less urgency to do so. Hence, in the latter case, it was the more engaged staff and those who generally sought out additional support and resources for their students who had their students assessed. These factors per se may have an impact on academic achievement within that programme. Xuehui, Hannum, and Sargent (2007), for example, showed that teaching quality is closely related to student engagement, with particular aspects of student engagement actually predicting academic achievement. This variable may have substantially threatened the external validity of the study had all the subjects been recruited in this manner. However, it was counter-balanced by the students who registered for courses where the dean had advocated the profiling of students. Personnel in these faculties who otherwise would not have had their students profiled also had their students tested.

The students evaluated were registered for courses across all seven faculties at the university, namely, the Faculty of the Arts, Faculty of Economics and Finance, Faculty of Engineering and the Built Environment, Faculty of Humanities, Faculty of Information and Communication Technology, Faculty of Management Sciences, and Faculty of Science.

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4.4.2 Sampling procedures

The current study utilised a convenience sampling strategy. This method entailed sampling without utilising random selection methods, implying that all the subjects in the possible sample set did not have an equal chance of being in the sample. This could have potentially created a bias towards particular cases in the population compared to others.

Convenience sampling is a non-probability sampling method where the subjects are selected due to their accessibility and proximity to the researcher. The subjects are selected for the study as they are the simplest to engage in the study. It is a quick, easy, and inexpensive, and the subjects are available compared to utilising the entire population. A convenience sample may either be by self-selection of individuals volunteering or a group of subjects that are accessible. Advantages of this method include that it enables documentation in of a specific property of a construct within a given sample, its efficacy in detecting relationships among different phenomenon, and it is beneficial in attaining baseline data and trends in pilot studies. The most significant criticism of this sampling technique is sampling bias as the sample is not representative of the total population. There is a likelihood that the results emanating from a study utilising a convenience sample may differ from the results of the complete population. A systematic bias may lead to skewed results. Furthermore, a convenience sample may limit the level of generalisations and inferences about the whole population, thereby threatening its external validity (Emmanuel, 2009).

4.4.3 Profiling the sample

Four-thousand seven-hundred and eighteen students participated in the study. Students were represented from all seven faculties within the institution, 35 departments and 54 programmes. The faculties, departments and programmes are indicated in Table 4.7.

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Table 4.7

Faculty, Department and Programme Composition

Faculty	Department	Course
The Arts	Drama and Film	Drama Film and TV Production
	Entertainment Technology	Performing Arts Technology
	Fashion Design and Technology	Fashion Design
	Fine and Applied Arts	Fine Art Jewellery Design Textile Design
	Performing Arts	Musical Theatre Vocal Art
	Visual Communication	Graphic Design Interior Design Photography
Economic Science	Accounting	Accountancy
	Managerial Accounting and Finance	Financial Information Systems
	Public Sector Finance	Finance and Accounting (Public) Local Government Finance
Engineering and the Built Environment	Building Sciences	Building
	Chemical, Metallurgical and Materials Engineering	Chemical Engineering Metallurgy
	Civil Engineering	Civil Engineering
	Electrical Engineering	Electrical Engineering
	Geomatics Industrial Engineering	Surveying Industrial Engineering
	Mechanical Engineering	Mechanical Engineering Mechatronics
Humanities	Educational Studies	Education
	Journalism	Journalism
	Safety and Security Management	Correctional Services Policing Road traffic
Information and Communication Technology	ICT First Years and Foundation Unit	Information Technology
Management Science	Office Management and Technology	Office Management and Technology
	Operations Management	Operations Management Management services
	People Management and Development	Human Resources Management
	Tourism Management	Adventure Tourism Management Ecotourism Management Events Management Tourism Management
Science	Biomedical Science	Clinical Technology Radiography
	Biotechnology and Food Technology	Biotechnology Food Technology
	Crop Sciences	Crop Production
	Environmental Health	Environmental Health
	Horticulture	Horticulture Landscape Technology
	Nature Conservation	Game Ranch Management Nature Conservation
	Nursing	Nursing
	Pharmaceutical Sciences	Somatology
	Physics	Fire Technology
	Sport, Rehabilitation and Dental Sciences	Orthotics and Prosthetics

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Of the respondents, 94.47% (4457) were first-time entering students, indicating that it was the first time that the students were registered at TUT while 5.53% (261) of the respondents were repeating the first year.

4.4.4 Gender

The total sample comprised 48% females and 52% males. Crosstabulations are presented below providing more information on the demographic profile of the sample. A crosstabulation or contingency table is a method of combining related frequency tables into one table. It describes the responses of subgroups in a sample (de Vaus, 2002). Crosstabulations are presented for the biographical variables (age, gender and language) for the research population.

Table 4.8 depicts the Gender by Year of Study crosstabulation. Whilst there were more males that were registered for the first time, there were more females that were repeating the first year.

Table 4.8

*Gender*Year of Study Crosstabulation*

	First-time entering students	Students who were repeating the first year
Male	2272	116
	52.8%	45.3%
Female	2034	140
	47.2%	54.7%

Note. N = 4562

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4.4.5 Population group

This section presents the ethnic/racial profiles of the sample. Within the South African context, inclusion of this demographic variable provides valuable information considering the historical context, and social and political objectives of the education system.

In terms of population group, the sample comprised 80% Black, 18% White, 1% Coloured, and 1% Indian students. At the institution, the student population is 92% Black, 7% White, 1% Coloured, and 0.004% Indian (Management Information System, 2012). The sample was, therefore, representative of the population groups within the institution. The frequencies for each population group, delimited by the year of registration are shown in Table 4.9. Similar patterns prevailed for the groups. The main difference was that amongst the first-time entering students there were more Coloured than Indian students whereas in the group of students repeating, there was an equal number of Coloured and Indian students.

Table 4.9

*Population Group*Year of Study Crosstabulation*

	First-time entering students	Students who were repeating the first year
Indian	29	2
	0.7%	0.8%
Black	3529	219
	80.6%	86.9%
White	777	29
	17.7%	11.5%
Coloured	40	2
	0.9%	0.8%
Other	6	0
	0.1%	0%

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4.4.6 Language

Figure 4.2 illustrates the home language of the students in the sample as well the language distribution of the institution's student population.

The pattern of the distribution of the scores within the sample approximated the distribution of the TUT student population. Sepedi was selected as the home language most frequently. The most significant observation about these results is that English was not one of the most frequently used home languages of the TUT population nor of the research population. It was ranked fifth in terms of home language of the TUT population and ranked sixth with regard to the sample. Yet, it is the official medium of instruction at TUT.

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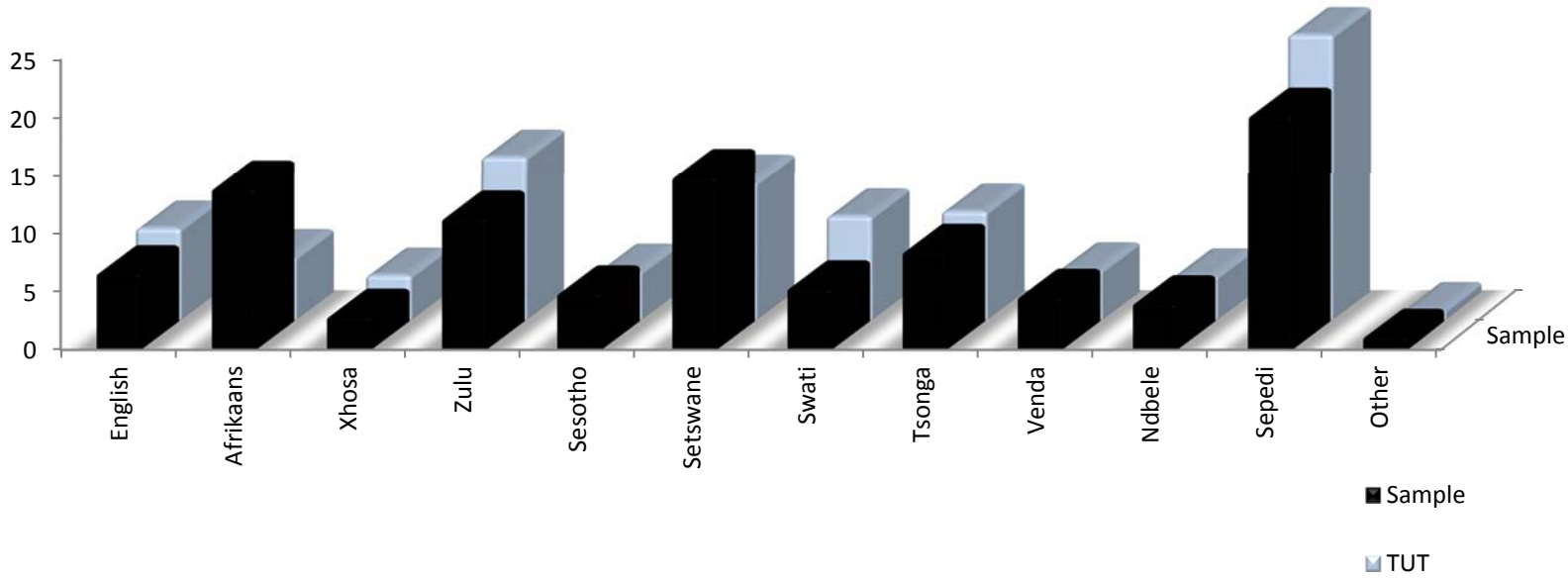
Figure 4.2 Language Profile of Research Sample and Overall TUT Student Population



Note. The figures for the TUT population were obtained from the TUT Management Information System (Management Information System, 2012).

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The frequencies for home language demarcated by year of study are depicted in Table 4.10. Similar patterns were evident for the two groups.

Table 4.10

*Language*Year of Study Crosstabulation*

	First-time entering students		Students who were repeating the first year		Total	
	n	%	n	%	n	%
English	295	6.7%	12	4.7%	307	6.6%
Afrikaans	624	14.1%	26	10.1%	650	13.9%
Xhosa	130	2.9%	10	3.9%	140	3.0%
Zulu	513	11.6%	34	13.2%	547	11.7%
Sesotho	217	4.9%	12	4.7%	229	4.9%
Setswana	666	15.1%	42	16.3%	708	15.1%
Swati	243	5.5%	15	5.8%	258	5.5%
Tsonga	386	8.7%	20	7.8%	406	8.7%
Venda	210	4.8%	14	5.4%	224	4.8%
Ndebele	176	4.0%	14	5.4%	190	4.1%
Sepedi	905	20.5%	56	21.8%	961	20.5%
Other	56	1.3%	2	.8%	58	1.2%

Note. N = 4678

4.4.7 Age

The mean age was 19.68 years. The median and mode were both 19. The positive skewness was expected (4.17) as there is a tendency for most students to enter higher education immediately or shortly after completing their secondary schooling. 0.02% of the sample was over 25 years old. McGivney (2004) categorises students over 25 who have had a gap since completing full-time education as adult students. The mean age for the first-time entering students was 19.64 years and the mean age for the first-year students who were repeating was 20.31 years. This was anticipated as the students

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who were repeating were in their second year of study although still registered for the first year. Figure 4.3 graphically represents the age distribution.

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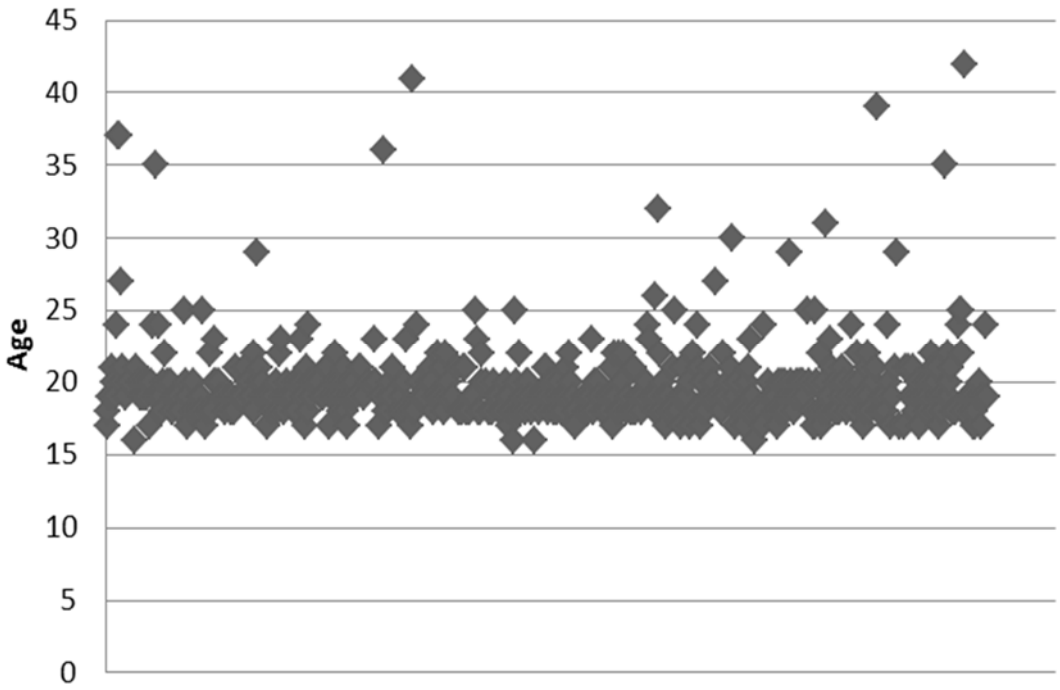
Figure 4.3 Age



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4.4.8 Generalising of research results

An advantage of the research population is its diversity in terms of gender, language and population group.

One of the limitations of the sample was the geographical demarcation of the study. The respondents were students registered at the Pretoria campuses of the university only. The students at the three distant campuses did not form part of the study.

A further limitation was that the institution being investigated was a university of technology. Hence, the results were not necessarily generalisable to other institutions in the higher education sector, specifically traditional universities or colleges for further education and training. The results may be relevant to diploma programmes at comprehensive universities.

4.5 Conclusion

This chapter outlined the methodology to operationalise the research. This was an applied research project that utilised a quantitative research strategy and a correlational design. The specific methods used in the data analysis were Pearson's product moment correlation coefficient, Pearson's contingency coefficient, and descriptive statistics. This chapter also discussed the assessment instruments, the subscales and the psychometric properties as provided by manuals and other existing literature for the ELSA, LASSI and ESAP. Prevailing research indicated sound reliability and predictive validity for these instruments. The ELSA and LASSI had been well validated within the South African context while studies on the predictive validity of the ESAP in South African higher education were limited. As the CCQ was developed by the institution in the sample for the purpose of risk-profiling, no prior research was available. The three academic performance measures that were used in the study were also discussed. A convenience sample of first-year students at TUT was used.

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CHAPTER 5
DATA PRESENTATION AND INTERPRETATION

"Statistics may rightly be regarded as a body of methods for making wise decisions in the face of uncertainty."
(Wallis and Roberts, cited in Agarwal, 2009, p. 2)

5.1 Introduction

This chapter presents the results and interpretation of the data of the present study. It comprises two phases: preliminary evidence and testing of hypotheses. The preliminary analyses consist of evidence for the relationships and reliability of the instruments. To give a description of the data, preliminary explanatory statistical procedures, such as percentages, means and standard deviations, were also computed. The phase encompassing the testing of hypotheses comprised results and analyses of the Pearson's chi-square tests of independence and the multivariate logistic regressions. These tests were conducted to understand the associations among the variables in the data.

PRELIMINARY ANALYSES

5.2 The Relationship Between the Measurement Instruments: Measured Constructs and Subconstructs

The correlations within instruments as well as the correlations between instruments are presented below.

5.2.1 ELSA

The correlations of the ELSA subscales with each other are presented in Table 5.1. The two ELSA subscales, Cloze Procedures and Vocabulary in Context, have a significant correlation with each other. In a language test, different subscales should measure different constructs, with each subscale contributing something unique about the testee's overall language ability. Hence, correlations should be relatively low, in the range of .3 to .5. High correlations above .9 would suggest that the two subscales are possibly measuring the same construct (Alderson, Clapham, & Wall, 1995). A

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correlation that is lower than .68 was therefore preferred, but the overlap was not sufficiently high to remove one of the subscales.

Table 5.1

Product-Moment Correlation Coefficients for ELSA Subscales

		Cloze procedures
Vocabulary in context	*r*	.68**
	Sig. (2-tailed)	0.000**
	N	4622

**. Correlation is significant at the 0.01 level (2-tailed).

5.2.2 CCQ

In Table 5.2 the correlations of the CCQ items with each other are indicated.

Table 5.2

Contingency coefficients for CCQ

			CCQ 1	CCQ 2	CCQ 3	CCQ 4
CCQ 2	Nominal by Nominal	Contingency Coefficient	.30			
CCQ 3	Nominal by Nominal	Contingency Coefficient	.24	.21		
CCQ 4	Nominal by Nominal	Contingency Coefficient	.14	.14	.345	
CCQ 5	Nominal by Nominal	Contingency Coefficient	.14	.18	.422	.43

Note. N=4466

The approximate significance value for all cells was .000. None of the items had a significant correlation with the other items. The correlations between them ranged from .135 to .431. Low correlations prevailed between the following: course awareness (CCQ1) and all the other items, and career path awareness (CCQ 2) and all the other

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items. Moderate correlations existed between choice number (CCQ 3), perceived aptitude (CCQ 4) and course satisfaction (CCQ 5). There were no strong correlations between the CCQ items, indicating that they all measured different aspects of career orientation.

5.2.3 LASSI

The correlations between the LASSI subscales are indicated in Table 5.3. The significance values for all the correlations were .000. The product-moment correlation coefficients ranged from .11 to .70.

Low correlations that were below .1 were only found with the Anxiety subscale. The low correlations were found between the following subscales: Anxiety and Attitude, Anxiety and Information Processing, Anxiety and Motivation, Anxiety and Self-Testing, and Anxiety and Study Aids.

Moderate correlations were found between the following subscales:

- Anxiety and Concentration, and Time Management
- Attitude and Information Processing, Self-Testing, Selecting Main Ideas, Study Aids, Time Management, and Test Strategies
- Concentration and Information Processing, Self-Testing, and Study Aids
- Information Processing and Selecting Main Ideas, Time Management, and Test Strategies
- Motivation and Selecting Main Ideas, and Test Strategies
- Self-Testing and Selecting Main Ideas, Selecting Main Ideas, and Study Aids
- Test Strategies and Study Aids, Time Management, and Self-Testing

Strong correlations were found between the following variables:

- Anxiety and Selecting Main Ideas, and Test Strategies
- Attitude and Motivation
- Concentration and Attitude, Motivation, Selecting Main Ideas, Time Management, and Test Strategies
- Information Processing and Motivation, Self-Testing, and Study Aids
- Motivation and Self-Testing, and Study Aids

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- Time Management and Selecting Main Ideas, and Study Aids and Time Management

The correlation between Selecting Main Ideas and Test Strategies was .70. This was a noteworthy association and partially due to certain items in the Test Strategies subscale pertaining to the skill of identifying important information.

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Table 5.3

Product-Moment Correlation Coefficients for LASSI Subscales

	Anxiety	Attitude	Concen-tration	Information Processing	Motiva-tion	Self-Testing	Selecting Main Ideas	Study Aids	Time Manage-ment
Attitude	.29**								
Concentration	.48**	.50**							
Information Processing	.13**	.39**	.41**						
Motivation	.23**	.52**	.54**	.61**					
Self-Testing	.11**	.33**	.47**	.62**	.60**				
Selecting Main Ideas	.52**	.47**	.65**	.41**	.49**	.37**			
Study Aids	.14**	.32**	.42**	.53**	.52**	.63**	.34**		
Time Management	.34**	.45**	.64**	.46**	.58**	.59**	.52**	.53**	
Test Strategies	.58**	.43**	.61**	.33**	.41**	.29**	.70**	.26**	.48**

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5.2.4 ESAP

In Table 5.4, the product-moment correlation coefficients between the twelve ESAP subscales are presented. All the significance values were .000. Most of the values fell in the range of a low to moderate correlation (.1 to .5).

A weak relationship with a value of less than .1 was found for:

- Deference and Empathy, Time Management, and Commitment Ethic
- Aggression and Decision Making

The following variables had strong correlations:

- Comfort and Empathy, Leadership, Drive Strength, and Self-esteem
- Empathy and Leadership, and Drive Strength
- Decision Making and Leadership, Drive Strength, and Commitment Ethic
- Leadership and Drive Strength, and Commitment Ethic
- Leadership and Self-esteem, Drive Strength, and Time Management
- Drive Strength and Commitment Ethic, and Self-esteem
- Time Management and Commitment Ethic, and Self-esteem

Leadership had a high correlation with six of the other eleven subscales as did Drive Strength. Decision Making correlated highly with five subscales. A strong correlation between items in the same cluster was expected.

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Table 5.4

Product-Moment Correlation Coefficients for ESAP Subscales

	Assertion	Aggression	Deference	Comfort	Empathy	Decision Making	Leadership	Drive Strength	Time Management	Commitment Ethic	Change Orientation	Self Esteem
Aggression	-.11**											
Deference	-.24**	.27**										
Comfort	.47**	-.23**	-.19**									
Empathy	.33**	-.18**	.047**	.57**								
Decision Making	.40**	-.07**	-.15**	.53**	.44**							
Leadership	.41**	-.12**	-.16**	.58**	.50**	.69**						
Drive	.41**	-.21**	-.11**	.54**	.51**	.58**	.57**					
Time Management	.34**	-.15**	-.09**	.44**	.43**	.49**	.44**	.68**				
Commitment Ethic	.34**	-.17**	-.04*	.45**	.46**	.51**	.52**	.67**	.59**			
Change Orientation	-.21**	.31**	.34**	-.28**	-.20**	-.26**	-.25**	-.31**	-.37**	-.21**		
Self Esteem	.41**	-.24**	-.24**	.59**	.46**	.49**	.52**	.62**	.53**	.49**	-.42**	
Stress Management	.18**	-.36**	-.28**	.29**	.18**	.17**	.20**	.27**	.22**	.20**	-.42**	.48**

Note. N = 4718

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5.2.5 Correlations between assessments

The correlations between the two ELSA subscales and the CCQ total score are shown in Table 5.5. The ELSA scores had a low inverse correlation with the CCQ total score. For the CCQ, a lower score was preferred. Therefore, the direction of the correlation was an acceptable finding.

Table 5.5

Correlations between the CCQ Total and ELSA Subscales

		Cloze procedures	Vocabulary in context	Total
Career Orientation	*r*	-.14**	-.13**	-.15**
	Sig. (2-tailed)	.000	.000	.000

Note. N = 4622
**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

In Table 5.6 the correlations between the two ELSA subscales and the ten LASSI subscales are presented. The significance value of all the pairs of correlations was .000. The correlations ranged from -0.026 to .213, indicating little association between the scores on the two assessments. This was an anticipated finding as the ELSA and LASSI measure very different constructs.

Table 5.6

Correlations (r) between ELSA and LASSI subscales

	Cloze procedures	Vocabulary in context	Total
Anxiety	.11**	.11**	.12**
Attitude	.15**	.13**	.15**
Concentration	.02	.01	.02
Information Processing	.01	.03	.02
Motivation	-.01	-.03	-.02
Self-Testing	-.13**	-.17**	-.16**
Selecting Main Ideas	.11**	.13**	.13**
Study Aids	-.10**	-.14**	-.14**
Time Management	-.05**	-.07**	-.06**
Test Strategies	.18**	.21**	.21**

Note. N = 4406
**. Correlation is significant at the 0.01 level (2-tailed)
*.Correlation is significant at the 0.05 level (2-tailed).

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In Table 5.7 the correlations between the two ELSA and the ELSA total score, and the twelve ESAP subscales are displayed. All the correlations had a significance value of 0.000. Correlations ranged from -.002 to -.25. These values reflect little or low correlation. The ELSA and the ESAP measure dissimilar constructs. Hence, high correlations were not expected.

Table 5.7

Correlations (r) between ELSA and ESAP Subscales

	Cloze procedures	Vocabulary in context	Total
Assertion	.13**	.13**	.13**
Aggression	-.22**	-.23**	-.25**
Deference	-.10**	-.12**	-.12**
Comfort	.14**	.13**	.14**
Empathy	-.00	-.02	-.02
Decision Making	.07**	.11**	.10**
Leadership	.12**	.14**	.15**
Drive Strength	.01	.01	.01
Time Management	-.08**	-.12**	-.11**
Commitment Ethic	.10**	.11**	.11**
Change Orientation	-.09**	-.08**	-.09**
Self-esteem	-.02	-.03*	-.03
Stress Management	.12**	.13**	.14**

Note. N = 3856

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The correlation between the total CCQ score and the ten LASSI subscales is shown in Table 5.8. Values ranged from -.06 to -.10. The significance values were all .000. All the values indicated very small inverse relationships. The inverse correlation was anticipated as a lower score was preferred for the CCQ.

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Table 5.8

Correlations between CCQ total and LASSI subscales

Subscale	Career Orientation
Anxiety	-.08**
Attitude	-.08**
Concentration	-.10**
Information Processing	-.10**
Motivation	-.06**
Self-Testing	-.06**
Selecting Main Ideas	-.08**
Study Aids	-.08**
Test Strategies	-.10**
Time Management	-.10**

Note. N = 4625

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

In Table 5.9, the correlations between the CCQ total score and the twelve ESAP subscales are displayed. The correlations ranged from -0.024 to -.102, indicating very little association. The significance values for all the correlations were .000 except for the Empathy-CCQ significance value which was .127. Kahn, Nauta, Gailbreath, Tipps, and Chartrand (2002) also considered personality variables and career orientation, and reported on the association of the Social Skills Inventory (SSI) and the Career Factors Inventory (CFI). The Emotional Sensitivity subscale in the SSI evaluates an individual's competence in "accurately perceiving and interpreting the emotional cues of others" (Kahn et al., 2002, p.9). The correlations between the Emotional Sensitivity and the CFI subscales were r =.10 for Need for Career Information, r = -.20 for Need for Self Knowledge, r = -.02 for Career Anxiety, and r = -.08 for Generalised Indecisiveness.

The CCQ score had a positive correlation with Aggression, Deference and Change Orientation. Aggression, Deference and Change Orientation are potential problem areas for which a low score was preferable. Hence, the positive correlation made sense as a low score was also preferred for the CCQ.

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Table 5.9

Correlations between CCQ Total and ESAP Subscales

Subscale	Career Orientation
Assertion	-.10**
Aggression	.08**
Deference	.06**
Comfort	-.08**
Empathy	-.02
Decision Making	-.07**
Leadership	-.09**
Drive Strength	-.10**
Time Management	-.10**
Commitment Ethic	-.11**
Change Orientation	.09**
Self-esteem	-.08**
Stress Management	-.09**

Note. N = 3939

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

In Table 5.10 the correlations between the ten LASSI subscales and the twelve ESAP subscales are presented. The values ranged from .05 to a moderate value of .36. The absence of strong correlations between similar subscales on the two instruments is notable. The two Time Management subscales only had a correlation of .36. Motivation (LASSI) and Drive Strength (ESAP) had a correlation of .34. Anxiety (LASSI) and Stress Management (ESAP) had a correlation of .24. Considering that these subscales measure similar constructs, higher correlations were expected.

All the correlations had a significance value of .000, with two exceptions. Self-testing and Deference had a significance value of .004, and Anxiety and Empathy had a significance value of .001.

The inverse correlations between Aggression, Deference and Change Orientation and the LASSI subscales were expected, as those were the three potential problem areas where lower scores were preferable.

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Table 5.10

Correlations (r) between ESAP and LASSI Subscales

	Anxiety	Attitude	Concen-tration	Information Processing	Motivation	Self-Testing	Selecting Main Ideas	Study Aids	Time Management
Assertion	.11**	.13**	.16**	.15**	.17**	.11**	.17**	.16**	.15**
Aggression	-.20**	-.25**	-.21**	-.08**	-.16**	-.06**	-.20**	-.10**	-.15**
Deference	-.23**	-.11**	-.17**	-.07**	-.10**	-.05**	-.19**	-.10**	-.12**
Comfort	.14**	.17**	.19**	.19**	.21**	.14**	.22**	.18**	.14**
Empathy	.05**	.13**	.15**	.16**	.20**	.18**	.15**	.18**	.16**
Decision	.14**	.13**	.18**	.19**	.20**	.14**	.22**	.15**	.15**
Time Management	.16**	.18**	.30**	.23**	.31**	.28**	.23**	.28**	.36**
Commitment Ethic	.13**	.21**	.24**	.22**	.28**	.21**	.23**	.21**	.24**
Change Orientation	-.24**	-.17**	-.28**	-.16**	-.21**	-.16**	-.26**	-.18**	-.26**
Self-esteem	.21**	.19**	.28**	.23**	.27**	.22**	.26**	.26**	.26**
Stress Management	.24**	.19**	.23**	.12**	.18**	.09**	.25**	.13**	.17**

Note. N=3939

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

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5.3 Reliability of Instruments

In this section reliability measures for the instruments as computed for the target population in the study are presented. Internal consistency measures were computed for each instrument.

5.3.1 ELSA

In Table 5.11 the reliability statistics for the ELSA are displayed.

Table 5.11

Internal Consistency Reliability Statistics for the ELSA

	Items	Cronbach's Alpha
Cloze Procedures	20	.73
Vocabulary in Context	30	.86
ELSA	50	.87

Note. N=4607

The Cronbach's alpha value for the total scale was .87 which was an infinitesimal improvement on the previously reported value of 0.86 (Horne, 2007). Both subscales and the total exceeded the minimum general standard of .70 (Nunnally, 1978), indicating good internal consistency of the instrument. The ELSA total score is used for categorisation purposes, while the individual subscale scores are used for developmental and remedial interventions.

5.3.2 CCQ

The Cronbach's Alpha value for the total scale was .65. The less than satisfactory internal consistency of the CCQ may have been attributed to the measure comprising only five items. Kline (2000) contends that while reliability increases as the length of a test increases, a minimum of ten homogenous items may yield a reliable test. However, he commended values lower than .7 in the Jackson Personality Research Form due to the brevity of the scales. Eight of the twenty-two scales were below .7 and two were below .6. These were still considered satisfactory.

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An analysis of the item-total statistics indicated that the Cronbach's Alpha value would have decreased if any of the items were dropped. Even though the accepted minimum standard is .70, Owen and Taljaard (1996) and Galpin (2001) suggested that a reliability coefficient of .60 may provide valuable information only if the results were interpreted appositely. Huysamen (1996) deemed a value of .65 as acceptable if decisions about groups were being made, and Gregory (2010) proposed that values below .70 may be satisfactory within the research context.

Considering that the current context precluded individual or high-stakes decisions, and that this is a short instrument, .65 may be regarded as acceptable within this research context. However, if the instrument will be utilised to make individual decisions, increasing the number of items in the instrument will enhance the internal consistency reliability of the instrument. Alternatively, different instruments measuring career orientation could be investigated.

5.3.3 LASSI

In Table 5.12 the Cronbach's Alpha values for the ten LASSI subcales are indicated. Each subcale had eight items. The values ranged from .68 to .80. Only one subscale fell below the .70 threshold, namely, Study Aids. The LASSI manual also indicated that the Study Aids subscale had the lowest Cronbach's Alpha coefficient of .73 where the range of coefficients was .73 to .89 (Weinstein & Palmer, 2002). When the item-total statistics of the Study Aids scale were analysed, the results indicated that the Cronbach's Alpha value would not have increased if any of the items were eliminated.

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Table 5.12

Reliability statistics for the LASSI

Subscale	Cronbach's Alpha
Anxiety	.75
Attitude	.74
Concentration	.74
Information Processing	.77
Motivation	.80
Self-Testing	.80
Selecting Main Ideas	.77
Study Aids	.68
Time Management	.70
Test Strategies	.71

Note. N = 4718

5.3.4 ESAP

In Table 5.13 the Cronbach's Alpha values for the twelve ESAP subscales are displayed. For the ESAP, the Cronbach's Alpha ranged from .67 to .81. The Assertion subscale (α = .67) and the Decision Making subscale (α = .68) were the only subscales below 0.70. Eliminating two items from the Assertion subscale would have only increased the value by .01 to .68. This increase would still not have raised the value to the .70 standard. If one item was removed from the Decision Making subscale, the Cronbach's Alpha value would have increased by .01 to α = .69.

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Table 5.13

Reliability statistics for the ESAP subscales

Subcale	Items	Cronbach's Alpha
Assertion	18	.67
Aggression	18	.80
Deference	18	.81
Comfort	12	.71
Empathy	12	.82
Decision Making	12	.68
Leadership	12	.79
Drive Strength	25	.81
Time Management	12	.82
Commitment Ethic	12	.74
Change Orientation	12	.81
Self-esteem	25	.82
Stress Management	25	.86

Note. N = 4718

The internal consistency of the five ESAP clusters is displayed in Table 5.14. The Cronbach's Alpha values ranged from .67 to .91. The Intrapersonal cluster comprises only one subcale, Assertion which was one of the two subscales which had an internal consistency of less than .70.

Table 5.14

Internal consistency for the ESAP clusters

Cluster	Items	Cronbach's Alpha
Intrapersonal	18	.67
Leadership	48	.90
Self management	49	.91
Interpersonal	50	.89
Potential problem areas	48	.86

Note. N = 4718

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5.4 Descriptive Statistics

In this section, the descriptive statistics for the independent and dependent variables are presented. The summary statistics for each of the four instruments (ELSA, CCQ, LASSI and ESAP) are presented. While comparisons were drawn between successful and unsuccessful students, and first-time entering students and students who were repeating, these comparisons were based on the descriptive measures and not on tests of significance. Significance tests were not executed because the research questions did not pertain to differences between the two groups, but to the profile of underachieving students.

5.4.1 ELSA

In Table 5.15 the summary statistics for ELSA are displayed.

Table 5.15

Summary statistics for the ELSA

Subcale	Mean	Std. Error of Mean	Median	Mode	Std. Dev.	Skew-ness	Kurtosis
Cloze Procedures	10.91	0.06	11	13	4.40	-.006	-.85
Vocabulary in Context	12.88	0.09	12	9	6.09	.54	-.36
Total	23.80	0.14	23	19	9.64	.34	-.62

Note. N = 4622

The mean scores were quite low: it was 11 (maximum 20) or 55% for Cloze Procedures. For Vocabulary in Context, the mean was 13 (maximum 30) or 43%. The mean for the total score was 24 (maximum 50) or 48%. A score of 24 falls into the Below Grade 8 level of functional English proficiency.

In Table 5.16, the ELSA mean scores for each of the academic performance measures in terms of the categories for each criterion are provided.

For the academic performance criterion of Retention, for the first-time entering students, the mean scores for students who returned the following year were higher than the mean scores for the students who did not reregister. The pattern was the same for the students

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who were repeating the first year, with one exception. The mean score for Cloze Procedures was higher for the students who did not reregister.

For Subjects Passed, in both groups (first-time entering students, and students who were repeating the first year), the mean score for the students who had passed 50% or more subjects was higher than the mean scores for the students who had passed less than 50% of the subjects.

The results for Average Mark were similar to the results for Retention. The mean score for students whose average mark was greater than 50% was greater than the mean score of the less than 50% group. However, the Cloze Procedures subscale for the students who were repeating the first year was an exception.

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Table 5.16

Mean scores for the ELSA for Academic Performance categories

	Retention				Subjects Passed				Average Mark			
	First-time entering students		Students who were repeating the first year		First-time entering students		Students who were repeating the first year		First-time entering students		Students who were repeating the first year	
	Did not reregister	Re-registered	Did not reregister	Re-registered	<50%	≥50%	<50%	≥50%	<50%	≥50%	<50%	≥50%
Cloze Procedures	10.37	11.04	11.03	10.85	9.95	11.25	11.42	10.71	9.51	11.32	11.11	10.81
Vocabulary in Context	12.42	13.00	11.83	13.00	11.44	13.36	11.49	13.26	11.04	13.40	11.70	13.18
Total	22.79	24.03	22.86	23.85	21.39	24.61	22.91	23.97	20.54	24.72	22.81	23.98

Note. N=4622

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5.4.2 CCQ

In this section the summary statistics and frequencies for the CCQ are presented.

Table 5.17 displays the summary statistics for the CCQ.

Table 5.17

Summary statistics for the CCQ

Subscale	Mean	Std. Error of Mean	Median	Mode	Std. Deviation
Total	.368	.01	0	0	.92

Note. N = 4466

The mean for the total score is very low, indicating that most students reported being clear regarding their career choices.

Table 5.18 indicates the mean scores for the three different academic performance indicators.

For Retention, in both groups, the students retained had preferable scores when compared to the students who did not reregister the subsequent year.

For Subjects Passed, students who scored 50% or more had lower scores than students who scored less than 50%. For the CCQ, a lower score is preferred.

The same pattern prevalent for the Subjects Passed category was shown for the Average Mark category. Students with an average mark greater or equal to 50% had preferable CCQ scores than students with an average mark less than 50%.

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Table 5.18

Mean scores for the CCQ for academic performance categories

	Retention				Subjects Passed				Average Mark			
	First-time entering students		Students who were repeating the first year		First-time entering students		Students who were repeating the first year		First-time entering students		Students who were repeating the first year	
	Did not reregister	Re-registered	Did not reregister	Re-registered	<50%	≥50%	<50%	≥50%	<50%	≥50%	<50%	≥50%
Mean	0.57	0.33	0.41	0.29	0.52	0.32	0.41	0.28	0.57	0.31	0.44	0.27

Note. N = 4669

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5.4.3 LASSI

The descriptive statistics for LASSI are presented in this section. None of the mean scores were above 75, that is, the threshold score for not needing to prioritise development in that area. Scores below 50 indicate risk areas; hence, mean scores under 50 are highlighted (Weinstein & Palmer, 2002).

Table 5.19

Summary statistics for the LASSI

Subscale	Mean	Std. Error of Mean	Median	Mode	Std. Deviation	Skew-ness	Kurtosis
Anxiety	46.71	0.39	45	15	26.85	.06	-1.03
Attitude	43.86	0.46	40	1	31.27	.18	-1.30
Concentration	56.18	0.39	60	90	26.85	-.27	-.98
Information Processing	64.86	0.38	75	75	26.10	-.92	-.06
Motivation	55.36	0.44	60	80	29.63	-.29	-1.07
Self-Testing	67.23	0.40	75	90	27.13	-.96	-.18
Selecting Main Ideas	53.97	0.40	60	85	27.09	-.25	-1.00
Study Aids	58.80	0.43	65	80	28.98	-.47	-.98
Time Management	59.49	0.38	65	85	25.82	-.55	-.70
Test Strategies	46.02	0.43	45	45[a]	29.16	.07	-1.23

Note. N = 4626

If a student scores below 50 on any of the subscales, intervention is required in that area. The median scores for Anxiety, Attitude and Test Strategies were below 50. The modes for Anxiety and Attitude were very low. The mode for Anxiety was 15 and Attitude was 1 which is the minimum score that may be obtained. The TUT mean scores indicated scores below 50 on three subscales, Anxiety, Attitude and Test Strategies. The remaining mean scores for the subscales were all in the intermediate category. None of the mean scores

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fell into the category where further development needed not be prioritised. None of the distributions were highly skewed. The distributions for all the subscales were platykurtic.

Table 5.20 displays the mean LASSI scores for the three academic performance criteria.

For Retention, in both categories, the mean scores for the students who reregistered were higher than the mean scores of the students who did not register. Furthermore, the mean scores of the first-time entering students were higher than the mean scores of the students who were repeating the first year.

For Subjects Passed, the mean scores for the students who passed at least 50% of the subjects were higher than the mean scores of the students who passed less than 50% of the subjects. Furthermore, the mean scores of the first-time entering students were higher than the mean scores of the students who were repeating the first year.

In both categories for Average Mark, the mean scores for students obtaining an average mark of 50% or higher was higher than the mean scores of the students who obtained less than 50%. There was one exception. In the category of first-year students who were repeating, the students who obtained less than 50% had a higher mean score for Study Aids than those with 50% or more. With regard to Retention and Subjects Passed, the mean scores of the first-time entering students were higher than the mean scores of the students who were repeating the first year.

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Table 5.20

Mean LASSI scores for academic performance criteria

	Retention				Subjects Passed				Average Mark			
	First-time entering students		Students who were repeating the first year		First-time entering students		Students who were repeating the first year		First-time entering students		Students who were repeating the first year	
	Did not reregister	Re-registered	Did not reregister	Re-registered	<50%	≥50%	<50%	≥50%	<50%	≥50%	<50%	≥50%
Anxiety	44.06	47.31	35.47	46.22	43.53	47.90	37.02	47.26	43.93	47.64	35.60	47.45
Attitude	40.57	44.89	29.75	40.02	39.05	45.91	34.75	39.93	37.44	46.10	35.15	39.71
Concentration	52.69	57.08	40.56	53.97	52.58	57.67	46.08	54.16	51.77	57.71	46.96	53.74
Information Processing	63.11	65.47	51.41	61.97	62.29	66.00	58.81	61.17	61.98	65.96	57.33	61.54
Motivation	52.42	56.08	39.75	53.25	51.44	56.83	45.03	53.52	51.18	56.72	46.84	52.84
Self-Testing	65.81	67.67	56.59	64.55	66.59	67.64	61.80	64.06	66.55	67.62	63.20	63.62
Selecting Main Ideas	50.97	54.91	38.94	50.24	50.20	55.65	44.36	50.17	50.30	55.44	43.45	50.30
Study Aids	58.58	59.28	46.34	52.98	57.88	59.59	53.02	51.85	58.01	59.49	53.16	51.84
Time Management	58.15	59.97	43.53	57.69	57.46	60.41	50.56	57.52	57.44	60.32	47.42	58.26
Test Strategies	42.49	46.95	34.00	43.27	41.48	47.84	34.85	44.32	41.18	47.71	33.16	44.60

Note. N = 4619

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5.4.4 ESAP

The descriptive statistics for ESAP for the total population are discussed in this section.

Table 5.21 provides the summary statistics for the ESAP. All the mean scores for the ESAP were in the 'Strengthen' category which is the intermediate category. None of the distributions were highly skewed and all were platykurtic.

Table 5.21

Summary statistics for the ESAP

Subscale	Mean	Std. Error of Mean	Median	Mode	Std. Dev.	Skew-ness	Kurtosis
Assertion	22.95	.08	23	24	4.85	-.45	.48
Aggression	10.05	.09	9	6	5.58	.58	.05
Deference	17.52	.10	18	18	6.13	.04	-.16
Comfort	18.27	.06	19	20	3.71	-.92	1.51
Empathy	18.43	.06	19	19	3.94	-1.05	1.59
Decision Making	15.88	.06	16	17	3.63	-.34	.41
Leadership	17.09	.07	18	19	4.22	-.67	.43
Drive Strength	36.86	.11	38	36	6.62	-.83	1.70
Time Management	17.13	.07	18	19	4.26	-.67	.30
Commitment Ethic	17.49	.05	18	18	3.44	-.80	1.28
Change Orientation	10.31	.08	10	10	4.81	.20	-.57
Self-esteem	37.15	.11	38	41	6.85	-1.07	2.13
Stress Management	30.00	.14	31	33	8.92	-.38	-.36

Note. N = 3940

Table 5.22 indicates the mean ESAP Scores for the three academic performance criteria.

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Table 5.22

Mean ESAP scores for academic performance criteria

	Retention				Subjects Passed				Average Mark			
	First-time entering students		Students who were repeating the first year		First-time entering students		Students who were repeating the first year		First-time entering students		Students who were repeating the first year	
	Did not reregister	Re-registered	Did not reregister	Re-registered	<50%	≥50%	<50%	≥50%	<50%	≥50%	<50%	≥50%
Assertion	22.48	23.03	22.43	23.02	22.50	23.08	23.65	22.73	22.50	23.06	22.74	22.99
Aggression	10.53	9.95	9.68	10.43	10.86	9.78	9.90	10.46	10.96	9.80	10.39	10.32
Deference	17.98	17.48	16.50	17.16	18.03	17.41	17.18	17.05	17.90	17.47	17.22	17.04
Comfort	18.19	18.31	18.43	17.97	17.96	18.39	18.88	17.79	17.94	18.38	18.30	17.96
Empathy	18.52	18.43	18.64	18.27	18.44	18.44	19.14	18.08	18.46	18.44	18.59	18.25
Decision Making	15.66	15.94	15.57	15.72	15.63	15.98	16.20	15.56	15.68	15.95	16.11	15.60
Leadership	17.06	17.12	16.50	17.16	16.88	17.17	18.35	16.71	16.82	17.18	17.52	16.96
Drive Strength	36.25	37.03	36.54	35.94	36.15	37.14	36.37	35.92	36.18	37.10	35.83	36.07
Time Management	16.56	17.24	17.32	16.87	16.73	17.27	16.69	17.00	16.74	17.24	17.00	16.91
Commitment Ethic	17.15	17.57	16.64	17.37	16.93	17.69	17.20	17.29	16.84	17.68	16.65	17.44
Change Orientation	10.81	10.18	10.79	10.87	10.81	10.11	12.08	10.50	10.89	10.12	10.96	10.83
Self-esteem	36.73	37.29	37.71	35.63	36.96	37.28	37.71	35.37	36.99	37.26	36.59	35.71
Stress Management	29.37	30.19	27.25	28.63	29.07	30.37	26.84	28.93	28.96	30.35	27.39	28.74

Note. N = 3939

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For the Retention criterion, for first-year entering students, there was one exception where the students who did not reregister obtained preferable scores when compared to the retained students. This exception was for the Empathy subscale. For the students who were repeating the first year, there were several subscales where the students who did not reregister had preferable mean scores compared to the students who reregistered. This occurred for the following subscales: Aggression, Deference, Comfort, Drive Strength, Time Management, Change Orientation, and Self-esteem. For the three potential problem areas, Aggression, Deference and Change Orientation, lower scores were preferred.

In the Subjects Passed category, for the first-time entering students, the Empathy scale was also the one exception where the students who passed less than 50% obtained preferable scores compared to the students who passed 50% or more of their subjects. The mean score for Empathy was the same in both categories. For the students who were repeating the first year, there were several scales where the students who passed less than 50% of their subjects had preferable mean scores compared to the students who reregistered. This occurred for the following scales: Aggression, Comfort, Empathy, Leadership, Drive Strength, Self-esteem and Stress Management.

For Average Mark, for the first-time entering students, the Empathy scale was also the one exception where the students who obtained an average mark of less than 50% obtained preferable scores compared to the students who attained an average mark of 50% or more. The Empathy mean score was slightly higher for students who had an average mark of less than 50%. For the students who were repeating the first year, there were several scales where the students who passed less than 50% of their subjects had preferable mean scores compared to the students who reregistered. This occurred for the following scales: Comfort, Empathy, Decision Making, Leadership, Time Management, and Self-esteem.

One of the commonalities for the three academic performance criteria was that underachieving students had higher Empathy scores. In one case students who had passed less than half the subjects as well as those who had passed at least half the subjects had an equal Empathy score. Also for all three groups of students who were repeating, underachieving students obtained a higher Comfort score.

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5.4.5 Biographical variables

The demographic characteristic of the sample are analysed in greater detail. The crosstabulations are presented for the following biographical variables: gender, population group, language and age.

5.4.5.1 Gender

The frequencies for gender are indicated according to the year of study and academic performance measures.

Table 5.23 indicates the frequencies of males and females within the two retention categories.

In both categories (first-time entering students and students who were repeating the first year) for Retention, there was a slightly higher proportion of males that reregistered in the subsequent year. For Subjects Passed, both the first-time entering students as well as the students who were repeating the first year, there were more males than females who passed at least 50% of the subjects for which they had registered.

The same pattern is evident for Retention and the Percentage of Subjects Passed was visible for the Average Mark too – in both categories, more males obtained an average mark of at least 50% compared to females.

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Table 5.23

Frequencies for gender for academic performance criteria

	Retention				Subjects Passed				Average Mark			
	First-time entering students		Students who were repeating the first year		First-time entering students		Students who were repeating the first year		First-time entering students		Students who were repeating the first year	
	Did not reregister	Re-registered	Did not reregister	Re-registered	<50%	≥50%	<50%	≥50%	<50%	≥50%	<50%	≥50%
Male	304	1954	14	99	519	1739	20	93	456	1802	16	97
	13.5%	86.5%	12.4%	87.6%	23.0%	77.0%	17.7%	82.3%	20.2%	79.8%	14.2%	85.8%
Female	292	1715	18	118	480	1527	39	97	427	1580	39	97
	14.5%	85.5%	13.2%	86.8%	23.9%	76.1%	28.7%	71.3%	21.3%	78.7%	28.7%	71.3%

Note. N = 4514

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5.4.5.2 Population group

The frequencies for population group will be indicated according to the year of study and academic performance measures.

Table 5.24 indicates retention patterns in terms of population group.

Amongst the first-time entering students for Retention, Coloured students had the highest percentage of students that reregistered while Indian students had the lowest percentage. Amongst the students who repeated the first year, the most noteworthy result was that all the White students reregistered again.

In both Average Mark categories, there were substantial differences between the average marks of the different population groups. White students achieved the highest percentage, obtaining an average mark greater than 50%.

The same pattern shown for Average Mark occurred for Subjects Passed. The group of White students had the highest percentage of students who passed at least half of their subjects.

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Table 5.24

Frequencies for population group for academic performance criteria

	Retention				Subjects Passed				Average Mark			
	First-time entering students		Students who were repeating the first year		First-time entering students		Students who were repeating the first year		First-time entering students		Students who were repeating the first year	
	Did not reregister	Re-registered	Did not reregister	Re-registered	<50%	≥50%	<50%	≥50%	<50%	≥50%	<50%	≥50%
Indian	6	23	1	1	9	20	1	1	9	20	1	1
	20.7%	79.3%	50.0%	50.0%	31.0%	69.0%	50.0%	50.0%	31.0%	69.0%	50.0%	50.0%
Black	508	3024	30	189	822	2707	51	168	925	2604	56	163
	14.4%	85.6%	13.7%	86.3%	23.3%	76.7%	23.3%	76.7%	26.2%	73.8%	25.6%	74.4%
White	96	681	0	29	68	709	2	27	82	695	1	28
	12.4%	87.6%	0.0%	100.0%	8.8%	91.2%	6.9%	93.1%	10.6%	89.4%	3.4%	96.6%
Coloured	4	36	1	1	6	34	1	1	7	33	1	1
	10.0%	90.0%	50.0%	50.0%	15.0%	85.0%	50.0%	50.0%	17.5%	82.5%	50.0%	50.0%
Other	0	6			0	6				6		
	0.0%	100.0%			0.0%	100.0%				100.0%		

Note. N = 4633

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5.4.5.3 Language

Table 5.25 indicates the frequencies for language according to the year of study and academic performance measures.

For Retention, the percentages ranged from 81.5% (Xhosa) to 91.8% (Zulu) for the first-time entering students that reregistered. For the students who were repeating, the range was much larger, from 66.7% (Sesotho) to 100% (Xhosa). There was not a substantial difference in the retention patterns of English-speaking students compared to the other languages.

For the first-time entering students the percentages of the students obtaining an Average Mark of at least 50% ranged from 70.2% (Tsonga) to 91% (Afrikaans). For the students who were repeating, the percentages ranged from 50% (Sesotho) to 100% (Venda).

With regard to Subjects Passed, the percentage of students passing at least half the subjects ranged from 64.7% (Venda) to 88.8% (Afrikaans) in the first-time entering students' category. Amongst the students who were repeating, the percentages ranged from 58.3% (Sesotho) to 92.3% (Afrikaans).

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Table 5.25

Frequencies for language for academic performance criteria

	Retention				Subjects Passed				Average Mark			
	First-time entering students		Students who were repeating the first year		First-time entering students		Students who were repeating the first year		First-time entering students		Students who were repeating the first year	
	Did not reregister	Re-registered	Did not reregister	Re-registered	<50%	≥50%	<50%	≥50%	<50%	≥50%	<50%	≥50%
English	45 15.3%	250 84.7%	1 8.3%	11 91.7%	39 13.2%	256 86.8%	3 25.0%	9 75.0%	41 13.9%	254 86.1%	3 25.0%	9 75.0%
Afrikaans	71 11.4%	553 88.6%	1 3.8%	25 96.2%	56 9.0%	568 91.0%	3 11.5%	23 88.5%	70 11.2%	554 88.8%	2 7.7%	24 92.3%
Xhosa	24 18.5%	106 81.5%	0 0.0%	10 100.0%	33 25.4%	97 74.6%	2 20.0%	8 80.0%	39 30.0%	91 70.0%	2 20.0%	8 80.0%
Zulu	42 8.2%	469 91.8%	3 9.1%	30 90.9%	87 17.0%	424 83.0%	10 30.3%	23 69.7%	98 19.2%	413 80.8%	12 36.4%	21 63.6%
Sesotho	36 16.7%	180 83.3%	4 33.3%	8 66.7%	53 24.5%	163 75.5%	6 50.0%	6 50.0%	63 29.2%	153 70.8%	5 41.7%	7 58.3%
Setswana	127 19.4%	527 80.6%	6 14.6%	35 85.4%	170 26.0%	483 74.0%	11 26.8%	30 73.2%	200 30.6%	453 69.4%	13 31.7%	28 68.3%
Swati	27 11.2%	215 88.8%	2 13.3%	13 86.7%	42 17.4%	200 82.6%	1 6.7%	14 93.3%	41 13.9%	254 86.1%	3 25.0%	9 75.0%
Tsonga	53 13.9%	329 86.1%	3 15.0%	17 85.0%	114 29.8%	268 70.2%	4 20.0%	16 80.0%	70 11.2%	554 88.8%	2 7.7%	24 92.3%
Venda	34 16.6%	171 83.4%	1 8.3%	11 91.7%	65 31.9%	139 68.1%	0 0.0%	12 100.0%	39 30.0%	91 70.0%	2 20.0%	8 80.0%
Ndebele	28 16.0%	147 84.0%	2 15.4%	11 84.6%	40 22.9%	135 77.1%	2 15.4%	11 84.6%	98 19.2%	413 80.8%	12 36.4%	21 63.6%
Sepedi	109 12.2%	784 87.8%	8 14.8%	46 85.2%	192 21.5%	700 78.5%	12 22.2%	42 77.8%	63 29.2%	153 70.8%	5 41.7%	7 58.3%
Other	3 5.4%	53 94.6%	1 50.0%	1 50.0%	10 17.9%	46 82.1%	1 50.0%	1 50.0%	200 30.6%	453 69.4%	13 31.7%	28 68.3%

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5.4.5.4 Age

Table 5.26 the mean ages for each of the academic performance criteria are shown.

In the Retention group, an unexpected result was the mean age for students who were repeating the first year as students who are in their second year are expected to be older than first-time entering students. This anomaly may be attributed to rounding off errors by respondents. For example, if a student was 19 years and 10 months, the student may have reported the age as 19 years instead of 20 as the student had not yet turned 20.

The mean age for the below 50% and ≥50% Average Mark groups were similar. The students who were repeating were older than the first-time entering students.

The same pattern that was evident for the mean age for Average Mark occurred for Subjects Passed.

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Table 5.26

Mean scores for age for academic performance criteria

	Retention				Subjects Passed				Average Mark			
	First-time entering students		Students who were repeating the first year		First-time entering students		Students who were repeating the first year		First-time entering students		Students who were repeating the first year	
	Did not reregister	Re-registered	Did not reregister	Re-registered	<50%	≥50%	<50%	≥50%	<50%	≥50%	<50%	≥50%
Age	19.84	19.62	19.86	20.36	19.70	19.64	20.47	20.25	19.5	19.7	20.36	20.57

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5.4.6 Interventions

The frequencies and crosstabulations for the intervention programmes are presented in Table 5.27 below.

Table 5.27

Frequencies for interventions programmes attended

Intervention	Frequency	Percentage
English Program	290	6.2%
Reading Enhancement Program	7	0.2%
Career Counselling	30	0.6%
Individual Study Skills Sessions	40	0.9%
Study Skills Workshops	181	3.8%
Academic Life Skills Workshops	283	6%
Personal Life Skills Workshops	141	3%
Personal Counselling	17	0.4%
Total	989	21.1%

Note. N = 4718

Relative to the sample size, a very small proportion of students (21.1%) attended the intervention programmes. The intervention programme that had the highest attendance was the English programme. The programme that was utilised the least was the Reading enhancement program. Individual study skills sessions, study skills workshops and academic Life Skills workshops all address the same competencies, in different formats. Cumulatively, 10.7% of the interventions attended represented an intervention addressing learning and study strategies. Fourteen (0.3%) students attended three types of intervention programmes, 134 (2.8%) attended two types, 679 (14.3%) attended a single intervention programme and 3891 (82.5%) did not attend any programmes.

Table 5.28 depicts a summary of the table analyses of frequencies for the intervention programmes attended.

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Table 5.28

Summary of table analyses of frequencies for intervention programmes attended

	Retention						Subjects Passed						Average Mark					
	First-time entering students			Students who were repeating the first year			First-time entering students			Students who were repeating the first year			First-time entering students			Students who were repeating the first year		
	Did not re-register	Rereg-istered	Total	Did not re-register	Rereg-istered	Total	<50%	≥50%	Total	<50%	≥50%	Total	<50%	≥50%	Total	<50%	≥50%	Total
English Program	32	249	281	3	6	9	32	249	281	4	5	9	32	249	281	4	5	9
Reading Enhancement Program	1	6	7	0	0	0	2	5	7	0	0	0	2	5	7	0	0	0
Career Counselling	3	24	27	0	3	3	8	19	27	0	3	3	8	19	27	0	3	3
Individual Study Skills Sessions	3	31	34	1	5	6	3	31	34	2	4	6	3	31	34	2	4	6
Study Skills Workshops	30	150	180	0	1	1	43	137	180	1	0	1	43	137	180	1	0	1
Academic Life Skills Workshops	23	245	268	1	14	15	23	245	268	1	14	15	23	245	268	1	14	15
Personal Life Skills Workshops	7	131	138	0	3	3	19	119	138	1	2	3	19	119	138	1	2	3
Personal Counselling	2	12	14	1	2	3	2	12	14	1	2	3	2	12	14	1	2	3
	10.6%	89.4%	100%	15%	85%	100%	13.9%	86.1%	100%	24.3%	75.7%	100%	13.9%	86.1%	100%	24.3%	75.7%	100%

Note. N = 4416

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With regard to Retention, the students who were registered for the first time, 89.4% of the students who attended an intervention programme reregistered the following year. Amongst the students who were repeating the first year, 85% of the attendees of intervention programmes reregistered again. In terms of Average Mark, the first-time entering students' group, 86.1% of the attendees attained an average mark greater or equal to 50% while amongst the students who were repeating the first year, 75.7% of the students who attended intervention programmes reregistered again the subsequent year. For the Subjects Passed criterion, amongst the first-time entering students, 81.2% of the attendees of the intervention programmes passed 50% or more of the subjects while 18.8% of the attendees passed less than 50% of the subjects. Amongst the students who repeated the first year, 25% passed less than 50% of the subjects and 75% passed 50% or more of the subjects.

5.4.7 Dependent variables

The summary statistics for the three academic performance measures, retention, percentage of subjects passed and average mark are displayed in this section.

Table 5.29 provides the descriptive statistics for the Subjects Passed and Average Mark categories. On average, 58.3% of subjects were passed by a student. The mean average mark was 53%. With regard to retention, 4 018 (86.1%) of the students in the sample reregistered in the subsequent year.

Table 5.29

Descriptive statistics for academic performance measures

Subscale	Mean	Std. Error of Mean	Median	Mode	Std. Deviation	Skew-ness	Kurtosis
Subjects Passed	58.30	0.01	1	1	28.40	-0.80	-0.52
Average Mark	53.46	0.36	53	54	8.56	-1.32	4.86

Note. N = 4665

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Table 5.30 shows how many students were first-time entering students and students who were repeating the first year for each of the academic performance categories.

Table 5.30

*Academic performance * Year of study crosstabulation*

			Year of study		Total
			First-time entering students	Students who were repeating the first year	
Retention	Did not reregister	Count	618	32	650
		% within Retention	95.1%	4.9%	100.0%
		% within Year of study	14.0%	12.7%	13.9%
		% of Total	13.2%	0.7%	13.9%
	Re-registered	Count	3798	220	4018
		% within Retention	94.5%	5.5%	100.0%
		% within Year of study	86.0%	87.3%	86.1%
		% of Total	81.4%	4.7%	86.1%
Average Mark	<50%	Count	912	55	967
		% Within Average Mark	94.3%	5.7%	100.0%
		% Within Year of Study	20.7%	21.8%	20.7%
		% of Total	19.5%	1.2%	20.7%
	≥50%	Count	3501	197	3698
		% Within Average Mark	94.7%	5.3%	100.0%
		% Within Year of Study	79.3%	78.2%	79.3%
		% of Total	75.0%	4.2%	79.3%
Subjects Passed	<50%	Count	1030	59	1089
		% Within Subjects Passed	94.6%	5.4%	100.0%
		% Within Year of Study	23.3%	23.4%	23.3%
		% of Total	22.1%	1.3%	23.3%
	≥50%	Count	3383	193	3576
		% Within Subjects Passed	94.6%	5.4%	100.0%
		% Within Year of Study	76.7%	76.6%	76.7%
		% of Total	72.5%	4.1%	76.7%

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Regarding Retention, 86% of the first-time entering students reregistered in the subsequent year, and 87.3% of the repeaters reregistered again the following year. Reregistering did not necessarily imply progression into the second year. It indicated that the student returned to continue with his/her studies. In terms of Average Mark, of the students who were registered for the first year for the first time, 20.7% obtained an average mark less than 50%, while 79.3% of the students who were first-time entering students obtained an average mark of 50% or more. Of the students who were repeating the first year, 21.8% obtained an average mark of less than 50% while 78.2% obtained an average mark of 50% or more.

TEST OF HYPOTHESES

5.5 Pearson's Chi-Square Tests of Independence

In Table 5.31 the results of the Chi-square tests of independence which analyses the association between the independent variables and the dependent variables are displayed. The values indicated in the cells are the significance values.

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Table 5.31

Pearson's Chi-square tests of independence

			First-time entering students			Students who were repeating the first year		
			Retention	Average Mark	Subjects Passed	Retention	Average Mark	Subjects Passed
Independent Variables	Intervention Programmes	English Program	0.1931	0.0322*	0.1931	0.0583**		
		Reading Enhancement Program						
		Career Counselling						
		Individual Study Skills Sessions		0.1002	0.2359			
		Study Skills Workshops	0.2914	0.0166*	0.0290*			
		Academic Life Skills Workshops	0.0084*	0.0002*	<0.001*			
		Personal Life Skills Workshops	0.0021*	0.0011*	0.0290*			
		Personal Counselling						
	Demographic Variables	Age	0.0986**	<0.0001*	0.0168*	0.3458	0.0379*	0.1005
		Gender	<0.0001*	0.6550	0.1740	0.8426	0.0169*	0.0445*
		Population Group	0.3333	<0.0001*	<0.0001*	0.1256	0.2437	0.0678**
		Language	<0.0001*	<0.0001*	<0.0001*	0.6947	0.9582	0.1917

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			First-time entering students			Students who were repeating the first year		
			Retention	Average Mark	Subjects Passed	Retention	Average Mark	Subjects Passed
Independent variables	ELSA	Total	0.0350*	<0.0001*	<0.0001*	0.5904**	0.1242	0.0204*
	CCQ	Total	<0.0001*	<0.0001*	<0.0001*	0.4075	0.5604	0.74
	LASSI	Anxiety	0.0058*	<0.0001*	<0.0001*	0.0432*	0.0132*	0.0013*
		Attitude	0.0195*	<0.0001*	<0.0001*	0.0936**	0.5018	0.2215
		Concentration	0.0002*	<0.0001*	<0.0001*	0.0108*	0.1925	0.0531**
		Information Processing	0.0390*	<0.0001*	<0.0001*	0.0471*	0.22	0.0344*
		Motivation	0.0049*	<0.0001*	<0.0001*	0.0213*	0.1358	0.1358
		Self-Testing	0.1205	0.1116	0.5518	0.1233	0.0055*	0.5982
		Selecting Main Ideas	0.0009*	<0.0001*	<0.0001*	0.0350*	0.0135*	0.0055*
		Study Aids	0.5822	0.3888	0.2470	0.2221	0.9106	0.9106
		Time Management	0.0009*	<0.0001*	0.0047*	0.6145	0.8708	0.0666**
		Test Strategies	0.0005*	<0.0001*	<0.0001*	0.1039	0.0016*	0.0016*

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			First-time entering students			Students who were repeating the first year		
			Retention	Average Mark	Subjects Passed	Retention	Average Mark	Subjects Passed
Independent Variables	ESAP	Assertion	0.0195*	<0.0001*	0.0029*	0.5258	0.1689	0.0911**
		Aggression	0.0304*	<0.0001*	<0.0001*	0.5288	0.4827	0.8233
		Deference	0.1029	0.0032*	0.0281*	0.6288	0.8206	0.1008
		Comfort	0.5022	0.0001*	0.0015*	0.5765	0.6450	0.0613
		Empathy	0.6109	0.6489	0.0977**	0.6631	0.5601	0.3493
		Decision Making	0.1089	0.0008*	0.0129*	0.8374	0.6626	0.7394
		Leadership	0.7808	0.0323*	0.1079	0.4523	0.5736	0.0604**
		Drive Strength	0.0139*	<0.0001*	<0.0001*	0.6774	0.5091	0.0783**
		Time Management	0.1092	0.0001*	0.0047*	0.0049*	0.0257*	0.0666**
		Commitment Ethic	0.9920	<0.0001*	<0.0001*	0.3311	0.2644	0.0613**
		Change Orientation	0.0064*	<0.0001*	0.0009*	0.9360	0.9748	0.0531**
		Self- esteem	0.0835**	0.1788	0.4281	0.2006	0.3255	0.0135*
		Stress Management	0.0535**	0.0001*	0.0009**	0.4701	0.2246	0.0061*

Note. * Significant at 0.05 level of significance

**Significant at 0.1 level of significance

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For the first-time entering students, all the demographic variables and almost all of the dependent variables had a relationship with at least one academic performance measure. The only dependent variable that did not have a significant relationship with any academic performance measures was Study Aids.

For the Intervention Programmes, blank cells indicated that the variables had a large percentage of cells with an expected frequency of less than five. Hence, Chi-square might not have been a valid test for those variables. There was a significant relationship between the English program and Average Mark. Academic and Personal Life Skills Workshops had a significant relationship with all three academic performance indicators. The Study Skills Workshops had a significant relationship with the Average Mark and Percentage of Subjects Passed, but not with Retention.

For the first year students who were repeating, there were much fewer variables that had significant relationships with academic performance indicators. Amongst the demographic variables, Age, Gender and Population group had a significant relationship with academic performance measures. For the intervention programmes, almost all the variables had a large percentage of cells with expected frequencies less than five. Hence, the Chi-square test might not have been a valid test. Fisher's Exact Test was calculated for those variables, but no significant relationships were found. The exception was the English program in the Retention category which was significant at the 0.1 level of significance. The following dependent variables did not have a significant relationship with at least one academic performance measure: Study Aids in the LASSI, and Aggression, Deference, Comfort, Empathy and Decision making in the ESAP.

5.6 Multivariate Logistic Regression

Multivariate logistic regression was conducted to determine if the independent variables contributed to the profile for underachieving students. For each research question the question was addressed for two groups of students: first-time entering students and students who were repeating the first year.

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5.6.1 Secondary research question 1: Retention

The analyses in this section address the secondary research question: What is the psychometric profile for a student at risk for not reregistering in the subsequent year?

The analyses were executed for the two categories of first-year students, namely, first-time entering students and students who were repeating the first year.

5.6.1.1 First-time entering students

A multivariate logistic regression analysis was performed to determine if English proficiency, career orientation, learning and study strategies, emotional skills, demographic variables, and interventions contributed to first-time entering students not reregistering in the subsequent year. The results of the analysis are presented in Table 5.32. In the sixth step of the model, the convergence criterion (GCONV=1E-8) was satisfied. Sixty-two percent of cases were correctly classified.

Table 5.32

Summary of stepwise selection for Retention, for first-time entering students

Step	Effect		DF	Number In	Score Chi-Square	Wald Chi-Square	Pr > ChiSq
	Entered	Removed					
1	CCQ (Total)		8	1	36.7478		<.0001
2	Language		11	2	39.3181		<.0001
3	Concentration		1	3	7.8501		0.0051
4	ELSA (Total)		1	4	6.9067		0.0086
5	Time Management (LASSI)		1	5	4.3464		0.0371
6		Concentration	1	4		3.8317	0.0503

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The model for academic performance as measured by retention, for first-time entering students was:

$$\text{Retention}_{\text{not reregistering}} = \beta + \delta_{CCQ} + \theta_{\text{Language}} + \alpha_1 \text{ ELSA} + \alpha_2 \text{ Time Management}$$

$$\text{Retention}_{\text{not reregistering}} = -0.676 + \delta_{CCQ} + \theta_{\text{Language}} - 0.0183 \text{ ELSA} - 0.0327 \text{ Time Management}$$

In Appendix C1 the probabilities for not reregistering (Appendix C1.2) or reregistering (Appendix C1.3) are presented. By entering a student's Time Management and English Proficiency scores in the grey cells in the Student's Scores table (Appendix C1.1), and thereafter looking up the student's home language and CCQ score in the probability tables, the probability of not reregistering (Appendix C1.2) or reregistering (Appendix C1.3) are obtained.

The estimates for the variables are provided in Table 5.33.

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Table 5.33

Maximum Likelihood estimates for Retention, for first-time entering students

Variable	Estimate	
Intercept	β	-0.676
CCQ (Total) = 0	δ_1	-17.9828
CCQ (Total) = 1	δ_2	0.2055
CCQ (Total) = 2	δ_3	0.4292
CCQ (Total) = 3	δ_4	0.5479
CCQ (Total) = 4	δ_5	1.2942
CCQ (Total) = 5	δ_6	1.274
CCQ (Total) = 6	δ_7	0.4064
CCQ (Total) = 7	δ_8	-11.129
CCQ (Total) = 8	δ_9	-11.011
English	θ_1	-4.8568
Afrikaans	θ_2	-0.2674
Xhosa	θ_3	-0.084
Zulu	θ_4	-0.9863
Sesotho	θ_5	-0.0234
Setswana	θ_6	0.0822
Swati	θ_7	-0.5455
Tsonga	θ_8	-0.5206
Venda	θ_9	-0.0997
Ndebele	θ_{10}	-0.3205
Sepedi	θ_{11}	-0.5203
Other	θ_{12}	-1.5713
ELSA (Total)	α_1	-0.0183
Time Management	α_2	-0.0327

In Table 5.34 the odds ratios and 95% lower and upper confidence intervals for each of the predictor variables are shown.

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Table 5.34

Odds ratio estimates for Retention for first-time entering students

Effect		Point Estimate	95% Wald Confidence Limits	
CCQ (total) 1 vs 0		1.228	0.914	1.651
CCQ (total) 2 vs 0		1.536	1.002	2.356
CCQ (total) 3 vs 0		1.730	0.895	3.342
CCQ (total) 4 vs 0		3.648	1.731	7.688
CCQ (total) 5 vs 0		3.575	1.581	8.087
CCQ (total) 6 vs 0		1.501	0.322	7.001
CCQ (total) 7 vs 0		<0.001	<0.001	>999.999
CCQ (total) 8 vs 0		<0.001	<0.001	>999.999
Language	Afrikaans vs English	0.765	0.473	1.238
Language	Xhosa vs English	0.919	0.474	1.782
Language	Zulu vs English	0.373	0.215	0.647
Language	Sesotho vs English	0.977	0.553	1.726
Language	Setswana vs English	1.086	0.683	1.726
Language	Swati vs English	0.580	0.313	1.073
Language	Tsonga vs English	0.594	0.343	1.031
Language	Venda vs English	0.905	0.492	1.664
Language	Ndebele vs English	0.726	0.376	1.401
Language	Sepedi vs English	0.594	0.369	0.957
Language	Other vs English	0.208	0.047	0.921
Time Management (LASSI)		0.968	0.946	0.990
ELSA (Total)		0.982	0.970	0.994

A total score of 1 to 6 on the CCQ increased a student's odds for not reregistering the subsequent year. This was not the case for a score of 7 to 8 as there were not any students in the sample who obtained these scores. Except for Setswana-speaking students, language decreased the odds of not reregistering the following year. Setswana-speaking students were more likely to not reregister the following year. Hence, Setswana-speaking students were most likely to drop out at the end of the first year. An increase in Time Management and the ELSA scores led to a drop in the odds of the students not reregistering.

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5.6.1.2 Students who were repeating the first year

For the students who were repeating the first year, a multivariate logistic regression analysis was also performed to determine if English proficiency, career orientation, learning and study strategies, emotional skills, demographic variables and interventions contributed to students not reregistering in the subsequent year. The results of the analysis are presented in Table 5.35.

Table 5.35

Summary of stepwise selection for Retention for students who were repeating

Step	Effect		DF	Number In	Score Chi-Square	Pr > ChiSq
	Entered	Removed				
1	Time management (LASSI)		1	1	8.3468	0.0039*

For students who were repeating the first year, only the Time Management subscale in the LASSI predicted whether they would reregister the following year or not. There was a 61.5% concordance for this model.

The model for academic performance as measured by retention for students who were repeating the first year was:

$$\text{Retention}_{\text{Not reregistering}} = \beta + \alpha_1 \text{ Time Management}$$
$$\text{Retention}_{\text{Not reregistering}} = -0.8796 - 0.0205 \text{ Time Management}$$

The point estimate for Time Management was 0.980, indicating that an increase in Time Management scores decreased the odds of the student not reregistering. Appendix C2 displays the probability table for retention for students who were repeating. By looking up the students Time Management score, the probability of not reregistering or reregistering are obtained.

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5.6.2 Secondary research question 2: Percentage of subjects passed

This section presents the analyses for the secondary research question: What is the psychometric profile for a student at risk for passing less than half the subjects for which he/she has registered?

The analyses were conducted for two groups of first-year students, first-time entering students, and students who were repeating the first year.

5.6.2.1 First-time entering students

The results of the multivariate logistic regression analysis are presented in Table 5.36.

Table 5.36

Summary of stepwise selection for subjects passed for first-time entering students

Step	Effect		DF	Number In	Score Chi-Square	Wald Chi-Square	Pr > ChiSq
	Entered	Removed					
1	ELSA (total)		1	1	62.5154		<.0001
2	Language		11	2	64.2332		<.0001
3	Concentration		1	3	37.5557		<.0001
4	Commitment Ethic		1	4	12.5271		0.0004
5	Attitude		1	5	6.1289		0.0133
6	CCQ (total)		8	6	18.2203		0.0196
7	Comfort		1	7	4.9363		0.0263

Language was the only biographical variable included in this model. The ELSA total and CCQ total were also included. Two LASSI subscales, Concentration and Attitude, and two ESAP subscales, Commitment Ethic and Comfort were included in the model. 66.4% of the cases were concordant.

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The model for academic performance as measured by percentage of subjects passed, for first-time entering students was:

$$\text{Subjects Passed}_{>50} = \beta + \delta_{CCQ} + \theta_{Language} + \alpha_1 \text{ Attitude} + \alpha_2 \text{ Concentration} + \alpha_3 \text{ ELSA} + \alpha_4 \text{ Commitment Ethic} + \alpha_5 \text{ Comfort}$$

$$\text{Subjects Passed}_{>50} = 0.3866 + \delta_{CCQ} + \theta_{Language} + 0.0041 \text{ Attitude} + 0.0062 \text{ Concentration} + 0.0229 \text{ ELSA} + 0.051 \text{ Commitment Ethic} - 0.0293 \text{ Comfort}$$

In Appendix C3, the probabilities for passing at least half the subjects (Appendix C3.2) or passing less than half the subjects (Appendix C3.3) are indicated. When entering a student's scores for the specific variables in the grey cells in the Student's Scores table (Appendix C3.1) and thereafter looking up the student's home language and CCQ score in the probability tables, the probability of passing at least half the subjects (Appendix C3.2) or passing less than half the subjects (Appendix C3.3) are displayed.

The estimates for the variables that were included in the model are provided in Table 5.37.

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Table 5.37

Maximum Likelihood estimates for subjects passed, for first-time entering students

Variable	Estimate	
Intercept	β	0.3866
CCQ (Total) = 0	δ1	8.7076
CCQ (Total) = 1	δ2	-0.3333
CCQ (Total) = 2	δ3	-0.2211
CCQ (Total) = 3	δ4	-0.6346
CCQ (Total) = 4	δ5	-0.2589
CCQ (Total) = 5	δ6	-1.0075
CCQ (Total) = 6	δ7	0.0121
CCQ (Total) = 7	δ8	-0.2362
CCQ (Total) = 8	δ9	11.3871
CCQ (Total) = 4	δ5	-0.2589
CCQ (Total) = 5	δ6	-1.0075
CCQ (Total) = 6	δ7	0.0121
CCQ (Total) = 7	δ8	-0.2362
CCQ (Total) = 8	δ9	11.3871
English	θ1	-4.9113
Afrikaans	θ2	0.1926
Xhosa	θ3	-0.825
Zulu	θ4	-0.1719
Sesotho	θ5	-0.8794
Setswana	θ6	-0.9472
Swati	θ7	-0.1698
Tsonga	θ8	-0.4302
Venda	θ9	-0.9433
Ndebele	θ10	-0.418
Sepedi	θ11	-0.4725
Other	θ12	0.1534
Attitude	α1	0.00413
Concentration	α2	0.00622
ELSA (Total)	α3	0.0229
Commitment Ethic	α4	0.051
Comfort	α5	-0.0293

In Table 5.38 the odds ratios and 95% lower and upper confidence intervals for each of the predictor variables are displayed.

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Table 5.38

Odds ratio estimates for subjects passed, for first-time entering students

Effect		Point Estimate	95% Wald Confidence Limits	
Attitude		1.004	1.001	1.007
CCQ (Total) 1 vs 0		0.717	0.562	0.913
CCQ (Total) 2 vs 0		0.802	0.549	1.170
CCQ (Total) 3 vs 0		0.530	0.301	0.934
CCQ (Total) 4 vs 0		0.772	0.338	1.762
CCQ (Total) 5 vs 0		0.365	0.167	0.797
CCQ (Total) 6 vs 0		1.012	0.266	3.856
CCQ (Total) 7 vs 0		0.790	0.069	9.033
CCQ (Total) 8 vs 0		>999.999	<0.001	>999.999
Concentration		1.006	1.002	1.010
ELSA (Total)		1.023	1.013	1.034
Language	Afrikaans vs English	1.212	0.728	2.020
Language	Xhosa vs English	0.431	0.232	0.798
Language	Zulu vs English	0.842	0.508	1.397
Language	Sesotho vs English	0.415	0.239	0.720
Language	Setswana vs English	0.388	0.242	0.623
Language	Swati vs English	0.844	0.473	1.506
Language	Tsonga vs English	0.650	0.385	1.098
Language	Venda vs English	0.389	0.219	0.691
Language	Ndebele vs English	0.658	0.355	1.221
Language	Sepedi vs English	0.623	0.388	1.001
Language	Other vs English	1.166	0.439	3.097
Commitment Ethic		1.052	1.024	1.082
Comfort		0.971	0.946	0.997

For Attitude, Concentration, ELSA (Total) and Commitment Ethic, an increase in scores was associated with an increase in the odds of passing at least half the subjects. For Comfort, an increase in scores, led to a reduction in the possibility of passing at least half the subjects. For the CCQ Total, an increase in scores decreased the chances of a student passing at least half the subjects. Anomalies were evident for a score of 6 or 8 where these two scores enhanced the possibility of

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a student passing at least half the subjects. Except for Afrikaans and "Other" languages, the language spoken decreased the chances of a student passing at least half the subjects.

5.6.2.2 Students who were repeating the first year

In Table 5.39, the summary of the logistic regression model for predicting the likelihood of students that were repeating of passing 50% or more of the subjects is displayed.

Table 5.39

Summary of Stepwise Selection for Subjects Passed, for Students Who Were Repeating

Step	Effect		DF	Number In	Score Chi-Square	Pr > ChiSq
	Entered	Removed				
1	Leadership		1	1	6.3846	0.0115
2	Anxiety		1	2	5.3346	0.0209

Only two variables emerged as predictors of passing at least half the subjects. These two variables were the Anxiety subscale in the LASSI and the Leadership subscale in the ESAP. There was a 66.1% concordance for this model.

The model for academic performance as measured by percentage of subjects passed for students who were repeating was:

$$\text{Subjects Passed}_{>50} = \beta + \alpha_1 \text{ Anxiety} + \alpha_2 \text{ Leadership}$$

Including the estimates in the model enables the model to be formulated as:

$$\text{Subjects Passed}_{>50} = 2.7198 + 0.0144 \text{ Anxiety} - 1.117 \text{ Leadership}$$

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Appendix C4.2 indicates the probabilities for passing at least half the subjects or passing less than half the subjects. By entering a student's Anxiety and Leadership scores in the grey cells in the Student's Scores table (Appendix C4.1), the probabilities of passing at least half the subjects or passing less than half the subjects are shown in Appendix C4.2.

Table 5.40 indicates the odds ratio estimates for Subjects Passed for the students who were repeating.

Table 5.40

Odds Ratio Estimates for Subjects Passed, for Students Who Were Repeating

Effect	Point Estimate	95% Wald Confidence Limits	
Anxiety	1.015	1.002	1.027
Leadership	0.890	0.815	0.971

The odds ratio of 1.015 indicates that the chances of the students passing at least half the subjects increases as the Anxiety score increases with each point. It should be noted that a high score on this subscale did not indicate high levels of anxiety, but a well-developed ability to manage one's anxiety regarding academic failure (Weinstein & Palmer, 2002).

The odds ratio for Leadership is less than 1, indicating that the chances of the students passing at least half the subjects decreases as the Leadership score increases with each point.

5.6.3 Secondary research question 3: Average Mark

This section displays the analyses for secondary research question 3: What is the psychometric profile for a student at risk for obtaining an average mark less than 50%?

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The analyses were performed for first-time entering students and students who were repeating the first year.

5.10.3.1 First-time entering students

Table 5.41 shows the predictive model for first-time entering students. The model was computed for variables predicting the probability of a student attaining an average mark of 50% or more.

Table 5.41

Summary of stepwise selection for average mark for first-time entering students

Step	Effect		DF	Number In	Score Chi-Square	Wald Chi-Square	Pr > ChiSq
	Entered	Removed					
1	ELSA (Total)		1	1	96.1969		<.0001
2	Attitude		1	2	37.5791		<.0001
3	Language		11	3	48.5962		<.0001
4	Concentration		1	4	14.8509		0.0001
5	Commitment Ethic		1	5	8.9157		0.0028
6	Decision Making		1	6	9.3453		0.0022
7	CCQ (Total)		8	7	16.3331		0.0379
8		CCQ (Total)	8	6		15.3183	0.0532

Language and the ELSA (total score) again emerged as significant predictors of academic performance. The Concentration and Attitude subscales from the LASSI were also included in the model. Two ESAP subscales, namely, Commitment Ethic and Decision Making were included in the predictive model. 68.1% of the cases were correctly classified.

The model for academic performance as measured by average mark, for first-time entering students was:

$$\text{Average Mark}_{>50} = \beta + \alpha_1 \text{Attitude} + \alpha_2 \text{Concentration} + \alpha_3 \text{ELSA} + \alpha_4 \text{Commitment Ethic} + \alpha_5 \text{Decision Making} + \theta_{\text{Language}}$$

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$$\text{Average Mark}_{>50} = -0.2926 + 0.0063\,\text{Attitude} + 0.007\,\text{Concentration} + 0.0375\,\text{ELSA} + 0.0625\,\text{Commitment Ethic} - 0.0458\,\text{Decision Making} + \theta_{\text{Language}}$$

In Appendix C5.2 the probabilities of obtaining an average mark of at least 50%, or obtaining an average mark less than 50% are given. By entering a student's scores for the relevant variables in the grey cells in the Student's Scores table (Appendix C5.1) and thereafter looking up the student's home language in Appendix C5.2, the probabilities of obtaining an average mark of at least 50% or obtaining an average mark less than 50% are displayed.

The estimates for the variables are provided in Table 5.42.

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Table 5.42

Maximum Likelihood Estimates for Average Mark, for First-Time Entering Students

Variable	Estimate	
Intercept	β	-0.2926
Attitude	α_1	0.00629
Concentration	α_2	0.00709
ELSA (Total)	α_3	0.0375
Commitment Ethic	α_4	0.0625
Decision Making	α_5	-0.0458
English	θ_1	-1.1427
Afrikaans	θ_2	0.5587
Xhosa	θ_3	-0.5419
Zulu	θ_4	0.1568
Sesotho	θ_5	-0.4684
Setswana	θ_6	-0.5647
Swati	θ_7	0.1627
Tsonga	θ_8	-0.3044
Venda	θ_9	-0.4649
Ndebele	θ_{10}	-0.0341
Sepedi	θ_{11}	-0.0899
Other	θ_{12}	-0.2926

In Table 5.43 the odds ratios and 95% lower and upper confidence intervals for each of the predictor variables are displayed.

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Table 5.43

Odds Ratio Estimates for Average Mark, for First-Time Entering Students

Effect		Point Estimate	95% Wald Confidence Limits	
Attitude		1.006	1.003	1.010
Concentration		1.007	1.003	1.011
ELSA (Total)		1.038	1.027	1.050
Language	Afrikaans vs English	1.748	1.030	2.967
Language	Xhosa vs English	0.582	0.309	1.094
Language	Zulu vs English	1.170	0.700	1.956
Language	Sesotho vs English	0.626	0.356	1.101
Language	Setswana vs English	0.569	0.353	0.915
Language	Swati vs English	1.177	0.651	2.127
Language	Tsonga vs English	0.738	0.438	1.242
Language	Venda vs English	0.628	0.349	1.130
Language	Ndebele vs English	0.966	0.509	1.835
Language	Sepedi vs English	0.914	0.568	1.471
Language	Other vs English	1.564	0.552	4.433
Commitment Ethic		1.065	1.033	1.097
Decision Making		0.955	0.928	0.984

For Zulu-speaking, Swati-speaking and students falling in the “Other” category, language increased the odds of obtaining an average mark greater than 50%. For students speaking any of the other languages, language decreased the odds of obtaining an average mark greater than 50%. An increase in Attitude, Concentration, ELSA (Total) or Commitment Ethic scores increases the odds of obtaining an average mark greater than 50%. However, an increase in Decision Making scores is associated with a decrease in the odds of obtaining an average mark greater than 50%.

5.10.3.2 Students who were repeating the first year

Table 5.44 displays the predictive model for students who were repeating. The model was computed for variables predicting the probability of a student attaining an average mark of 50% or more. For students who were repeating, only two variables

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were included in the predictive model, namely Gender and Anxiety. 67.9% of the cases were concordant.

Table 5.44

Summary of Stepwise Selection for Average Mark, for Students who were Repeating

Step	Effect		DF	Number In	Score Chi-Square	Wald Chi-Square	Pr > ChiSq
	Entered	Removed					
1	Gender		1	1	9.9708		0.0016
2	Anxiety		1	2	6.2803		0.0122

The model for academic performance as measured by the average mark for first-time entering students was:

$$\text{Average Mark}_{>50} = \beta + \alpha_1 \text{ Anxiety} + \alpha_2 \text{ Gender}$$

$$\text{Average Mark}_{>50} = 2.4156 + 0.0157 \text{ Anxiety} - 1.1161 \text{ Gender}$$

In Appendix C6.2, the probabilities of obtaining an average mark of at least 50% or obtaining an average mark less than 50% are shown. By entering a student's Anxiety scores and gender in the grey cells in the Student's Scores table (Appendix C6.1), the probabilities of obtaining an average mark of at least 50% or obtaining an average mark of less than 50% are depicted in Appendix C6.2. Table 58 shows the odds ratios and 95% lower and upper confidence intervals for each of the predictor variables.

Table 5.45 shows the odds ratios and 95% lower and upper confidence intervals for each of the predictor variables.

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Table 5.45

Odds Ratio Estimates for Average Mark, for Students who were Repeating

Effect	Point Estimate	95% Wald Confidence Limits	
Anxiety	1.016	1.003	1.029
Gender	0.328	0.154	0.695

The odds ratio for Anxiety (1.016) showed that the odds of obtaining an average mark of 50% or more increased by a multiplicative factor of just over 1 for each point increase in the Anxiety subscale. The odds ratio for Gender (0.328) suggested that being male decreased the odds of obtaining an average mark of 50% or more.

5.11 Conclusion

The current chapter presented the results of the data analyses. Six models for academic underachievement were derived. The percentage of concordant cases ranged from 61.5% to 68.1%, with the model that had the highest percentage of concordant cases (68.1%) being the model for the prediction of Average Mark for first-time entering students. In Chapter 6, the results are discussed in more detail. The conclusions and recommendations emanating from these results are also discussed.

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CHAPTER 6
DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

CLOSURE OF RESEARCH ENDEAVOUR

6.1 Introduction

The aim of this study was to derive a profile for first-year students at risk for underachievement at a university of technology. The primary predictor variables were four instruments: ELSA, CCQ, LASSI and ESAP. The additional independent variables were the demographic variables and intervention programmes. Underachievement was measured by using three different criteria: not reregistering in the subsequent year, passing less than half the subjects registered for and obtaining an average mark less than 50%. The research questions were explored for two categories of first-year students: first-time entering students and students who were repeating the first year. In this chapter the results emanating from the study are discussed, and the conclusions and recommendations are provided.

6.2 Discussion of Research Outcomes

6.2.1 Preliminary analysis

This section discusses the results of the preliminary analyses, that is, the reliability analyses and the descriptive statistics.

6.2.1.1 ELSA

Both the ELSA subscales (Cloze Procedures and Vocabulary in Context) complied with minimum standards for internal consistency reliability. The α =.87 for the total score exceeded Horne's (2007) previously reported coefficient of.86.

The predominant criticism levelled against the ELSA was that the construct measured by the ELSA might not necessarily have been the most relevant construct. There appeared to be a strong need to move away from the evaluation of English Proficiency skills and instead evaluate Academic Literacy. Academic Literacy refers to the combination of linguistic, conceptual and cognitive skills, and resources

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required to analyse, construct and communicate knowledge in the specific subject domain (Warren, 2003). It includes the ability to understand information presented in various modalities, to paraphrase and summarise, to present information in visual format, to explain, to write expository prose that reflects one's own views, appropriate referencing of sources and to structure basic numerical manipulations. The Placement Test for Educational Purposes (PTEEP) is one test that measures this construct (Yeld, 2003).

The mean score for ELSA fell into the below Grade 8 level of English Proficiency. This is consistent with prior research conducted by Dockrat (2007) which indicated that the ELSA scores of the majority of students at TUT were below the Grade 8 level. Considering that first-year students are expected to be in the Grade 12 or 12+ category, the mean score which is in the primary school category for English proficiency is a matter of serious concern. This suggested that the average student's English proficiency was not on an adequate level for comprehending the content in lectures, text books and assessments, and written and oral communication within a higher education academic context.

For all the academic performance measures, the ELSA scores in the "successful" categories (that is, reregistering in the subsequent year, passing at least half the subjects and obtaining an average mark of at least 50%) being higher than the scores in the "unsuccessful" categories (not reregistering in the subsequent year, passing less than half the subjects and obtaining an average mark less than 50%), indicated that underachieving students had lower levels of English proficiency than students with adequate academic performance.

6.2.1.2 CCQ

Low mean scores were obtained for the CCQ. For this instrument, a lower score was preferred. For all three academic performance indicators, the mean scores in the "successful" categories were lower than the mean scores in the "unsuccessful" categories; this implies that students who were performing adequately had a better sense of career orientation than those who were underperforming. The significance of these differences were not analysed. This is consistent with Oswald et al.'s (2004) view that career awareness is an important aspect of academic performance.

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Gibson & Walters (2002) and Tomkinson, et al. (2002) too have also emphasised the role of career orientation specifically for retention and attrition.

6.2.1.3 LASSI

In the LASSI, only the Study Aids subscale fell below the .70 threshold for internal consistency. It is interesting to note that the Study Aids subscale has been removed from the new edition of the LASSI as the items are outdated. The Study Aids subscale has been replaced with the Using Academic Resources subscale. This new subscale examines students' inclination to utilise various types of academic support systems when confronted with academic difficulties. The Coefficient Alpha for this new scale is .76 (Weinstein, Palmer, & Ace, 2016).

None of the mean scores for the LASSI were above 75 which is the threshold for students not prioritising development in that area. This implies that on average none of the learning and study strategies were in the "top" LASSI category. The question then remains as to which are the primary learning and study strategies that have been extensively developed at basic education level. Furthermore, which study skills have the students relied upon to succeed. An alternative way of viewing this would be to take into consideration the minimum admission requirements for South African universities of technology vis-à-vis the requirements for traditional universities. Diploma courses (which are the primary offering at UoT's) have lower entry requirements than degree courses (which are are the primary qualifications at traditional universities) (R.S.A. Government. Department of Higher Education and Training, 2005). It may be hypothesised that students employing superior study skills are more likely to obtain better results in Grade 12, which enables them to study for a degree course at a university rather than a diploma course at a university of technology. However, the mean LASSI scores in Seabi's (2011) study with students at the University of Witwatersrand do not uphold this hypothesis.

The mean scores for Anxiety, Attitude and Test Strategies in all the relevant tables were below 50 which is the at-risk region. In Moseki and Schulze's (2010) project with a TUT sample, the mean scores of these three subscales, as well as Selecting Main Ideas, were also in the at-risk category. These results differed from those in Seabi's (2011) research project, where the mean of these three subscales were 50

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or above. In van Staden's (2005) study with entry level Information Technology students at the Vaal University of Technology, only the mean for the Anxiety subscale was below 50.

If one takes note of the timing of the evaluation, a low score for Anxiety was expected as entering higher education is a major transition and likely to trigger feelings of anxiety. Ozan, et al. (2010) mentioned the articulation challenges of understanding lectures and adapting to university as some of the anxiety-provoking variables. It was disconcerting that the mean score for Attitude lay in the risk region. As the students had just commenced with the academic year, it implied that they had already entered higher education with negative attitudes, before having had any experiences that may have led to the breakdown of a positive attitude. Entering higher education with underdeveloped test strategies may have been reflective of the primary and secondary schooling system, where the nature of assessments may not have necessarily demanded employing effective test strategies. This relates to Dzubak's (2007) notion of underpreparedness in terms of critical academic skills.

For all three academic performance criteria, the LASSI mean scores in the "successful" categories were higher than mean scores in the "unsuccessful" categories, suggesting that students performing satisfactorily had better learning and study strategies than underachieving students. The mean scores of the first-time entering students were higher than the mean scores of the students who were repeating the first year. This indicates that the students who were repeating had inferior learning and study strategies compared to the first-time entering students despite having had experienced higher education for a whole year. This result is aligned with Dill, et al.'s (2014) study with academically suspended students where all the mean percentiles were in the at-risk region. Potential reasons for students who were repeating not having enhanced learning and study strategies could include not having attended any individual study skills sessions, study skills workshops, academic life skills workshops, or having attended at least one of these programmes but failed to apply the strategies effectively to the learning process.

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6.2.1.4 ESAP

For the ESAP, the overall mean scores were in the intermediate 'strengthen' category. In the first-time entering students' category, the mean scores were preferable in the "successful" categories, with the Empathy subscale being the exception. This aligned with Barchard's (2003) and William's (2004) studies which failed to find a significant relationship between empathy and academic performance. In the category for the students repeating the first year, there was no clear pattern.

6.2.3.5 Biographical variables

With reference to the biographical variables, in all three "successful" categories, there were more males than females. This result is inconsistent with the national statistics. The graduation and success rates for South African females were consistently higher than those of males from 2005 to 2010 (CHE, 2012). This finding is also inconsistent with research by Ali and Naylor (2010), Cole and Espinoza, (2008) and Huang et al., (2000). Schram (1996) have shown that females tend to perform better in some courses, and males in certain types of courses. Unpacking the relationship between gender and academic achievement at a qualification/course/programme level could potentially provide more information on the types of programmes where males are outperforming females.

There were a higher percentage of White students in ≥50% category for Average Mark and Subjects Passed, and for Retention, Coloured students obtained the highest percentage. In terms of marks, White students appear to display superior performance, but in terms of persistence, more Coloured students reregister the following year. In terms of South African graduation rates, White students still have the highest percentages as indicated in Table 2.1 (CHE, 2013a). These figures are reflective of the challenges confronting South African education in terms of transformation.

6.2.3.6 Interventions

Intervention programmes were only attended by 17.5% of the sample. Pascal (2015) refers to the students' lack of utilising institutional resources as the "I got this" syndrome.

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The English program and Life Skills programme were the interventions that were completed by the highest number of students. The reason for the high attendance was that these programmes were scheduled for classes and indicated as a formal class on the students' timetables. Some of these programmes were even given academic credit. Although these programmes were "bolted on", their structured and mandatory nature made them appear as formal subjects. This is consistent with Seidman's (2005) proposal that interventions should be mandatory. He goes as far as to state that an appeals process should be instated for students who fail to attend a prescribed intervention.

The more voluntary interventions, where attendance was dependent upon each student's own initiative, were not as well attended. Gauging from these statistics, one may infer that there is a greater likelihood of students attending intervention programmes if they are compulsory and/or obtain academic credit for attendance. Implementing policies that make the interventions compulsory could ensure that students participate in the requisite interventions.

The small number of students attending intervention programmes relative to the total sample size may also be a potential indicator of the low intensity of the interventions at institutional level. According to Seidman's (2005) retention model, interventions need to be intensive to have an impact on retention. Alternative service delivery modes need to be explored, that will increase the scale at which programmes are delivered.

For all three academic performance measures, more students in the "successful" categories attended the intervention programmes. The one exception was study skills workshops for students who were repeating. The one student who attended obtained an average mark less than 50%, and passed less than half the subjects. Considering that it was only one student in this category, one cannot draw worthwhile conclusions in this case.

6.2.3.7 Academic performance

In terms of retention, 86.1% of the students in the sample reregistered in the subsequent year. This is more positive than the national statistics which indicated

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that 24% of students in three-year programmes at contact institutions dropped out at the end of the first year (CHE, 2013a). On average students passed 58.3% of their subjects and the mean average mark was 53%.

6.2.4 Pearson's Chi-square tests of independence

For the first-time entering students, all the biographical and most of the independent variables had a relationship with at least one academic performance indicator. Self-Testing, Study Aids, Empathy and Self-esteem did not have a significant relationship with any academic performance measures. Interventions that had a significant relationship with at least one academic performance indicator were the English program, Academic and Personal Life Skills workshops, and Study Skills workshops.

For the Reading enhancement program, Career counselling, Individual study skills sessions and Personal counselling, and almost all the interventions for the students who were repeating, a large percentage of cells had expected counts of less than 5. Hence, Chi-square may not have been a valid test.

Amongst the students repeating, there were much fewer variables that had significant relationships with academic performance measures. These findings also suggested that it is difficult to identify valid predictors of academic performance for students who are repeating. The category of "students who are repeating" is similar to the concept of "academic probation" which refers to students who are at risk for being dismissed (Arcand & Leblanc, 2011), and minimal research has been conducted on supporting students on probation (Fletcher & Tokmouline, 2010; Hwang et al, 2014; Mathies, Garner & Bauer, 2006; Tovar & Simon, 2006).

6.2.5 Predictive models

In Table 5.46 a summary of variables included in the predictive models derived from the logistic regression analyses is presented.

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Table 6.1

Summary of Variables Included in the Predictive Models

First-time Entering Students			Students who were repeating the first year		
Retention	Subjects Passed	Average Mark	Retention	Subjects Passed	Average Mark
Language	Language	Language			Gender
ELSA (Total)	ELSA (Total)	ELSA (Total)			
CCQ (Total)					
Time Management (LASSI)			Time Management (LASSI)		
	Attitude	Attitude		Anxiety	Anxiety
	Concentration	Concentration			
	Commitment Ethic	Commitment Ethic			
	Comfort				
		Decision Making			
				Leadership	

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There were only two noteworthy findings in the study regarding home language. Firstly, Setswana decreased the odds of academic success for all three academic performance criteria. Secondly, students speaking an “Other” language were more likely to be academically successful. Figure 6.1 depicts the odds of being successful for the different languages.

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Figure 6.1 Visual Summary of Odds of Success for the Different Languages

	Retention	Subjects Passed	Average Mark
Afrikaans			
Xhosa			
Zulu			
Sesotho			
Setswana			
Swati			
Tsonga			
Venda			
Ndebele			
Sepedi			
Other			

Note. The table indicates the odds of the specific languages increasing or decreasing the chance of being academically successful for each of the three academic achievement criteria. Red indicates decreased odds of academic success and green indicates increased odds of academic success.

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Regarding Setswana, without further sociolinguistic research, it is difficult to identify specific reasons why students speaking this particular African language are more at risk for academic underachievement. Setswana is the second most widely spoken African language in Pretoria, where the TUT data was gathered. It is the home language of 14.7% of Pretoria's population (Statistics South Africa, 2015). Future research could investigate if the Setswana-speaking students are living at home. It may be likely that their place of residence is linked to their academic performance. Astin and Oseguera (2012) contend that living in a campus residence hall, as opposed to living at home, increases a students' chance of completing his/her qualification. Astin and Oseguera mention Astin (1975, 1977, 1993a), Astin and Henson (1977), Chickering (1974), Pascarella and Terenzini (1991, 2005) and Schudde (2011) who provide support for the relationship between place of residence and completion of an undergraduate degree. However, this conclusion cannot be drawn from this study. Sepedi is the most widely spoken African language in Pretoria (Statistics South Africa, 2015) and amongst the students in the sample in this study. Yet, Sepedi-speaking students were not at greater risk for academic achievement.

Students in the 'Other' category were most likely to have been international students. As the eleven official languages were included in the biographical details of the questionnaire, any unlisted languages had to have been foreign languages. Also, respondents were not asked to indicate their nationality in any of the questionnaires. Future projects need to disaggregate this category in order to determine if there are any specific linguistic groups that are more likely to be academically successful. Furthermore, the number of international students had increased from 12600 in 1994 to 72875 in 2012 in South Africa (MacGregor, 2014). This substantial increase in international students in South African higher education institutions warrants additional attention being devoted to factors influencing the success of international students in local institutions of higher education.

It was a reasonable result that career orientation was included in the model for Retention, but not for Subjects Passed or Average Mark. Having a vivid sense of one's career is linked to one's decision to continue studying a particular course, rather than dropping out or registering for an alternate qualification. This finding

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supported the results of Gibson and Walters's (2002) and Tomkinson et al.'s (2002) which linked student attrition to being in a course that was unsuitable for them.

The LASSI Time Management subscale was a predictor of retention for both first-time entering students and students who were repeating. It was the only variable included in the model for Retention for students who were repeating. This was consistent with George et al.'s (2008) finding that time management skills was the strongest predictor of academic performance. The ESAP Time Management subscale being excluded from the models further suggested that the two subscales measured somewhat different constructs. This was also implied by the correlation value of .36 between the two Time Management subscales. A strong correlation between these two subscales was anticipated.

An unexpected finding was the absence of any ESAP subscales in the model for Retention. This contradicted the assertion made by Nelson et al. (2003) that the action orientated emotional skills of Drive Strength, Time Management and Commitment Ethic were consistent predictors of retention.

Attitude was included in the models for Subjects Passed and Average Mark. A negative attitude being found to be a risk factor is consistent with McCoach's (2002) contention that underachievers tend to have more negative attitudes. Considering that the mean score for Attitude was also in the risk region, it would be beneficial to gain a deeper understanding of the nature and etiology of the presenting negativity. A student in Fakude's (2012) qualitative study at the University of Zululand provided one explanation: students' negative attitude towards lecturers affected the amount of effort invested in their studies, thereby affecting their academic performance.

The only other LASSI subscale that was included in models for first-time entering students was Concentration which is the ability to focus one's attention. This result aligned with Luo et al.'s (2006) research which concluded that attention is a good predictor of academic performance.

Anxiety was included in two models for students who were repeating, but did not appear in any of the models for first-time entering students. In Dill et al.'s (2014) research with students who were academically suspended, Anxiety was the only

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LASSI subscale that significantly contributed to predicting which students would be removed from suspension and retained. It should be noted that a high score on the Anxiety subscale did not pertain to high levels of anxiety, but referred to effectively managing anxiety related to academic failure (Weinstein & Palmer, 2002). Considering that the Anxiety subscale featured in two models for students who were repeating, it appears as if worrying about failing exacerbates when a student has already experienced failing. The management of academic anxiety needs to be focused on for students who are repeating either through relevant workshops or providing counselling support.

The following LASSI subscales were not included in any of the predictive models: Information Processing, Motivation, Self-Testing, Selecting Main Ideas, Study Aids, and Test Strategies. The Pearson Chi-Square Tests also failed to indicate significant relationships between academic performance indicators, and Self-Testing and Study Aids.

While none of the ESAP subscales were included in the Retention model, three subscales were included in the models for Subjects Passed and Average Mark. The Commitment Ethic subscale featured in both these models emphasizing the importance of perseverance and persistence when confronted with difficulties. This is consistent with the findings by Rice (2006) and Vela (2003).

In Rice's (2006) and research Wilkins's (2004), Decision Making was found to be a predictor of academic performance, specifically Subjects Passed. In this study, an unexpected finding was that it was an inverse relationship. Decision making encompasses problem solving and conflict management skills, and decisiveness when confronted with decisions which students are confronted with on a day to day basis. These include academic as well personal decisions which affect their overall wellbeing. Further research is required to verify the direction of this relationship, and reasons therefor.

Comfort was included in the model for first-time entering students for Average Mark; this indicates the importance of navigating social, emotional and physical distance in interpersonal relationships. This was an unexpected finding for two reasons. Firstly,

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an increase in Comfort scores led to a reduction, not an increase, in the odds of passing at least half the subjects. Secondly, Rice's (2006) and William's (2004) studies did not find correlations between these constructs.

Leadership was included in the model for Average Mark for students who were repeating. This was the only ESAP subscale to be included in a model for students who were repeating. The unanticipated aspect of this finding was that the chances of the students passing at least half the subjects decreased as the Leadership score increased. Intuitively, one is inclined to deduce that participation in student organisations at a leadership level was at the expense of time required for academic activities, and may have negatively affected academic performance. However, the score on this subscale did not indicate that the student was in a leadership position in any student organisations or clubs, it only evaluated leadership skills. This result contradicts extant literature on the area. For instance, a study conducted at Purdue University found that student organisation officers obtained a significantly higher GPA than regular members of the organisation, and regular organisation members performed better than the general student population (Hawkins, 2010). Future research needs to focus on the triad of leadership skills, holding a leadership position and academic performance.

What is interesting to note about the ESAP skills that were included in the models is that three out of the four belonged to the "Leadership" cluster. Furthermore, an increase in scores on these subscales was associated with a higher chance of academic underachievement. A possible explanation for this finding is that students with strong leadership skills are likely to devote their energy to student clubs and associations to the extent that it becomes detrimental to their studies.

Only one subscale, Commitment Ethic belonged to the "Self Management" cluster. No subscales from the Intrapersonal (Assertion), Interpersonal (Self Esteem and Stress Management) and Potential Problem Areas (Aggression, Deference and Change Orientation) clusters were included in any of the models. The Self Management skills of Drive Strength and Time Management were also excluded.

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The only demographic variable that was retained in any of the logistic regression models was gender. Gender was included in the model for Average Mark for students who were repeating the first year. Being male decreased the likelihood of obtaining an average mark of at least 50%. This finding is consistent with the literature that reports female students to be more likely to outperform male students on academic performance (Ali & Naylor, 2010; Cole & Espinoza, 2008; Huang et al., 2000).

Demographic variables are almost by default included in most instruments. However, the difficulty remains as to what measures can be implemented to manage these variables if they are found to be risk factors. From an ethical and human rights perspective, it is challenging to execute interventions for specific subpopulations that are at risk in a non-discriminatory manner.

The value of these findings lied in sensitizing faculty and student support personnel to specific engendered student experiences and contexts that may potentially have differential impact on males and females, to the detriment of male students.

Another noteworthy finding is that none of the interventions were included in any of the predictive models. While it was expected that the interventions that had low attendance would not feature in the models, as they had not been entered as variables, the absence of any of the intervention programmes in the models was disconcerting. Research conducted by Malan and Vermaas (2013), Moseki and Schulze (2010), Shange (2015), and Tisane and Chweu (2013) had demonstrated the efficacy of specific intervention programmes. However, the research methodology of the abovementioned studies differed from the methodology employed in the current study. This was the only study that entered all the interventions as variables in a model that predicted academic achievement.

Referring to the relevant component in Seidman's (2005) model, interventions need to be early, intensive and continuous. While the risk profiling evaluation allowed for early intervention, the issue then pertained to the intensity and continuous nature of the interventions. Seidman proposes that the intervention should continue until no

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longer required, should be compulsory, and students should be subject to disciplinary processes for failure to attend. While developmental and remedial interventions at TUT have specific exit criteria, additional programme and impact evaluations need to be conducted to determine if they are sufficiently intensive to address the respective risk areas. In terms of demonstrating impact at an institutional level, the intensity of the intervention programmes need to increase with regard to the number of students attending the programmes. Seidman's proposal of making the interventions compulsory would facilitate the process of having the students attend programmes. Many students do not attend the requisite interventions even after the risk area has been identified and communicated. Despite the increase in the number of students attending development and support interventions during the past two decades, Jones et al. (2008) suggested that some students may still be stigmatised for attending some of these programmes.

6.3 Examination of the Thesis Statement

The thesis statement proposed that first-year students at TUT may be identified as being at risk for academic underachievement based on a psychometric profile derived from results obtained on the ELSA, CCQ, LASSI and ESAP.

This proposition was investigated through a primary research question: "Which variables need to be included in a psychometric profile to predict a first-year student's risk for academic underachievement at a university of technology?" Underachievement was measured using three difference academic performance criteria, each constituting a secondary research question. The research questions were addressed for two categories of first-year students: first-time entering students and students who were repeating the first year. Psychometric profiles of students at risk were derived for each of the six groups with the concordant cases ranging from 61.5% to 68.1%. The model that had the highest percentage of concordant cases (68.1%) was the model for the prediction of Average Mark for first-time entering students. This model included Language, the ELSA total, Concentration, Attitude, Commitment Ethic and Decision Making. Considering the number of variables that

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were entered into the model, very few were included in the predictive models, particularly for students who were repeating the first year.

Secondary research question 1: Which variables need to be included in a psychometric profile that identifies a first-year student at risk for not reregistering in the subsequent year?

For first-time entering students, one demographic variable was included in the predictive model, namely Language. The total score for the ELSA and the CCQ were included in the model. The only LASSI subscale included was Time Management. None of the ESAP subscales were predictors. This finding highlights the importance of language as a predictor of academic performance. Two language related variables were included in the predictive model, Home Language and English Proficiency. The CCQ total emerging as a predictor stresses the importance of an informed career choice. Despite significant relationships prevailing when using the Chi-square test, the inclusion of only one LASSI subscale and exclusion of the ESAP subscales in the predictive model was an unexpected finding.

For the first-year students who were repeating group, only one variable, the LASSI Time Management subscale, was included in the predictive model for Retention.

Secondary research question 2: Which variables need to be included in a psychometric profile that identifies a first-year student at risk for passing less than half the subjects for which he/she has registered?

For the first-time entering students, Language and the ELSA score were included in the model. Two LASSI subscales, Attitude and Concentration, and two ESAP subscales, Commitment Ethic and Comfort were included in this model.

The predictive model for students who were repeating the first year of their studies comprised only two variables, the LASSI Anxiety subscale and the ESAP Leadership subscale.

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Secondary research question 3: Which variables need to be included in a psychometric profile that identifies a first-year student at risk for obtaining an average mark less than 50%?

For the first-time entering students group, Language and the ELSA score were included in this predictive model as well. The two LASSI subscales, Attitude and Concentration, were also included. The ESAP subscales that were included were Commitment Ethic and Decision Making.

For the students who were repeating the first year, one demographic variable, Gender, and one LASSI subscale, namely Anxiety, were singled out in the predictive model.

6.4 Conclusions

6.4.1 Measurement instruments

The Cronbach's Alpha for the measurement instruments approximated the generally accepted benchmark of .70 (Nunnally, 1978). Four measurements fell below .70, namely the CCQ Total, the Study Aids subscale in the LASSI, and the Assertion subscale and Decision Making subscale in the ESAP. According to Owen and Taljaard (1996) and Galpin (2001), a value of .6 may be accepted provided the results are interpreted appropriately. Even though there were four coefficients that were below .70, the four were .65 or higher, the results were not used to make individual decisions in this instance, and were used within a research context. Thus, it may be deduced that for the present study the reliability of the instrument was acceptable.

6.4.2 Research sample

Four-thousand seven-hundred and eighteen first-year students registered at a university of technology participated in the study. For the purpose of more accurate analysis, the students were categorised as first-time entering students and students who were repeating the first year. In terms of the demographic variables of gender, population group and language, the sample represented the composition of the

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institution. Although all the departments and undergraduate qualifications were not included in the sample, there were students from all the faculties within the institution. Furthermore the students were from 35 departments and 54 qualifications. The sample is, therefore, representative of the institution.

6.4.3 Prediction models

Home Language and English Proficiency were included in the predictive models for first-time entering students for all three academic performance criteria. These findings provide further justification for attention in South African higher education being devoted to language proficiency. The role of language in education during the twenty years post-democracy in South Africa has provided academics and scholars rich research opportunities as indicated by and the number of dissertations and at least three journals devoted to the theme of language in South Africa (Manyike & Lemmer, 2014).

The total score on the CCQ was included in the predictive models for first-time entering students using retention and the proportion of subjects passed as independent variables. These findings indicated the importance of career orientation as a predictor of academic performance. Noteworthy strides have been taken in recent years in this area with the drafting of the Framework for Cooperation in the provision of Career Development (Information, Advice and Guidance) Services in South Africa (R.S.A. Government. Department of Higher Education and Training, and South African Qualifications Authority, 2012).

Based on the results of the Chi-square tests and the logistic regression analyses, there is value in retaining the LASSI in the profiling battery. Although all the variables were not included in the predictive models, all the subscales except for Study Aids had a significant relationship with at least one academic performance measure in each of the two categories. For first-time entering students, additional emphasis and time may be dedicated to the development of time management, attitude and concentration skills. Learning and study strategies workshops targeting students who are repeating the first year ought to emphasise time management and anxiety.

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Using Pearson's Chi-square test of independence, all the ESAP subscales had a significant relationship with at least one academic performance measure for the first-time entering students. For the students who were repeating, the Aggression, Deference, Comfort, Empathy and Decision Making subscales did not have a significant relationship with any academic performance measure. None of the ESAP subscales were taken up in the predictive models for Retention for both the first-time entering students and the students who were repeating, and there were also no ESAP subscales included in the model for the average mark for subjects passed. For the first-time entering students, Commitment Ethic and Decision Making were included in the predictive model for average mark while Commitment Ethic and Comfort were included in the predictive model for the subjects passed. In William's (2004) study, Commitment Ethic was the strongest predictor of academic achievement. For students who were repeating, only the Leadership subscale was included in the model for subjects passed.

In terms of biographical variables, age and population group were not found to be significant predictors. However, gender mattered amongst students who were repeating the first year. Being male was a risk factor for obtaining an average mark below 50%.

Regarding interventions, the Academic Life Skills Programme and the Study Skills Workshops had a significant relationship with academic performance measures, but failed to be included in any of the risk profiles. The scale on which Individual Study Skills interventions were presented, precluded effective statistical analyses. However, individual interventions still have an essential role to fulfil. While Study Skills training was accessible in a group format, the individual sessions were reserved for high-risk students or students who had already been through the Academic Life Skills programmes and Study Skills Workshops, but required further individual attention.

6.5 Recommendations

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6.5.1 English proficiency

In terms of home language, the results indicated that Setswana-speaking students were at risk for academic underachievement in all three academic performance groups for first-time entering students. It is recommended that in-depth research be conducted with this subpopulation in order to identify potential reasons for their academic underperformance. Also, first-time entering students who had indicated 'Other' as their home language had a greater chance of academic success. These students were most likely international students. Future research initiatives should disaggregate such linguistic data to discern more specific trends within other language and international groupings.

The predicament of inadequate language proficiency can by no means be resolved solely by the higher education sector. The South African Government and the Department of Basic Education are key role players. It is recommended that the strategies discussed in Chapter 2 (Literature Review) be considered when attending to this problem.

National legislation and policies pertaining to the language of teaching and learning should be reviewed and modified to facilitate the optimal development of academic language proficiency. Collier & Thomas's (1997) and Ramirez et al.'s (1991) research support an "English mainly" approach. If an "English mainly" approach is to be retained, in-service teacher education to enhance the English proficiency levels will require implementation and an additional two years of schooling will have to be introduced.

The minimum admission requirements for Grade 12 English could be raised. This could potentially provide the university with registered students who have a higher level of English proficiency. By implementing this strategy, the university may have fewer applicants who meet the minimum admission requirements. Data analysis on the Grade 12 matric results of applicants should be conducted for each qualification to ensure that there will be sufficient applicants to admit to the qualification. If not, meeting enrolment management targets may be problematic and this will negatively impact on subsidies generated. If the existing Grade 12 admission requirements are

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retained, students performing poorly on the ELSA could register for an extended qualification with an intensive module focusing on the enhancement of English proficiency levels. Recommendations for future research include investigating the relationship between Grade 12 English results and the ELSA as well as the relationship between the Grade 12 English score and academic performance.

In Table 5.31, it was indicated that there was a significant relationship between the English program and academic performance. However, the English program was not included in the profiles for predicting academic underachievement. Additional research needs to be conducted to determine if the program is sufficiently intensive.

There were only a small number of students who completed the Reading Program and thus, it was not possible to determine a relationship. Alternative research methodologies need to be employed to determine the impact and efficacy of the Reading Program. A built-in approach towards reading enhancement should be piloted. The built-in approach could entail combining the English and Reading Programs, or curricular integration where the program is lodged within a subject with the competencies addressed using domain specific instead of generic content. This would increase the proportion of students obtaining the requisite skills.

As educators themselves may have limited English skills (Pretorius & Matchet, 2004), it is recommended that parallel English enhancement programmes be implemented for lecturing staff as well. Lecturing staff could also benefit from academic development programmes on appropriate strategies for teaching students whose first language is not English. Since many students spoke each of the official languages, the formation of learning communities based on language is recommended for each qualification. These groups may be facilitated by a student mentor or tutor who speaks the same language.

6.5.2 Career orientation

The Cronbach's Alpha value of .65 was less than the .70 benchmark, primarily due to the instrument only comprising five items. In order to enhance the CCQ, it is recommended that the length of the instrument be increased to at least ten items (Kline, 2000). It would be useful to develop a subscale with multiple items for each

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construct. If the CCQ is going to be used for individual purposes, it is strongly suggested that the instrument first be modified to increase its reliability.

Where students are required to indicate if the course is a first or subsequent choice, it is recommended that respondents indicate the name of the first choice programme if the course is not their first choice. This could provide some sort of indication if the course that the person is registered for is in a related field. Alternatively, the use of a different instrument evaluating career orientation may be investigated.

In terms of career counselling, the number of students who had career counselling was too few for valid Chi-square results. In order to determine the efficacy of career counselling, alternative research methodologies will need to be utilised. For this specific type of individual career guidance intervention, increasing the number of consultations is challenging as it is for the most part a reactive measure and too resource intensive to administer on a large scale. Students attended a career counselling consultation only in particular circumstances. These situations included a recommendation based on the CCQ results, referral by a faculty member, or the students wanted to change the course for which they were registered and were uncertain what direction to pursue. Proactive measures would need to be implemented before registration. Strategies that could be implemented by the university include: (a) pre-university courses that orientate prospective students to specific fields of study; (b) admissions strategies which incorporate interviews or having the applicants complete the CCQ and other instruments evaluating career orientation; (c) workshops on Open Day on how to make a career decision; and (d) career counsellors accompanying marketing personnel when visiting schools to disseminate information on the institution and courses offered.

6.5.3 Learning and study strategies

The results of the Pearsons Chi-square tests of independence indicated a significant relationship between academic performance (for all three academic performance measures) and all the LASSI subscales except the Self-Testing and Study Aids subscales for the first-time entering students. For the students who were repeating, all the LASSI subscales except the Study Aids subscale had a significant relationship

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with at least one academic performance measure. This finding is inconsistent with Hendrich's (2002) findings which found Study Aids to be one of the best predictors of academic success. Within the LASSI context, Study Aids refers to students using additional resources like other people (peers, lecturers or support personnel), websites or textbook processing strategies (highlighting, headings, and italics) to enhance learning. Additional research is required to determine the reasons for Study Aids not being a significant variable. Further studies will also be required to investigate the utilisation of supplementary instruction initiatives in the institution like tutorials, mentors and lecturer consultations. The Study Aids subscale has been removed from the new edition of the LASSI and replaced with the Using Academic Resources subscale (Weinstein, Palmer & Ace, 2016). A further recommendation is to repeat the study using the third edition of the LASSI.

6.5.4 Emotional skills

The three subscales in the Leadership cluster that were included in the models had an inverse relationship with academic success indicators. Further research needs to be conducted to probe this unexpected finding.

The Personal Life Skills workshops that focused on the development of emotional skills had a significant relationship with all three academic performance criteria for first year students, but did not have a significant relationship with any measure of academic achievement for students who were repeating. It is recommended that the programme be continued for first-time entering students.

6.5.5 Demographic variables

The three demographic variables, gender, population group and age each had a significant relationship with at least one academic performance criterion in both categories. However, only gender was included in a predictive model. For students who were repeating the first year, being male decreased the probability of obtaining an average mark of 50% or more. This model is consistent with studies that suggest that there is a relationship between gender differences and academic achievement (Insah et al., 2013; Jaeger & Eagen, 2007). The finding of males being at greater risk for underachievement is similar to the research conducted by Cole and Espinoza

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(2008) and Huang et al. (2000) and suggests that compared to males, female students tend to fare better academically.

6.5.6 Further Recommendations

6.5.6.1 Student tracking system

Actionable mutual knowledge refers to significant qualitative and quantitative institutional and student data that may be used to identify, predict and attend to risks effectively. This entails comprehensive student profiling and the tracking of significant trends in student behaviours and activities as well as institutional practices and services. A strategic student tracking system ought not only to incorporate traditional cohort academic progress data. Relevant and appropriate institutional processes should be able to be profiled and tracked, and based on this intelligence, risks can be identified, addressed and monitored. This is a mutual process as students need to participate in the self-assessment of these risks (Subotzky & Prinsloo, 2001). The institutional student tracking system may serve as a valuable tool in managing the results obtained from the risk profiling evaluation. It may serve as an additional platform for communication of results to the student and relevant faculty personnel, and monitoring attendance of interventions by appropriate support staff (Dockrat, 2013).

6.5.6.2 Customised profiles

Faculty-specific, department-specific or qualification-specific profiles could be derived from existing risk profiling data to facilitate more customised risk profiling models with greater accuracy.

6.5.6.3 Institutional integration

Participating in the risk profiling process was the prerogative of the faculty, department or programme. It is recommended that an institutional policy be drawn up that makes the profiling process compulsory upon admission or during the faculty orientation programmes. The attendance of the feedback session where the reports are issued and the recommendations are discussed also needs to be regulated. The

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challenges confronted by the university with the large number of late applicants prevent the implementation of pre-enrolment programmes which would be preferable. If a stage is reached where pre-university programmes are viable, the risk profiling evaluation could be administered at the beginning of the programme and immediately proceed to the interventions during the programme.

Institutional integration of interventions is also strongly recommended. The interventions that had a significant relationship with academic performance were the ones completed on a large scale. The inclusion of Life Skills and the English enhancement programme in the first-year mainstream curriculum for all qualifications is a proactive manner of ensuring that all students are required to attend the relevant programmes. Recognition of prior learning (RPL) options may be made available to students performing adequately on the ELSA. Simpson (2005) corroborates this view by suggesting that the activities most significant to retention will be proactive rather than reactive and an institution should implement active contact rather than only providing support services where students are expected to take initiative. Simpson quoted Anderson: “Self-referral does not promote retention. Students who need help the most are the least likely to seek it” (Simpson, 2005, p.42).

6.5.6.4 Conceptual model

It is recommended that the conceptual model employed in this study be expanded in line with Simpson’s (2005) recommendation to incorporate “Appropriate Career Choice” into Seidman’s formula. As the profile for students who are repeating the first year differs from students who are registered for the first time, profiling has to be repeated and appropriate interventions instituted. The revised model is depicted in Figure 6.2.

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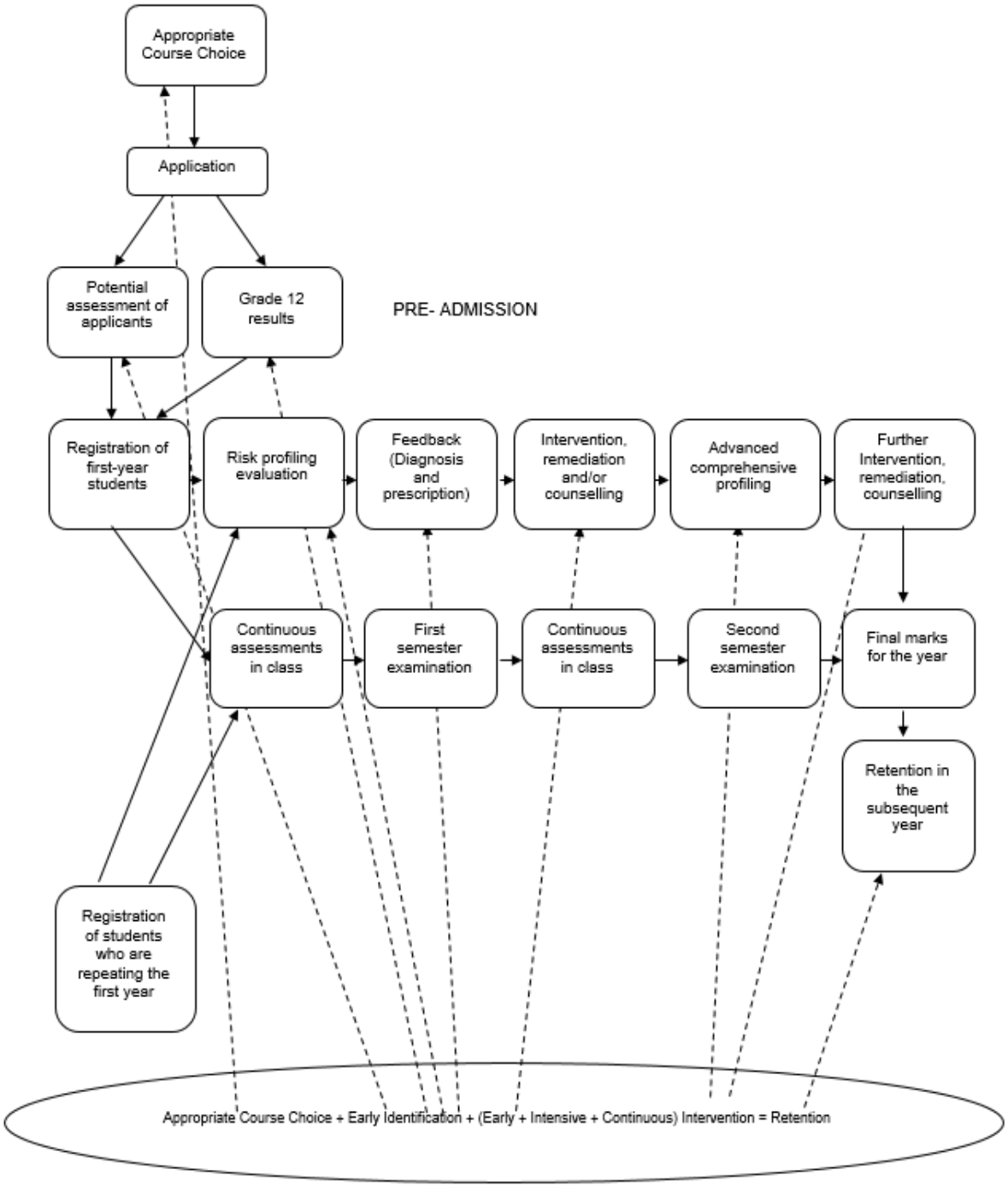
Figure 6.2 Revised Conceptual Model for Retention



Note. The revised conceptual model for retention includes appropriate career choice as the first step in the process and incorporates repeating the post-admission components of the model for students who are repeating the first year.

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This model should be evaluated in its entirety. The components not addressed in this study should be included in a more comprehensive study. These components are the potential assessment results, the Grade 12 APS scores, results obtained from additional profiling, attendance of other interventions and marks obtained from continuous assessments such as class tests, major projects and semester examinations.

Very few variables were included in the predictive models for students who were repeating. Additional research projects should focus on these students which should attempt to determine which support systems need to be mobilised, and what type of curricular, co-curricular or non-curricular interventions need to be implemented in order to assist the students to pass. Caplan (cited in Wilson, 2006) referred to interventions with students who are failing as tertiary prevention.

6.6 Limitations of the Study

6.6.1 Study in a single institution

The study being conducted at a single university of technology limits the generalisability of the results to other institutions of higher education in South Africa or even to other universities of technology. For a profile of a risk student to be adequately generalisable to first-year students, this study will need to be replicated as an inter-institutional project comprising universities, comprehensive universities and universities of technology.

6.6.2 Criteria for academic achievement

Although three different academic performance criteria were used, all three focused on the first year level only. A more suitable academic performance indicator would have been throughput. Investigating throughput would entail the analysis of how many students in a specific cohort completed their degrees and graduated within the specified time, how many students had dropped out and how many took longer than the requisite duration to graduate (Scott et al., 2007). However, as this research was conducted for qualification improvement purposes, the time frame did not permit a

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longitudinal cohort study. It is strongly recommended that the study be repeated using throughput as the dependent variable.

6.6.3 Interventions

Statistically, the relationships between some of the interventions which were attended by very few students and academic performance could not be measured due to the relatively small numbers of students which attended these programmes. Career counselling and personal counselling are by nature individual processes and individual study skills interventions are provided only to high risk students or those requiring individual attention.

This does not necessarily imply that there is no or little value in an institution offering these services. Studies by Malan and Vermaas's (2013), Moseki and Schulze (2010), Shange (2015), and Tisane and Chweu (2013) have demonstrated the utility of these programmes. Alternative methods of evaluating the impact of the interventions need to be investigated. The potential role of the interventions as mediating or moderating variables should also be investigated.

6.7 Contribution of the Study

The study adds value at a macro and micro level. At a macro level, it was a large-scale evaluation of components of Seidman's Retention Formula within the South African higher education context. This could provide a student success framework for other South African institutions.

At a more micro level, the application and utilisation of the retention formula was an innovative conceptual framework for rendering student development and support services within the South African context.

Furthermore, the study provided reliability information on the utilization of the four instruments in the context of a South African university of technology.

While the importance and necessity of individual interventions cannot be disputed, the results have shown that large scale group interventions are essential to making a difference to academic performance indicators at a macro level.

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The importance of home language and language proficiency skills to academic performance has already been well established in literature. What is significant about the role of language in this study is that Language and the ELSA score were the only two variables that were included in all three models of academic performance for first-time entering students.

The present study contributed to scientific knowledge by demonstrating the utility of an innovative battery of instruments that combines a number of constructs that were previously not used together in a study on academic achievement. The study yielded profiles for identifying students at risk for academic performance for three different academic performance criteria.

The present research project had numerous beneficiaries and positive scientific side-effects. The national government and TUT benefited from the research. University staff who became involved in and were exposed to the study gained the opportunity to enhance their skills-levels and professionalism. TUT was able to justify the deployment of its resources. Other higher- education institutions in South Africa are likely to also gain from the research. The research results that were generated have expanded the existing body of scientific knowledge in the science discipline of Educational Psychology on improved academic performance at tertiary institutions.

6.8 Formal Closure of the Research

The most noteworthy conclusion that emanates from the study is that there is no simple solution when addressing the issue of student success. From the models surveyed in the literature review, it is evident that there are a multitude of complex intrapersonal, interpersonal, institutional and contextual (political, social and economic) variables that have a dynamic interplay in influencing academic performance of students at an institution of higher education.

This research project focused only on a small subset of these variables. The contribution of English proficiency, career orientation, learning and study strategies, emotional skills and relevant interventions, as well as biographical variables to three academic underachievement criteria was evaluated. The findings support the use of the instruments in the risk profiling evaluation. The models and associated tables

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may be used for profiling for the identification of students at risk of academic underachievement.

The quandary of academic underachievement is even more perplexing for students who were repeating the first year. There were fewer variables that emerged as risk factors.

Overall, Seidman's (2005) conceptual framework was beneficial in this study for providing a structure for the identification of and intervention with students at risk at a university of technology in a South African context. Recommendations for the elaboration of the framework to include appropriate career choice, scores on admissions mechanisms and results from assessments have been proposed in this study.

This study should serve as an impetus for further reflection on the student success models, and student development and support practices prevailing within the institution. Transformative learning institutions that effectually and analytically reflect on their practices and processes have a greater tendency to respond to a diverse student population (Subotzky & Prinsloo, 2011).

"Improvement in rates of student success does not arise by chance. It requires intentional, structured, and proactive action that is systematic in nature and coordinated in application."
(Tinto, 2013, slide 11).

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APPENDIX A

FIGURES

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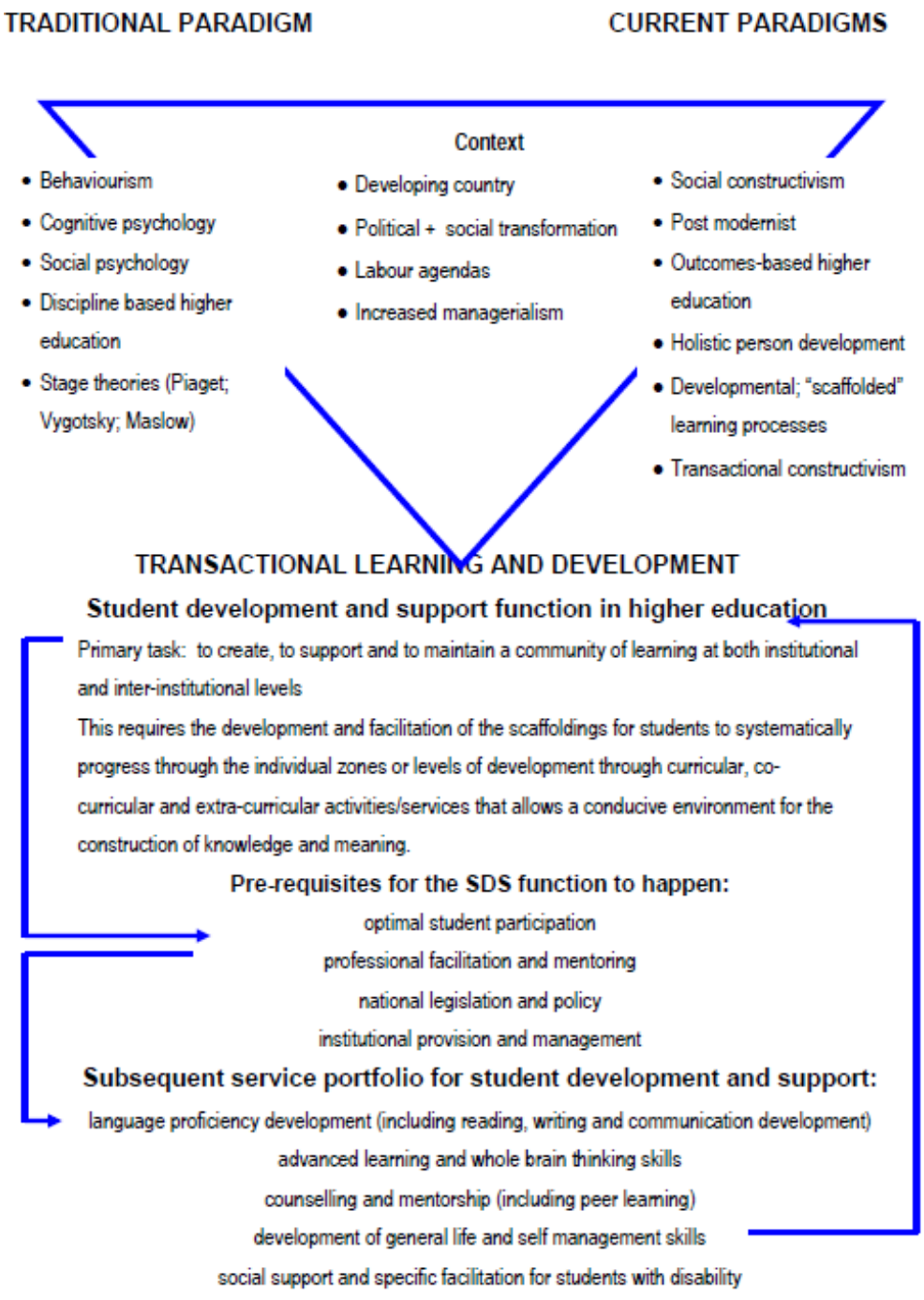
Figure A1 A Theoretical Framework for Student Development and Support



Note.. A framework for student development and support by Van Heerden, M.S. (2009). Providing and managing student development and support in higher education in a developing country (p.159). Unpublished doctoral thesis at the University of Pretoria.

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Figure A2 Factors related to Academic Performance

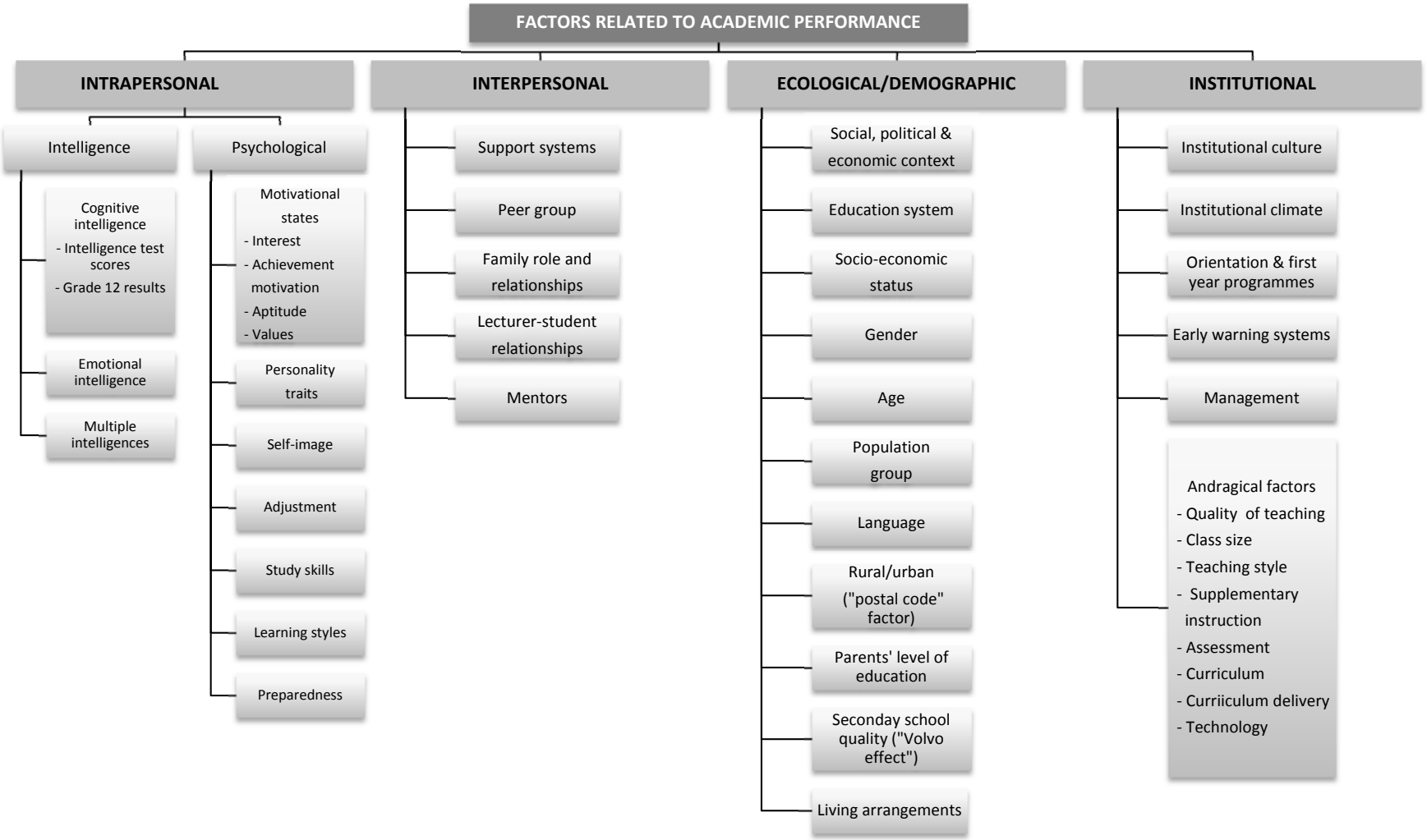

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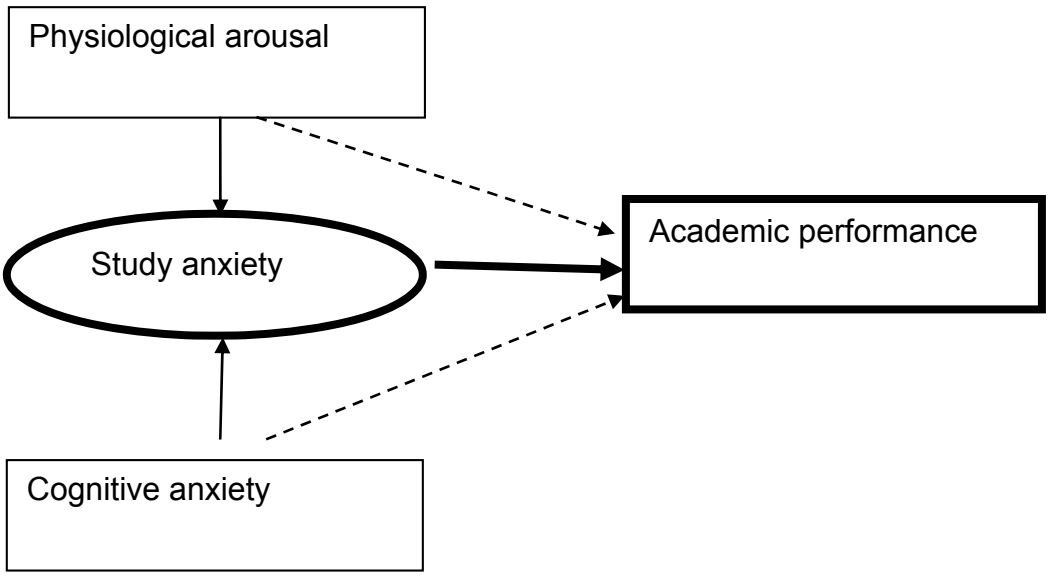
Figure A3 Relationship between Study Anxiety and Academic Performance



Note. Adapted from "The relationship between study anxiety and academic performance among engineering students" by P. Vitasari, M.N.A. Wahab, A. Othman, T. Herawan and S. Sinnadurai, 2010, Procedia Social and Behavioral Sciences, 8, p. 10. Copyright 2010 by the International Conference on Mathematics Education Research 2010 (ICMER 2010).

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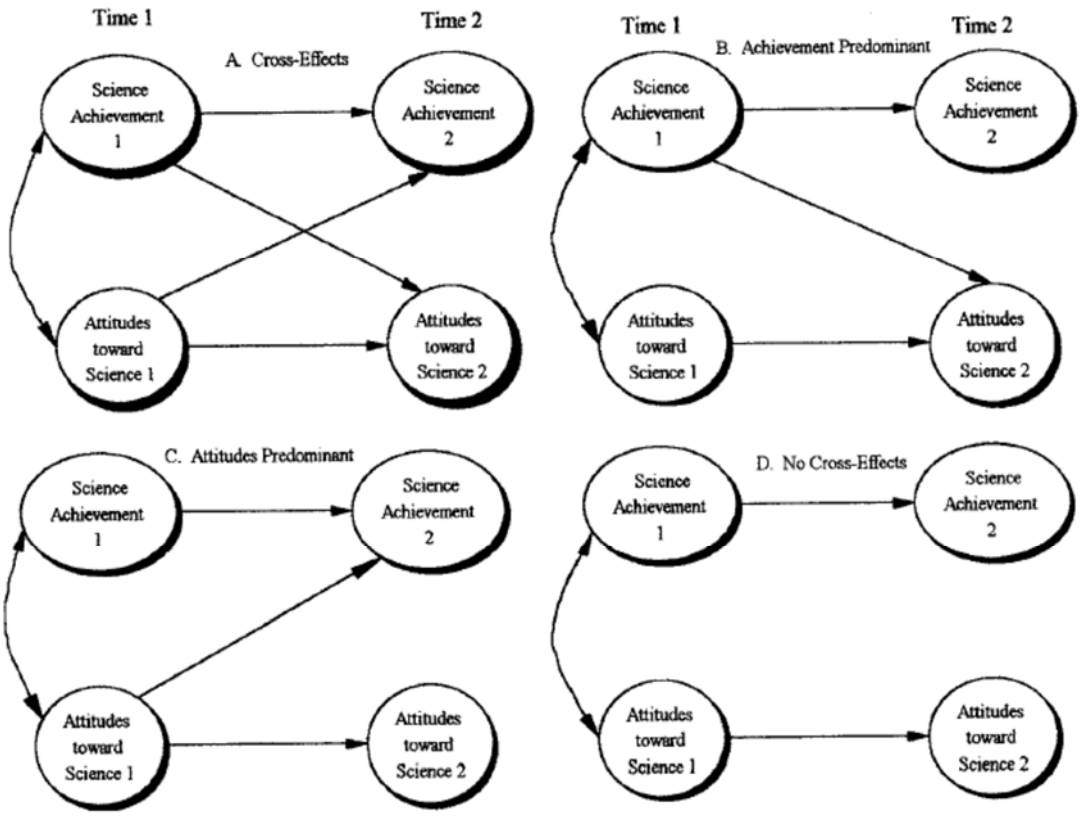
Figure A4 Relationship between Attitude and Achievement



Note. Four models of possible relationships between attitudes and achievement over time. Adapted from Gender differences in science attitude-achievement relationships over time among White middle-school students. (p. 327), by Nancy Mattern and Candace Schau, 2002, Journal of Research in Science Teaching, 39(4), 324-340.

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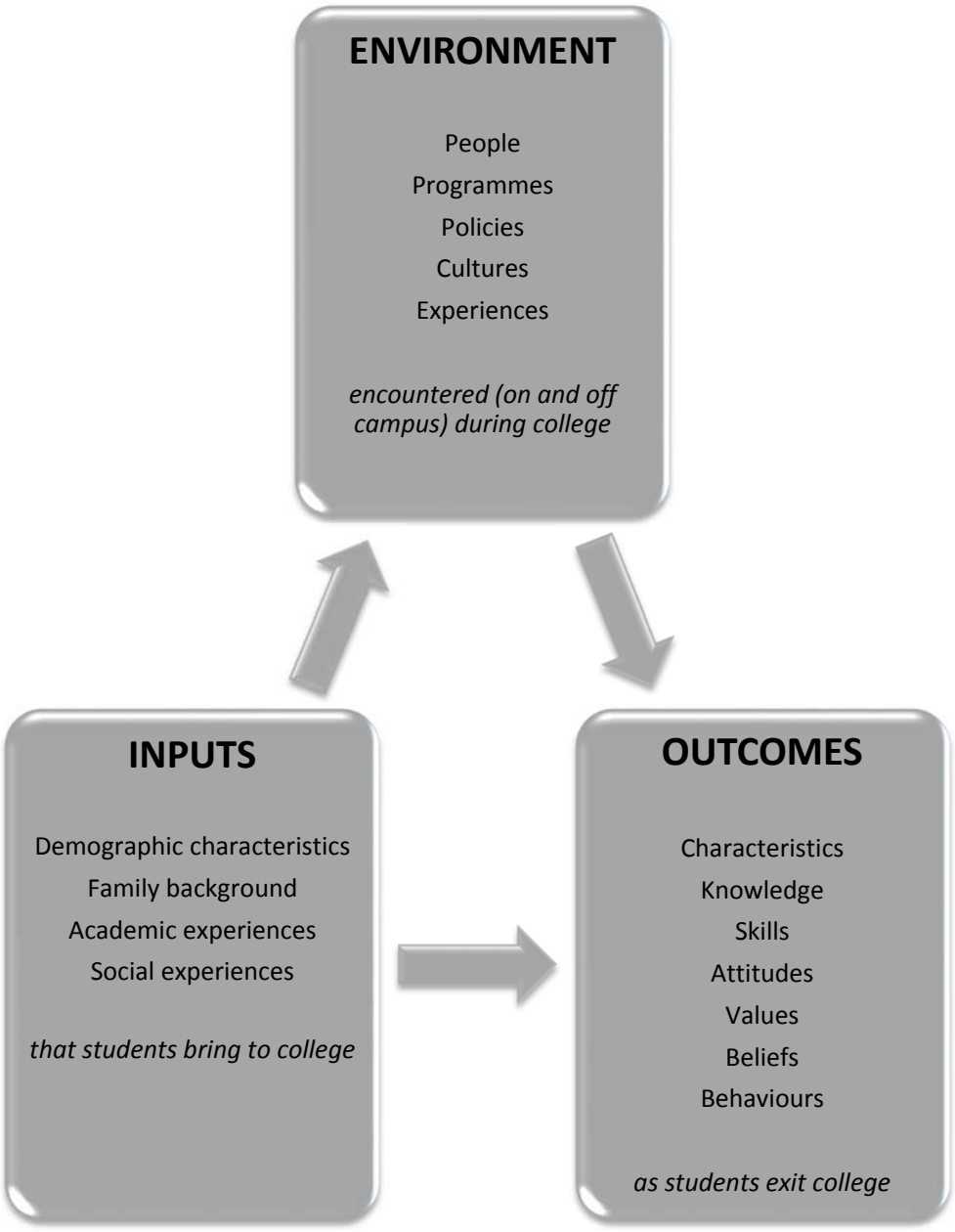
Figure A5 Astin's I-E-O Model



Note. Astin's input-environment-output (I-E-O) model adapted from his model discussed by A. Astin (1993b) in Assessment for excellence: The philosophy and practice of assessment and evaluation in higher education (p.18). Phoenix: The Oryx Press.

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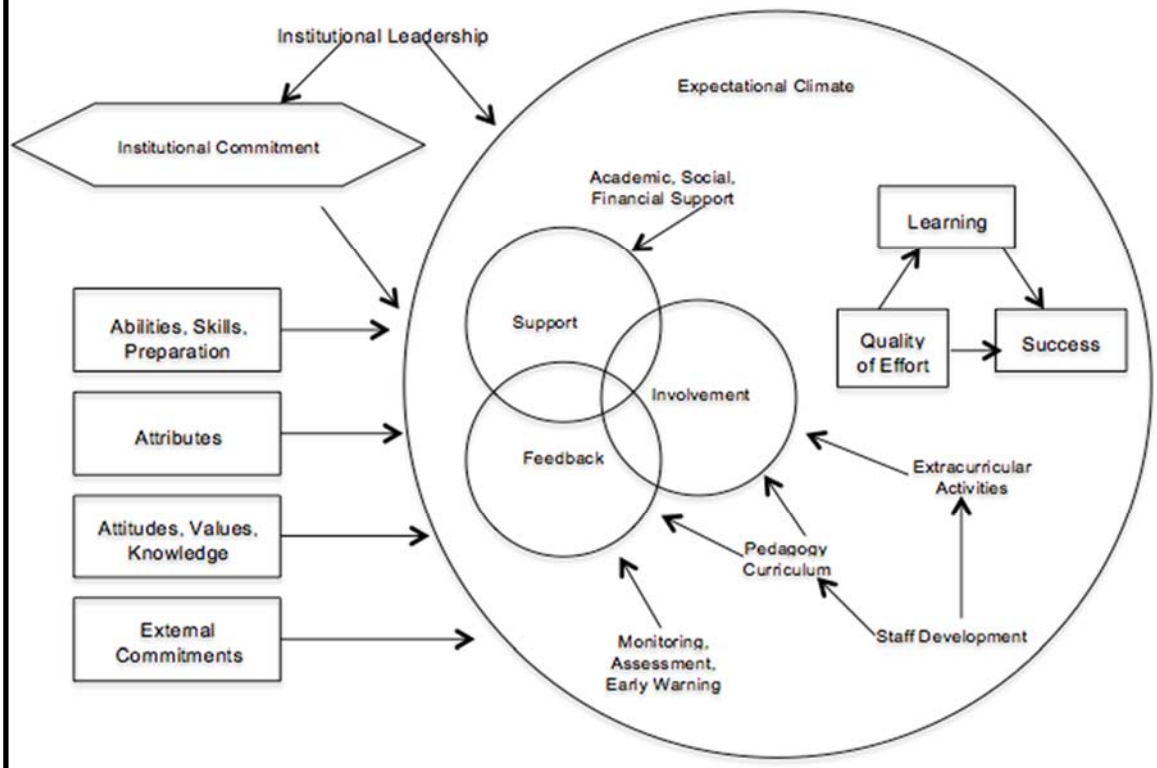
Figure A6 Elements of a Preliminary Model of Institutional Action



Note. The model of institutional action by Vincent Tinto and Brian Pusser, 2006, examines intra-institutional influences on students and the influence others exert on the student. Adapted from Moving From Theory to Action: Building a Model of Institutional Action for Student Success (p. 11), Washington, DC: National Postsecondary Education Cooperative. Copyright 1993 by National Postsecondary Education Cooperative.

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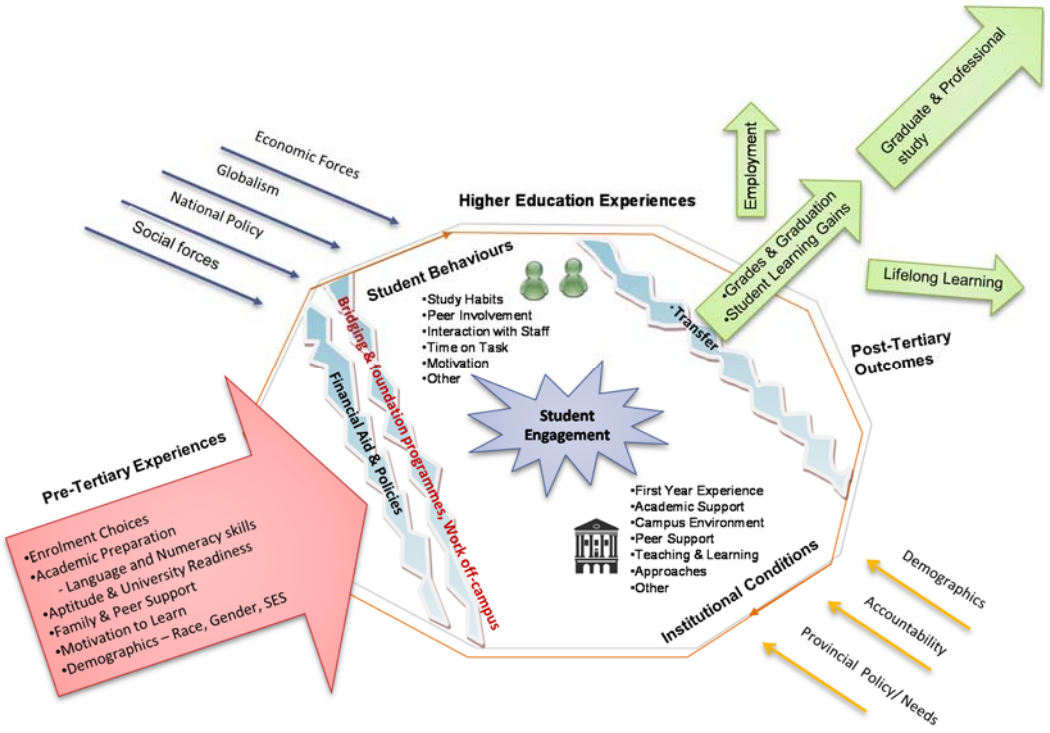
Figure A7 A Student Engagement Framework



Note. Adapted from Piecing together the student success puzzle: research, propositions, and recommendations (p. 11), by George D. Kuh, Jillian Kinzie, Brian K. Bridges, and John C. Hayek, 2007, San Francisco: Jossey-Bass. Copyright 1993 Jossey-Bass.

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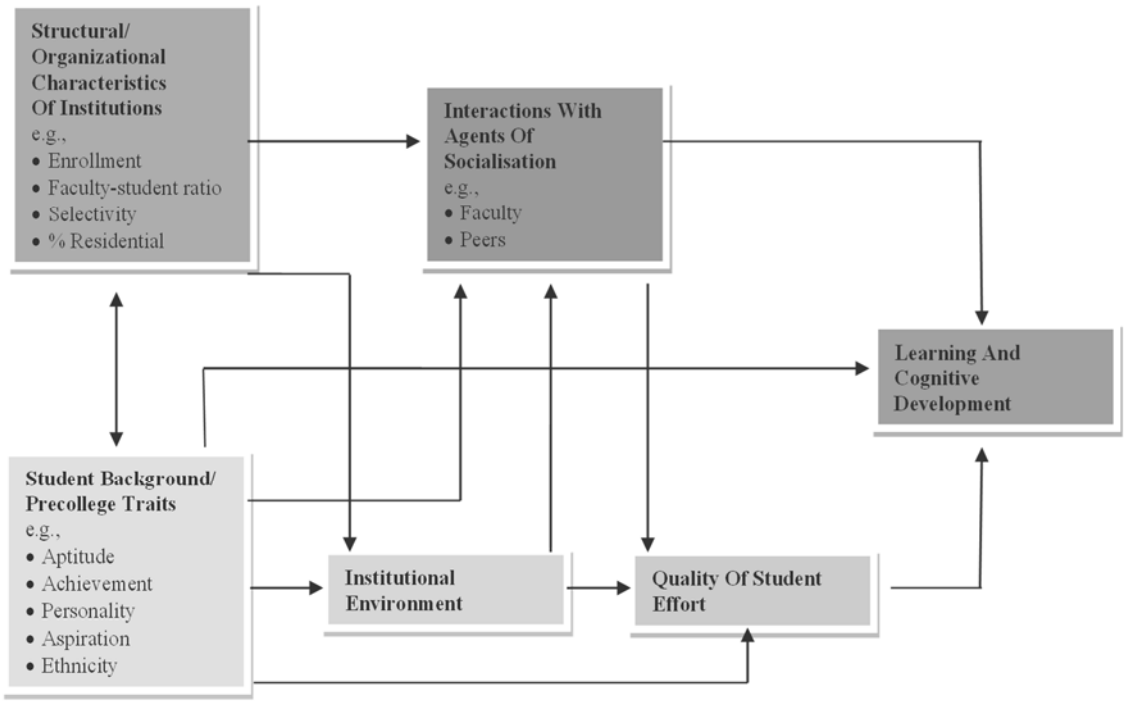
Figure A8 Pascarella's General Causal Model for Assessing Change



Note. Adapted from College environmental influences on learning and cognitive development: A critical review and synthesis (p. 10), by E. Pascarella, 1985, New York: Agathon. Copyright 1985 Agathon. In J.Smart (Ed.), Higher education: Handbook of theory and research, vol. 1.

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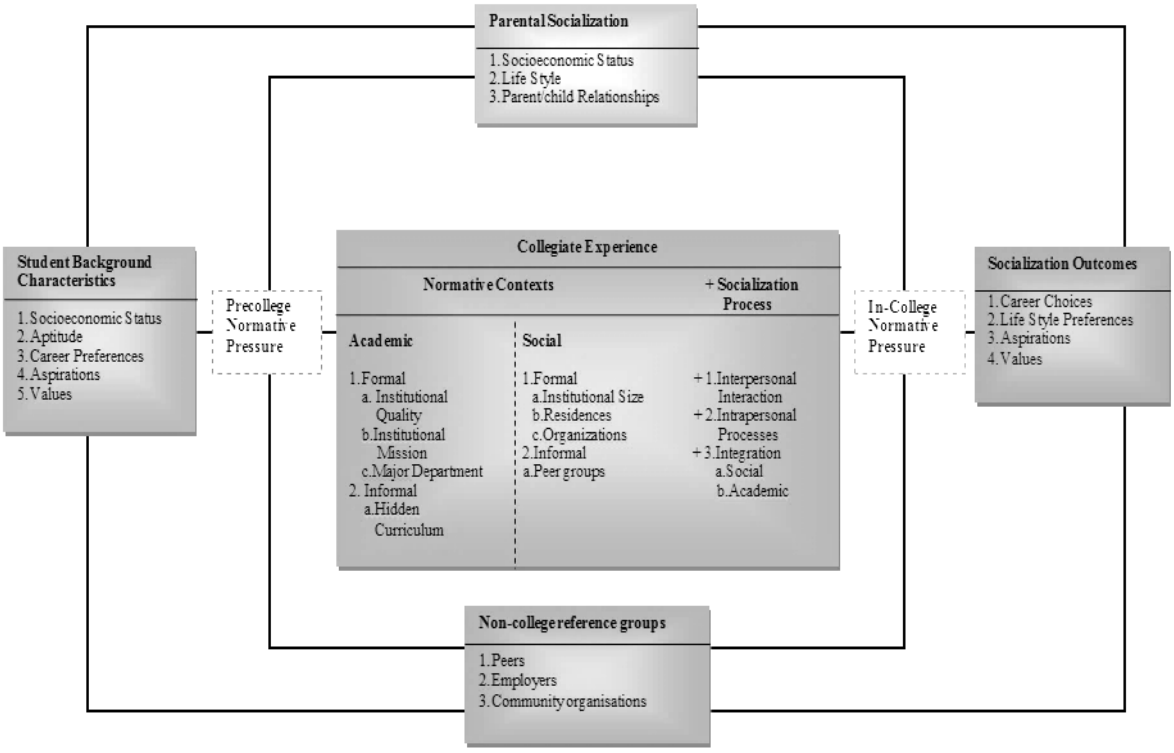
Figure A9 A Conceptual Model of Undergraduate Socialization



Note. A model of undergraduate socialization by J.C. Weidman, 1989, p299. Copyright 1989 Agathon Press. In J.Smart (Ed.), Higher education: Handbook of theory and research, vol. 1. p59.

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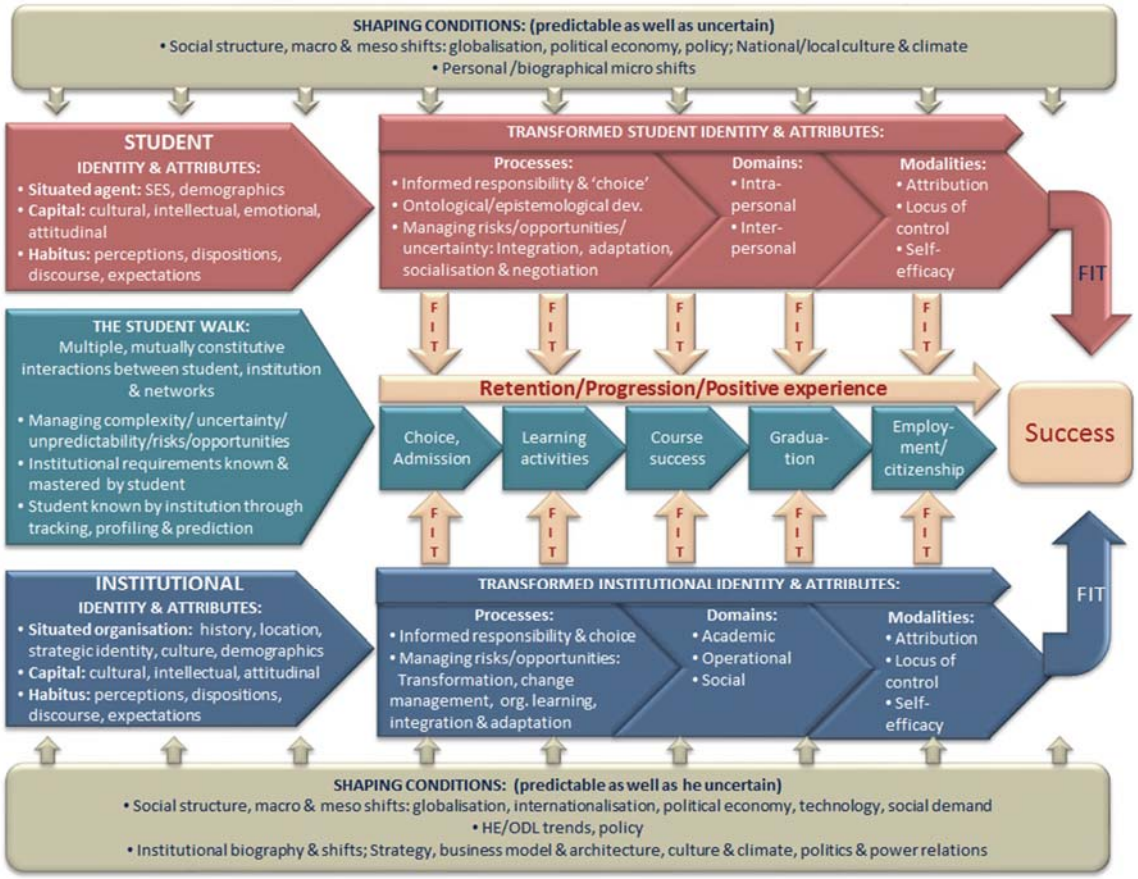
Figure A10 UNISA Student Success Framework



Note. By H. Liebenberg, H. Subotzky and D. van Zyl, 2011. Enhancing ODL Students' Success through Risk Profiling and Prediction: The Case of Unisa. NADEOSA Conference, Johannesburg, 30 August 2011.

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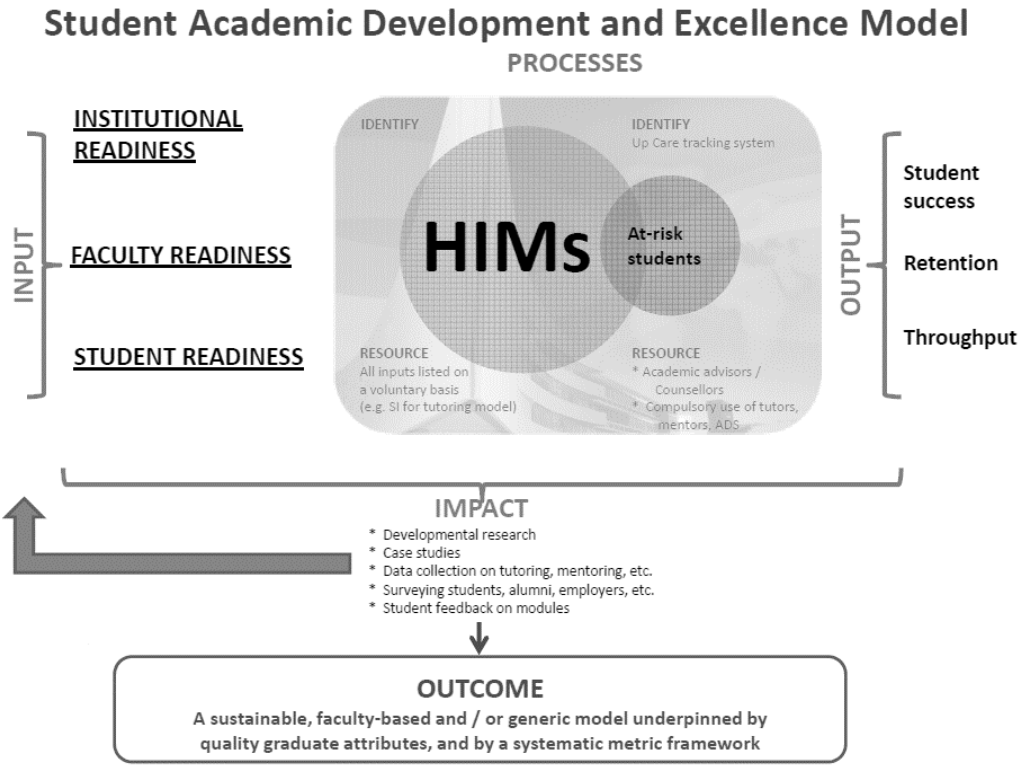
Figure A11 University of Pretoria Student Academic Development and Excellence Model



Note. University of Pretoria Student Academic Development and Excellence Model by J. Lemmens, 2012. Mission Impossible: proactive initiatives to student success. SAACDHE regional conference, Pretoria, 18 May 2012.

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APPENDIX B

TABLES

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APPENDIX B1

TEST-PREPARATION STRATEGIES

Category	Strategy	Example
Cognitive strategies	Reviewing	Formulas, problems, notes, examples, book (chapters and sections); homework assignments; quizzes, sample tests, pretest practice tests; other materials
	Outlining	Notes, prospective test items
	Solving	Problems, made-up problems, example or sample problems, practice problems; homework problems; problems in notes; problems in book, chapters, and sections
	Repeating	Review, look over, rework or solve, do, or practice over and over
	Checking	Knowledge, answers, steps or processes
	Memorising	Words, definitions, formulas, notes
	Understanding	Concepts, processes
	Reasoning	Multiple viewpoints (look at problems from different angles)
	Note taking	Theorems, formulas, detailed notes, good notes
	Externalising	Write down formulas or problem-solving process
Environmental and structural management	Managing work environment	Furniture design (e.g., lie on the floor), intake, time management (e.g., take a break, morning), study alone or with peers, background sound
	Seeking assistance	Teachers, peers, siblings, tutors, someone who knows the material
	Conditional management	Time (e.g., If have more time, read chapter), difficulty level (e.g., if difficult, seek assistance), type of material (for understanding concepts, for number-crunch situations)
Motivational awareness	Confident – no effort	"Don't study because good at math"
	No effort	"Rarely study, not a good study person"
	Need for effort	"Need more work for math, need to pay attention in class"

Hong, E., Sas, M. and Sas, J.C. (2006). Test-taking strategies of high and low mathematics achievers. *The Journal of Educational Research,99*(3),144-155. Pg149

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APPENDIX B2

TEST-TAKING STRATEGIES

Category	Strategy	Example
Cognitive strategies	Checking	Understanding, correctness of answers, correct use of equation, minor steps or processes
	Externalising	Write down formulas, draw pictures
	Remembering	Materials in homework or book
	Repeating	Rereading, redoing, rechecking problems
	Eliminating	Wrong answers in multiple-choice questions
	Using memory aids	Mnemonics
	Elaborating	Relate to something
Structural organisation	Assessing and allocating	Time (e.g., "First count how many problems are, then measure time for each item"), item type (e.g., "Look through problems before solving to determine the type of problems")
	Sequencing	Easy to difficult, difficult to easy, start and go back
Motivational awareness	Effort expenditure	"Show all work for partial credit," "Go through all items and try as many items as I can do," "Try the best I can do no matter if I get it wrong."
	Passive	None, no method (e.g., just hope)

Hong, E., Sas, M. and Sas, J.C. (2006). Test-taking strategies of high and low mathematics achievers. *The Journal of Educational Research,99*(3),144-155. Pg151

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