UNIVERSITY OF KWAZULU-NATAL

PERFORMANCE OF STUDENTS IN THE COLLEGE OF LAW AND MANAGEMENT STUDIES, UKZN: AN ECONOMETRIC ANALYSIS

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A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

School of Accounting, Economics and Finance
College of Law and Management Studies

Supervisor: Professor Devi Tewari

2011

DECLARATION

I **Koye Gerry Bokana** declare that

(i) The research reported in this thesis, except where otherwise indicated, is my original research.

(ii) This thesis has not been submitted for any degree or examination at any other university.

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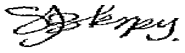
Signed: 

ACKNOWLEDGEMENTS

This study organizes focus groups, correlations sweep, and fits data to an educational production function to analyse holistically, students' academic performance in the College of Law and Management Studies at University of KwaZulu-Natal (UKZN), which is one of the largest universities in South Africa. I wish to express my gratitude to those who contributed to the completion of this thesis.

I am most grateful to my supervisor Professor Devi Tewari who examined all earlier versions of the research reported in this thesis and provided several suggestions and useful comments that improved the thesis. The paper I have co-authored with him "Tewari, Bokana, and Deis (2008). "Explaining the Academic Performance of Students in Introductory Accounting and Economics Courses at the University of KwaZulu-Natal (UKZN): An Econometric Analysis" published in the *Global Education Journal,* Volume 2008, Issue 1, pp. 47-74" was a valuable experience which has taught me a great deal about how academic research should be conducted. Several academic staff members of the School of Accounting, Economics and Finance, UKZN examined and commented on parts of the earlier version of the research reported in this thesis. I am most grateful to all of them for their encouragement, friendship and invaluable help. I am most grateful to Professor Charlotte Mbali from the Centre for Higher Education Studies (CHES). Charlotte has been the tree from which I have harvested much higher education literature relevant to the study. I am thankful to all the members of the Faculty Office of Management Studies and to former colleagues in the Deputy Dean's suite for many fruitful discussions and their support, which set the scene for the completion of this thesis. Thank you to Ms Deanne Collins for the good editing. Financial support provided by the University Teaching and Learning Office, the Research Office, and the School of Economics and Finance is gratefully acknowledged. Finally, I would like to thank my family and friends. My deepest appreciation goes to my wife Gisele Manga and my two sons Dav and Delice-Nathan whose love, support and patience enabled me to complete this work. However, none of the above is responsible for the use I made of their advice and guidance, nor are they for the contents of this thesis.

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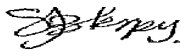

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ABSTRACT

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South Africa needs more higher education graduates with the capability to adapt to and function in a knowledge-driven and knowledge-dependent economy and society. High dropout and failure rates, as well as the slow progression of students, have revealed themselves as complex, persistent and seemingly intractable crises. These hindrances are fuelling student attrition, poor graduation, or low throughput rates in South African universities, and constitute a wastage of much needed potential skills for the South African economy. While on average less than 15 percent of a cohort of school leavers get into higher educational institutions, less than 50 percent graduate. Moreover, if high dropout and failure rates or the slow progression of students affect students from previously disadvantaged population groups in South African universities, this may result in further racial and socio-economic disparity in future generations.

To identify determinants of students' academic performance in the College of Law and Management Studies at UKZN, this study conducted focus groups, correlations sweep, and fits the students' records data in two different educational production functions applying two econometric approaches, namely, Ordinary Least Squares and Logistic Regression models.

Arising from focus group discussions, a consolidation of results indicated that unpreparedness that lead to exclusion on academic grounds, and financial difficulties were not wholly to blame. Other reasons including feeder high schools, life events, and the youth's sundry needs were considerable stumbling blocks on the graduation path of students. An amalgam of perceptions on ways to address the quality of teaching and learning, services and support systems to students, academic staff members' development, curriculum development, admission policy and placement of students in appropriate curricular routes as well as the most effective use of resources across the College of Law and Management Studies was reported.

Results of correlations sweep showed some positive correlations between students' performance at university and their matric scores. Results of Ordinary Least Squares and Logistic Regression analyses confirmed that important predictors of students' academic performance are total matric points, matric Maths score, English I score, and English as home first language. In some extent, non-designated matric subjects scores that include matric Accounting score and matric Economics score play some role. This study, however, cautions that all the predictors identified play only a minor role since they predict only a very small proportion of the entire variance in students' academic performance. This is evident from some of the pseudo-R^2 and R^2, which were low ranging from 2 to 65 percent pointing out low explanatory power.

Conclusions emanating from these analyses are that these determinants of students' academic performance are not straightforward measures of student quality, as they are the sum of complex and multifaceted process. Other personal and student demographic variables such as age and race play some role in predicting university success. Exogenous factors such as the institutional environment, intellectual leadership, a proper learning infrastructure and environment at the university, socio-economic characteristics, and psychological attitudes may also play an important role in predicting students' performance, demanding further investigation.

Some policy implications of the results are that: (1) hypotheses focusing their educational policy-making process and strategic planning for admission, retention and graduation rates based solely on student characteristics are challenged. Instead, an integrated holistic approach run parallel to appropriately targeted educational investments to enhance student success in the College is imperative making the prediction of students' performance a far more complex and multifaceted process; (2) admission eligibility should consider additional mechanisms in the selection of candidates and their placement into appropriate curricular routes where they are more likely to be successful. This will go a long way in reversing the trends of student attrition and slow progression by keeping them on the graduation path and ultimately increasing the pass rates, graduation, and throughput rates in the College. These implications should be explored and integrated into the educational policy-making process and strategic planning.

Keywords: Educational production function, Higher education, Matric score, Students' performance, Throughput rate, UKZN.

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ABBREVIATIONS, ACRONYMS, AND DEFINTIONS OF TERMS

ABET: Adult Basic Education.

Academic Development (AD): In South Africa, AD is defined by the Higher Education Quality Committee (HEQC) as 'A field of research and practice that aims to enhance the quality and effectiveness of teaching and learning in higher education, and to enable institutions and the higher education system to meet key educational goals, particularly in relation to equity of access and outcomes.' (HEQC, 2007:74).

ACCT101: Accounting 101 or Accounting 1A provides students with an understanding of the role of accounting in various forms of business entities and how to record basic financial transactions and to prepare basic financial statements in accordance with International Financial Reporting Standards (IFRSs) and the Companies Act. This module was referred to as DAC1AC1 (Howard College Campus) and PAC100 (Pietermaritzburg Campus) at the former University of Natal (UN) or as ACC111S at the former University of Durban-Westville (UDW) prior to the merger in 2004.

ACCT102: Accounting 102 or Accounting 1B has ACCT101 as a prerequisite but further underpins theories that apply when recording financial transactions and preparing financial statements in accordance with IFRSs and the Companies Act. This module was referred to as DAC1AC2 (Howard College Campus) and PAC100 (Pietermaritzburg Campus) at the former University of Natal (UN) or as ACC112S at the former University of Durban-Westville (UDW) prior to the merger in 2004.

ACCT103: A terminal module for first year students who have no desire to major in Accounting.

ACCT200: Accounting 200 introduces further International Financial Reporting Standards and sections of the Companies Act (Level 2).

ACCT2A0: Advanced Generally Accepted Accounting Practice (GAAP) theory and applications (Level 2).

ACCT2IS: Accounting Information Systems 2B (Level 2) has Business Information Systems 1A and 1B or Computer Science 1A and 1B, and Business Information Systems 1B. The module prepares students to become Chartered Accountants with a knowledge of business computing and comprises accounting package software, controls in computer-based systems and managing information systems resources.

ACCT300: Accounting 300 (Level 3) equips students to compile and critically evaluate primary and group financial statements in sundry business-related topics.

APS: Admission Point Score.

BAdmin: Bachelor of Administration.

BBus Admin: Bachelor of Business Administration.

BCom: Bachelor of Commerce.

BCom4: Bachelor of Commerce Extended Curriculum, which is a 4-year degree.

CHE: Council on Higher Education.

CSO: Civil Society Organisation.

Course: A course is a unit of study that is assessed, i.e. a formal component of a qualification.

DoHET: Department of Higher Education and Training. This Department deals with universities and the whole field of skills development and training, including post-school education and training, the Sector Education and Training Authorities (SETAS), the National Skills Authority (NSA), the National Skills Fund (NSF), as well as coordination of the National Human Resource-Development Strategy (NHRDS) (http://www.info.gov.za/aboutsa/education.htm).

DBE: Department of Basic Education. This Department deals with all schools from Grade R (also referred to as grade 0 or the reception year) to Grade 12, as well as adult literacy programmes.

DoE: Former Department of Education. As of 2009, the new administration of President Jacob G. Zuma separated the department into the Department of Basic Education (DoBE) and the Department of Higher Education and Training (DoHET).

DP: Duly Performed. DP requirements are Faculty-determined requirements for a module, which must be met to permit a student to be eligible for final assessment or examination in that module.

ECD: Early Childhood Development.

ECON101: Economics 101 or economics 1A. This module introduces students to principles of micro-economics, economic concepts and to sundry economic principles including supply and demand, market structures, and markets for factors of production. This module was referred to as DEC1EC1 (Howard College Campus) and PEC1101 (Pietermaritzburg Campus) at the former University of Natal (UN) or as ECN101S at the former University of Durban-Westville (UDW) until 2005 after the merger.

ECON102: Economics 102 or economics 1B. This module introduces students to principles of macro-economics, components of aggregate expenditure, the operation of the money market, simple macro-economics models, and how fiscal, monetary and trade policy tools have the ability to influence key macro-economics concerns of inflation, unemployment and economic growth. This module was referred to as DEC1EC2 (Howard College Campus) or as ECN102S at the former University of Durban- Westville (UDW) until 2005 after the merger.

ECON122: Quantitative Management 1B. This module was referred to as DEC1QT2 at the former University of Natal (UN) until 2005 after the merger. It then became MATHS134.

ECON201: Economics 201 or economics 2B. This second level module introduces students to intermediate macroeconomics and applications. It has ECON102 as a prerequisite and mainly covers theories of income determination and employment, the trade-off between inflation and unemployment, and fiscal and monetary policies and their impact on output, employment and prices. This module was referred to as ECN201S at the former University of Durban-Westville (UDW) until 2005 after the merger.

ECON202: Economics 202 or economics 2A. This second level module introduces students to intermediate microeconomics and applications. It has ECON101 as a prerequisite and covers micro-economics theories of consumer behaviour and production behaviour, transaction costs, game theory, and allocation of resources and output under welfare economics. This module was referred to as ECN202S at the former University of Durban-Westville (UDW) until 2005 after the merger.

ECON314: Quantitative economics. This is a core and compulsory module to progress to honours in economics and has both ECON201 and 202 as prerequisites. The module uses the tools of mathematics and econometrics, which lay the foundation for the estimation, and interpretation of equations modelling the real-world data.

EMS: Enriched Management Studies.

FET: Further Education and Training.

FTE: Full-time Equivalent.

FINR104: Financial reporting 1A. This module provides an understanding of entrepreneurship, the role of accounting in various forms of business entities and to how record financial transactions, and basic financial statements in accordance with generally accepted accounting principles in South Africa and IFRSs.

FMS: Faculty of Management Studies.

GAAP: Generally Accepted Accounting Practice.

GDP: Gross Domestic Product.

HE: Higher Education. In South Africa HE is a level of educational provision defined by the National Qualifications Framework (NQF) as including all qualifications from Level 5 to Level 8 on the NQF.

HEIs: Higher Educational Institutions.

HELTASA: Higher Education Learning and Teaching Association of Southern Africa.

HEMIS: Higher Education Management Information System.

HEQC: Higher Education Quality Committee.

HEQF: Higher Education Qualification Framework.

HEP: Higher Education Practise.

HESA: Higher Education South Africa. It was formed on May 9, 2005 to represent the voice of Vice Chancellors – leadership- of South Africa's public universities and is successor to the two statutory representative organisations for universities and universities of technologies (the former Technikons), the South African Universities Vice-Chancellors Association (SAUVCA) and the Committee of Technikon Principals.

ISTN101: Information systems and technology fundamentals for business. This module provides an understanding of organisational systems, and how information and systems are used in organisations. This module was referred to as DAC1ST1 at the former University of Natal (UN) until 2005 after the merger.

ISTN102: Information systems and technology development fundamentals and applications. This module introduces students to systems analysis and design, design, Web Page Design and programming in sundry business contexts. This module was referred to as DAC1ST2 at the former University of Natal (UN) until 2005 after the merger.

MATHS134: Quantitative Methods 1. This module has as a prerequisite (entry requirement) NSC Level 4 or matric Maths (Higher Grade symbol E or Standard Grade symbol B for students who completed their matric prior to NSC). This module introduces mathematical techniques for business mathematics and develops problem-solving skills. Presently, this module is being phased out by the School of Mathematical Sciences towards offering Math130 with higher requirements - NSC Level 5 matric Maths (or Higher Grade symbol D or Standard Grade symbol A for students who completed their matric prior to NSC). This module was referred to as DEC1QT2 at the former University of Natal (UN) until 2005 after the merger.

MATHS137: Business Mathematics. . This module has as a prerequisite (entry requirement) NSC Level 4 or matric Maths (Higher Grade symbol E or Standard Grade symbol B for students who completed their matric prior to NSC). Presently, this module is being phased out by the School of Mathematical Sciences.

MGNT101: Management 110 or Management 1A. This module takes current business practice as a basis for developing knowledge, critical thinking, and effective language skills within an integrated, interdisciplinary core module.

MGNT102: Management 120 or Management 1B. This module introduces students to the development of management theory and the work of managers.

Module: a separate course of study for which credits may be obtained. Modules are designated as being at level 0, usually taken in an access programme at UKZN, level 1 (first year), level 2 (second year), level 3 (third year), level 4 (fourth year), level 7 (Honours and Postgraduate diplomas), level 8 (Masters), and

level 9 (Doctoral). The level of a module is given by the first numeric character in the module code, e.g. ECON101 is level 1 (FMS Handbook, 2010).

NATED 550: An official government policy document that spells out the norms and standards defining the old matriculation system curriculum, which had Higher Grade (HG) and Standard Grade (SG) and was phased out at the end of 2008.

NBTs: National Benchmark Tests.

NCHE: National Council for Higher Education.

NCS: National Curriculum Statement. This is an official government policy document that spells out the norms and standards defining the new National Curriculum Statement - the new matriculation system.

NGO: Non Governmental Organisation.

NIHE: National Institute of Higher Education.

NQF: National Qualifications Framework.

NPHE: National Plan for Higher Education (2001).

NSC: National Senior Certificate. This is the new matriculation system as from the end of matric written in August 2008.

NSFAS: National Student Financial Aid Scheme.

OBE: Outcome Based Education.

OECD: Organisation for Economic Co-operation and Development.

Participation rate: refers to the proportion of 18-24 year-olds in higher education. Government has set a target of 20 percent participation rate by 2015.

Pass Rate: Refers to the number of students, shown as a percentage, who were successful in a particular assessment (examination or test). It is calculated as a percentage of the total number of students who passed the assessment divided by the total number of students who actually write the assessment.

Placement: refers to the placing of students in foundational or mainstream provision on entry.

PMB: Pietermaritzburg campus - one of two constituents of the former University of Natal (UN) and now a campus of UKZN.

Prerequisite: A module which must have been passed, with at least the minimum mark required by the relevant Faculty, before registration for the proposed module is permitted.

Programme: is a combination of courses or modules that leads to a qualification.

Progression Rules: A student who, after six semesters as a full-time student or ten semesters as a part-time student, has not completed the requirements for the degree shall be required to apply for re-registration, which will only be permitted on receipt of a satisfactory motivation.

SAAAD: South African Association of Academic Development.

SAJHE: South African Journal of Higher Education.

STAT171: Specialized Business Statistics. This module introduces students to a wide range of statistical techniques and reinforces the student's ability to solve and interpret statistical problems. This module has Math134 as a prerequisite.

STAT181: Basic Business Statistics. This module introduces students to basic statistical techniques and how these techniques are applied to solve management problems of a quantitative nature. This module has either MATHS134 or MATHS137 as a prerequisite.

Student-Lecturer Ratios: Refer to the ratio of academic staff members to students. The ratio is calculated by dividing the total number of academic staff members by the total student population (also referred to as FTEs).

Throughput Rate: The total number of students who graduate from a HEI each year, as a percentage of the total number of students enrolled in that institution.

UDW: The former University of Durban-Westville prior to the merger in 2004 and presently a constituent of UKZN.

UKZN: (the newly merged) University of KwaZulu-Natal after 2004.

UMALUSI: Council for Quality Assurance in General and Further Education and Training.

UN: The former University of Natal prior to the merger in 2004 and presently a constituent of UKZN.

UNESCO: United Nations Scientific and Cultural Organisation.

UTLC: UKZN Teaching and Learning Committee.

UTLO: UKZN Teaching and Learning Office. It was established in October 2008 under the leadership of a Deputy Vice-Chancellor to provide leadership in all areas of teaching and learning to realise the University's vision, mission and strategic plan with regard to teaching and learning (http://utlo.ukzn.ac.za). The UKZN Teaching and Learning Committee was approved by Senate on 14 November 2007 almost a year earlier.

CHAPTER 1

INTRODUCTION

1.1. BACKGROUND

High dropout and failure rates, as well as the slow progression of students have revealed themselves as complex, persistent challenges and seemingly intractable crises at South African universities. On average, less than 15 percent of the cohort of school leavers (referred to in South Africa as matriculant pupils, matriculants, or "matric") gain admission to Higher Education Institutions (HEIs) (Njuguna *et al.*, 2008), out of which less than 50 percent graduate (Macfarlane, 2006; Letseka and Maile, 2008; OECD, 2008). Students who do not complete their tertiary degree will most likely join the millions of unemployed in South Africa and have no prospects for a decent life (Gordhan, 2011). Leaving a HEI without graduating implies a loss in potential earning power and livelihood, lower job prospects, and a weakened ability to accumulate assets and capital, not to mention the personal and emotional consequences (Visser and Hanslo, 2005). These educational phenomena have triggered renewed focus and attention on the determinants of students' academic performance.

The disparate education system organized along racial lines during the apartheid era disadvantaged the non-white population (black Africans, Coloureds and Indians) causing social inequalities (Njuguna *et al.*, 2008). Education for the non-white population and specifically for black South Africans systematically reinforced decades of racially and geographically segregated and financially neglected schooling, despite increasing enrolments and growing skills shortages (OECD, 2008: 37). About 2.8 million South Africans are illiterate, having never been to school and about 3.9 million are functionally illiterate, having dropped out of school before completing grade seven (Statistics South Africa (Stats SA), 2007/2008). The large majority of the black African population is uneducated, and ill-prepared for the world of work, having not acquired the skills to meet the labour market demands of the competitive and dynamic environment of modern knowledge-based economies (Council on Higher Education (CHE), 2010; Sedgwick, 2004). The South African labour market demands are generally directed to attract graduates and high-level skilled workers causing a mismatch between the supply of and the demand for labour for score of black African population. High dropout and failure rates, slow progression, attrition, and low throughput rates at South African universities have severely limited the number of graduates eligible to pursue professional career paths.

All over the world, HEIs, under increasing pressure to exhibit efficiency, effectiveness and quality; admit a diverse array of students, and contribute to the sustenance of the economic and social development of their

countries. Teaching, learning and research effectiveness and quality are an ongoing focus of policymakers, researchers and public opinion. Countries around the world are moving towards systems that establish a link between public funding and the effectiveness and quality of education. This is changing the way HEIs operate.

An increasingly complex society and rapid technological advances, coupled with international competitiveness, require a highly educated workforce. Several studies have found that education is an important determinant of inequality and poverty (Parkin *et al.*, 2010; Tilak, 1999; Fields, 1980). Educational deprivation leads to poverty. Investment in human capital is key to breaking this cyclical relationship (Tilak, 1999). Education as a mean of increasing human capital is a basic factor in the sustenance of economic growth process and international competitiveness. Both have a direct relationship with long-term economic performance. Human capital theory stresses the role of education as a productivity enhancing investment (Becker, 1964) and a key factor in generating economic growth (Gordhan, 2011; Barro and Sala-i-Martin, 1995). The World Bank notes that higher education is a leading instrument for promoting economic growth. A one year increase in the tertiary education stock increases the long run Gross Domestic Product (GDP) per capita in Africa due to factor inputs by 12.2 percent (World Bank, 2006).

The link between higher education and economic growth is well illustrated in the 2006 World Bank Report illustrated in the following Figure 1-1.

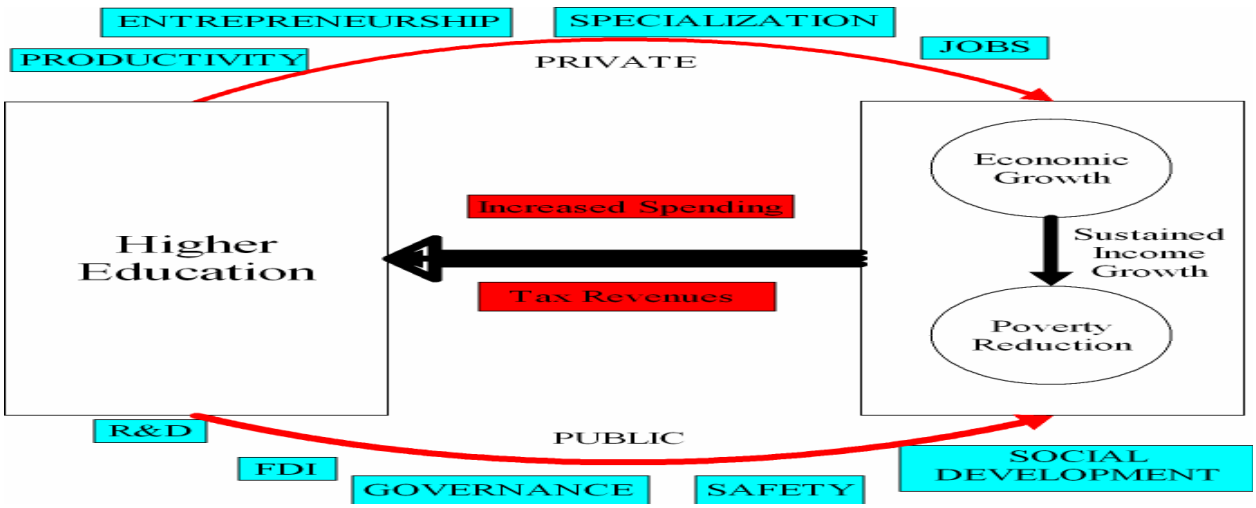


Figure 1-1: Conceptual model of the link between higher education and economic growth, adapted from World Bank (2006).

Figure 1-1 shows that there are many possible routes (both private and public) through which higher education can lead to economic growth. For graduates, the private benefits include better employment prospects, high salaries, and an increased ability to save and invest. These result in better health and an improved standard and quality of life, which in turn set off a virtuous spiral of benefits. Life expectancy is extended, enabling graduates to work more productively over a longer period of time, further boosting lifetime earnings. For the country, the public benefits include an increase in tax revenues, and fewer demands on state finances and the welfare budget. Moreover, higher earnings raise consumption, which translates into greater use of factors of production: capital, labour, land, technology, and the generation of entrepreneurship; and the development of new tools and skills, which all have positive effects on GDP and job creation.

Qualified human capital is therefore critical to a nation's competitiveness in global markets. The training of human capital relies on the effectiveness and quality of the education system of a country. The scarcity of qualified human capital is hindering and undermining South Africa's economic growth needs. Higher education in South Africa has the potential to generate human capital among previously disadvantaged population groups, the deployment of which will have a ripple effect on racial equity requirements in the labour market. Higher education, therefore, represents an investment for society, government and families, particularly for previously disadvantaged population groups who are gaining access to higher education for the first time, and for better employment and life prospects. Completion of a higher education degree is a way of raising income and creating wealth in many impoverished households among previously disadvantaged population groups (Lissenburgh and Bryson, 1995).

In South Africa, the black African population suffers from a dearth of postgraduate and high-level skills (DoHET, 2011; CHE, 2010). The high dropout and failure rates, as well as the slow progression of students from previously disadvantaged population groups in South African universities may result in further racial and socio-economic disparities in future generations. Anecdotal evidence suggests that the opportunity cost of leaving HEIs without graduating is even higher for students from previously disadvantaged population groups. These students will more likely revert to marginalized areas where dire poverty, poor housing, limited health and welfare are the norm, educational resources are scarce, and the incidence of HIV/AIDS, alcohol abuse and unemployment are high. The education of students from previously disadvantaged population groups is considered a crucial determinant of the democratic South Africa's ability to achieve equity and the participation of all race groups in the mainstream economy.

Low graduation and throughput rates in HEIs constitute wastage of much-needed skills for the South African economy. South Africa needs more higher education graduates with the capability to adapt to and function in a knowledge-driven and knowledge-dependent economy and society (CHE, 2010). Higher education is a vehicle for public investment (World Bank, 2006). Government and families measure their returns from investment in education against the efficiency and effectiveness with which South African HEIs discharge their functions in the context of their specific mission - that include inter alia enrolment of students, their retention and progression along the graduation path, and their graduation (Lissenburgh and Bryson, 1995).

1.2. PROBLEM STATEMENT

This sub-section gives an overview on the South Africa's higher education system landscape by paying special attention to issues of teaching and learning, student admission and access processes, academic performance, and retention; high dropout and failure rates, poor graduation and low throughput rates, governance of HEIs, key developments and trends in the higher education sector, and the implications of key South Africa's policies and documents for education.

1.2.1. THE HIGHER EDUCATION LANDSCAPE IN SOUTH AFRICA

Prior to 1994 during the now defunct Apartheid system, higher education was binarily divided with education of nonwhite groups of population administrated separately from the education of whites. Not only was the higher education system separated according to race and ethnic group, it was also separated according to region and institutional type (CHE, 2004). The binary division of higher education had serious consequences both in terms of admission, access and governance, and the funding of HEIs. The quality of teaching, learning and research, as well as community outreach was very unequal as was the allocation of funding and human resources to HEIs in order to achieve their mission and goals (CHE, 2010; OECD, 2008: 327).

Since the establishment of the first democratic government in 1994, the higher education sector has been at the forefront of efforts to correct the social inequalities and imbalances, which are the legacy of the Apartheid system. South Africa has chosen to right the ills of the past, and structures and institutions are being transformed to become more responsive to the demands of South Africa's economic development needs (Africa, 2005). Higher education is being steered towards raising graduation and throughput rates,

thus enhancing South Africa's human resources capacity (Gordhan, 2011; Barro and Sala-i-Martin, 1995; Becker, 1964). To achieve these laudable goals and transform the racially divided structure of South African society, higher education is called upon to fulfil three important roles: (1) human resource development, (2) high level skills training, and (3) production, acquisition and application of new knowledge (DoE, 1997: 1.1 to 1.12).

Key policies, documents and initiatives in education include the Report of the 1996 National Commission on Higher Education (NCHE), the Green and White Papers on Higher Education (1996, 1997, 2004) - the 1997 White Paper on Higher Education and the 1997 Higher Education Act set out "A Framework for Transformation of Higher Education", and the February 2001 National Plan for Higher Education (NPHE) (Njuguna *et al.*, 2008; Rembe, 2005). The NPHE (2001) set out a single overall goal of transformation of South African higher education and identified five key specific policy goals coupled with the related strategic objectives for achieving the overall goal. These policy goals included: (1) producing the graduates needed for social and economic development in South Africa, (2) achieving equity in the South African higher education system, (3) achieving diversity in the South African higher education system, (4) sustaining and promoting research, and (5) restructuring the institutional landscape of the higher education system.

However, in 2011, some 17 years after the abolition of the apartheid system and the advent of democracy, the deterioration of the education system is still one of the central topics in the public opinion and policy landscape in South Africa. Many challenges remain , such as poor student achievements or outcomes (high dropout and failure rates, high attrition of students, slow progression, poor graduation rates, or low throughput rates), the fact that the demand for student financial aid and loans steadily exceeds the supply, inadequate educational infrastructure, unqualified educators, the huge number of learners and large classes, a biased curriculum, poor conditions of work in higher education, inadequate student support systems, and labour market relevance (CHE, 2010; OECD, 2008; DoE, 2005).

Existing studies of the landscape of students' performance at South African universities indicate that there are still relatively low numbers of students from previously disadvantaged population groups in higher education. This points to ongoing racial inequality in education outcomes (Rembe, 2005). A study of a cohort of 2000-2004 students' national attrition rate of South African universities is illustrated in Table 1-1 (Macfarlane, 2006). This indicates that about 50 percent dropped out before their graduation in 2004. Enrolments in the HEIs dropped by 4 percent between 1998 and 2000, allegedly as a result of financial constraints facing students (OECD, 2008).

Table 1-1: A Cohort of 2000-2004 Student National Attrition Rate of South African Universities

Universities	Nominal Intake of Students in 2000	Dropout Rate in 2004 (%)	Graduation Rate in 2004 (%)	Pipeline Students Rate in 2004 (%)
Cape Town	3135	28	61	10
Durban-Westville	1654	42	45	13
Fort Hare	659	36	47	18
Medunsa	437	21	32	46
Natal	3285	29	60	11
North West	971	61	27	13
Free State	2035	38	46	16
Port Elizabeth	1172	37	49	13
Potchefstroom	1718	25	68	7
Pretoria	4685	26	60	14
Rau	2874	33	58	9
Rhodes	1340	31	67	2
Stellenbosch	3218	27	62	11
Transkei	668	59	29	12
Venda	892	62	29	9
Vista	4248	64	25	11
Western Cape	1979	48	36	16
Witwatersrand	2356	33	47	19
Zululand	1081	54	40	6
National Total	38407	-	-	-
National Average	2021	38	50	12

Source: Adapted from Macfarlane (2006).

Factors influencing the university success have received a great deal of attention from South African education stakeholders with the view to investigate the reasons for the poor performance at universities (Horn *et al*., 2011). The Council on Higher Education (CHE) (2010) contracted six research projects to analyse key trends and identify the major challenges within the South African higher education landscape.

These reports identified general concerns and the challenges within South African higher education, as illustrated in Table 1-2.

Table 1-2: Trends and Challenges within South African Higher Education

- Overall, due to a complex set of reasons, HEIs are not performing well in the area of teaching and learning in relation to access, graduations and throughputs (Scott *et al*., 2006).
- The expansion of enrolments has not been accompanied by a proportional increase in the number of graduates. Only a very small number of students complete their degrees in the allotted time.
- Undergraduate students take too long to graduate (years to graduation) and comparatively few progress into postgraduate studies. The higher education system does not produce sufficient number of postgraduate students, particularly at doctoral level (Mouton, 2008).
- High student drop-out rates (DoHET, 2011).
- Graduates' attributes not always match employers' expectations and needs. There are insufficient graduates with the required skills in a number of strategic areas of economic development (Kraak *et al.*, 2003 and 2009; CHE, 2009).
- Success rates in higher education are skewed by race and are currently 74 percent for black African, 76 percent for Coloured, 81 percent for Indians, and 85 percent for Whites (DoHET, 2011). The participation rate of African students is disproportionately low in relation to the demographic profile of the South African population.
- There are many challenges in retaining more high level (especially black) academics and managers who are either highly prized by the government and corporate sectors or lured away from a career in academia by fat cat salaries and the prospect of swift career promotion (DoHET, 2011).
- Most university lecturers are not sufficiently prepared to respond to the variety of educational needs of a new and varied student population.
- The South African higher education system has an unusually high proportion of students dropping out, mainly at undergraduate level.
- There is uneven quality across the higher education sector (DoHET, 2011; Taylor and Harris, 2002 and 2004; Athanassopoulos and Shale, 1997).

Source: Adapted from CHE (Council on Higher Education) (2010).

Internationally, universities admit students from different socio-economic backgrounds that lead to different academic potential and needs, different educational opportunities, and diverse expectations and life experiences (Yathavan, 2008; Goduka, 1996). More relevant is that universities in countries that are poorer than South Africa are achieving better results in terms of student achievement, retention, and completion (OECD, 2008: 95). Compared to South Africa which is among the middle-income countries, Sri Lanka is among the poor income group, but has high enrolment rates, the dropout rates in the country are low and graduation rates are the highest among all the South Asian countries (Tilak, 1999).

Student attrition, high dropout and failure rates, slow progression, and poor graduation or low throughput rates in South African universities are not only educational problems but also economic developmental problems since they are major impediments to economic growth and development. Like any pandemic, they are leading to significant budgetary and financial penalties for HEIs, and have far-reaching economic impact on the students themselves and on the South African economy at large.

The educational trends and challenges identified above should have government and various education stakeholders worried that their policies, documents, and initiatives are failing to achieve the intended outcomes. Seemingly, both government and education stakeholders are accustomed to low expectations, which justify the lack of appropriate and coherent educational investments. This is in contradiction to the drive to recruit students, particularly from previously disadvantaged population groups. It is essential that the hindrances to student success[1] be examined.

Taking into account the historical development of the higher education sector in South Africa, there is a need for a basic inquiry to understand the determinants of students' academic performance. This is the aim of this thesis[2]. There is also need for information, insights, perspectives, and reasons for student attrition, slow progression, and poor graduation, or low throughput rates in South African universities.

1.2.2. THE LANDSCAPE OF STUDENT PERFORMANCE AT UKZN

The NPHE in 2001 and White Papers on Higher Education in 1997 and 2004 outlined the framework, mechanisms, re-organization and merger of HEIs in South Africa (Makgoba and Mubangizi, 2010). The merger process was driven by the Government's national endeavors to restructure and re-configure the higher education landscape in South Africa with the view to deriving benefits of greater efficiency resulting from economies of scale (Makgoba and Mubangizi, 2010; Ruggunan, 2010). The University of KwaZulu-Natal (UKZN) was established in January 2004 as the result of the merger between two large universities of different history and ethos in South Africa: the University of Natal (UN) (which incorporated four campuses: Howard College, Edgewood, Pietermaritzburg, and Nelson R Mandela School of Medicine) and the University of Durban-Westville (UDW). The formerly UDW was considered a dysfunctional, apartheid institution and UN was a model of old white universities (UKZN, 2011). UKZN was established with a purpose of redressing historical imbalances between UN formerly privileged and UDW formerly

[1] The terms "students' academic performance", "student performance" and "student success" are used interchangeably. In this thesis, student success is measured by their performance in the final examination marks in the undergraduate accounting and economics modules.
[2] The terms "thesis" and "study" are used interchangeably.

disadvantaged institutions (Ruggunan, 2010). UKZN is a thus multi-campus public institution with five campuses within a radius of 80 kilometers. UKZN has four colleges: (1) Humanities, (2) Law and Management Studies (CLMS), (3) Agriculture, Engineering and Science, and (4) Humanities (incorporating Education). In January 2004, UKZN had a student enrolment of 37 377 and a staff complement of 5 434, consisting of 2 043 academic and 3 391 non-academic staff members (Africa, 2005). Students' numbers reached 41 000 in 2010 and that trend is set to continue. Students at UKZN are either full-time (receive direct lectures), part-time or distance students, and attend two semesters annually. In 2011, in terms of university rankings, UKZN is ranked 472 in the world and third in Africa (UKZN, 2011).

Under the leadership of the Teaching and Learning Office (UTLO), UKZN is examining the determinants of students' academic performance in order to offer better teaching, learning and research. While there is much literature on the determinants of students' academic performance in the American, Asian, European and Oceania context, few studies have been done on the African continent at large and in South Africa in particular. Little is known about the determinants of students' academic performance and the kinds of educational inputs that play a major role in predicting and enhancing the undergraduate students' academic performance in the CLMS at UKZN.

The newly-formed UKZN faced organizational challenges during the re-organization and relocation of Faculties and Schools. The institution reflected the characteristics of merged South African universities (Makgoba and Mubangizi, 2010), namely, high dropout and failure rates, or slow progression of students. These factors have ramifications that are impacting negatively on the funding made available by the Department of Higher Education and Training (DoHET) to UKZN through the state funding formula of public universities. The executive managers, academics, and administrators of UKZN including the Chancellor, Vice-Chancellor, different Deans, Deputy Deans, Head of Schools and Students Representative Councils (SRCs), in their regular Executives Board meetings (referred to as Executives of Council or Exco), have deliberated on these trends over the years and the cash flow penalties that ensued. Recommendations called for an ongoing audit and evaluation of the effectiveness of the learning, teaching and research enterprise, and students' performance at UKZN with the overarching desire of implementing interventions aimed at smoothing the progression of students, reducing their attrition, and increasing graduation and throughput rates. Investigations and strategic planning were undertaken at the institutional level to evaluate different methodologies and subject areas where students were performing below acceptable norms and for which corrective measures needed to be taken, so that the overall levels of high failure and dropout rates, as well as the slow progression of students are reduced (Mbali, 2006).

The adoption of the single Faculty and single School approach and the effects of their relocation resulted in the direct transfer or mix of academic and non-academic staff members, infrastructure and resources, and students. The additional and unintended consequences of this relocation were imbalances in the campuses' resources and quality of students, lack of harmony in the teaching and learning practices originating from the former UDW and UN, and concerns relating to timetables, parking, consultation space and time, and administrative support among others. Difficulties were experienced by some Schools, programmes, and qualifications, which are dependent on Faculties/Schools that now based on a different campus (UTLC, 23 March 2007). For example, when the Executive managers first set up on Westville campus (UDW) in early 2004, they perceived that staff members had a notoriously poor work ethic. An e-memo about working hours and not leaving their offices during working hours was circulated to all UKZN staff members (author's verbal discussion with Professor Charlotte Mbali of the Centre for Higher Education Studies (CHE), Howard College, UKZN).

The need to regulate teaching and learning across campuses, approved curricula and community and institutional development have been proposed as causal factors in student dropout and failure (Africa, 2005; FMS, 2005). Other factors such as the large intake of students in 2003 to attain the student enrolment targets set by the DoE, the qualifications of academic staff members, curricula approved in the former UDW and UN, class sizes, the size of lecture rooms, theatres and venues; the material available in the specific campus libraries , the number, quality, and age of computers available in different laboratories (LANs), computers and internet hook-up per student; differences in the empowerment and integration of students from disadvantaged socio-economic backgrounds, and the job descriptions and performance of academic and non-academic staff members were also alluded to (Africa, 2005; FMS, 2005).

Other variables not related to UKZN also affected student dropout and failure rates. These included their socio-economic backgrounds; public policy such as funding schemes and de-accreditation; student demographics such as age, gender and race; ill-health (such as students or their family members suffering from HIV/AIDS, TB or trauma); financial issues where the majority of students cannot fund their education and are expecting support from the National Student Financial Aid Scheme (NSFAS); the learning and institutional environment; and attitudinal, emotional, and motivational factors (UKZN Students Wellness and Counselling, 2008).

The UTLO, under the leadership of a Deputy Vice-Chancellor, was set up in October 2008 to steer the tabled recommendations and to ensure that the learning, teaching, and research enterprises at UKZN are

regulated across campuses and benefit from best practices. UTLO is aiming at creating "supportive, adaptable and innovative learning environments in which outstanding teaching and learning at all levels are nurtured, recognized, and rewarded" (http://utlo.ukzn.ac.za). Three key priorities have been identified: (1) leading curriculum transformation, (2) continuing to promote access but to expand this focus to paying special attention to throughput and success in subsequent years, and (3) establishing an ongoing cycle of developing, implementing and reviewing university policies and procedures at all levels and with respect to both staff and students, to improve teaching and learning.

However, many issues pertaining to teaching and learning are still being questioned at UKZN and ways of addressing them are still being sought. For example, the relocations of Faculties/Schools to specific campuses have resulted in spatial and disciplinary boundaries that were perceived to be set up primarily on the basis of managerial considerations such as costs effectiveness, convenience, and the need to avoid de-accreditation. As an unintended consequence, greater reliance for interdisciplinary configurations has been placed on formal interaction through degree structures, electives and pre-requisites and not on corridor discussions and tea-time (UTLC, 23 March 2007). Ways of creating cohesive Colleges, Faculties and Schools in an environment of interdisciplinarity are still being sought.

In 2010, the Council of the UKZN approved a review of the College Model from its traditional three tiers (Colleges, Faculties, and Schools) to two tiers (Colleges and Schools) with the purpose of improving effectiveness (UKZN, 2010). Faculties are being phased out to create super schools within the traditional four Colleges. This restructuring is clearly intended to mitigate bureaucracy, improve the graduation and throughput rates. However, the need for new studies is still alive. The UKZN executive and the SRCs still have major concerns regarding teaching and learning. The UTLO still needs pointers to assist in renewed strategic planning at UKZN. Any research that can contribute to finding an optimum framework for the effective achievement of UKZN's laudable education objectives is deemed important.

This study is wide-ranging. It aims to develop research-based evidence and provide insights and pointers which might help the UTLO to engineer changes in the quality of teaching and learning, identify the determinants of student performance at UKZN, address the issues of curriculum design and development, place students on appropriate curricular routes, develop students' learning skills, and enhance the student's experience at UKZN.

1.2.3. THE LANDSCAPE OF STUDENT PERFORMANCE IN THE COLLEGE OF LAW AND MANAGEMENT STUDIES

The CLMS at UKZN comprises of two Faculties: (1) Law and (2) Management Studies (FMS). The FMS is the largest single Faculty at UKZN in terms of student numbers and comprises of six schools which confer degrees, diplomas, and certificates that include *inter alia*: Bachelor of Commerce (BCom (General)), Bachelor of Commerce (Accounting) (BCom (Accounting)), Bachelor of Business Science (in Actuarial Science, Economics, Finance, Human Resource Management, Industrial Relations, Information Systems and Technology, Management, Marketing, and Supply Chain Management), Bachelor of Administration (BAdmin), and Bachelor of or certificate in Business Administration (BBus Admin). The CLMS as a whole offers a number of core disciplines such as accounting, commercial law or legal studies, economics, financial management, human resources, information systems and technology, management, marketing, public administration, and quantitative methods that form the foundation for many highly specialized professional career paths in South Africa.

Executive managers and administrators of the CLMS discuss the University-wide high failure rates, and poor graduation and throughput rates regularly at College, Faculty or School Board meetings in order to address the problem at the College level.

Particular concerns include the decreasing trends in the pass rates of undergraduate modules of BCom (Accounting) and the BCom (General) degree over the years. The Mbali (2006) Report, commissioned by the Exco, identified the modules with the highest failure rates for the 2004 and 2005 academic years. As these modules are taught in different classes on three different campuses (Howard College, Westville and Pietermaritzburg), these failure rates are illustrated in Table 1-3 and Table 1-4 with different module codes for the same modules taught in a specific campus of UKZN. In 2004, there was a dismal failure rate of 74 percent in intermediate macroeconomic policy and issues (ECON202S on the Westville Campus) (see Table 1-3). In 2005, there was an extraordinarily high failure rate of 81 percent in Advanced Generally Agreed Accounting Practice (ACCT2A0 on the Westville Campus) (see Table 1-4). It was agreed that these low pass rates have to be investigated (FMS, 2005).

Table 1-3: Highest Failure Rate and Attrition of Students in First and Second-year Modules, FMS, CLMS, UKZN, 2004

Module Code	Number of Students	Failure Rate (in %)	Supp/fail	Drop-out	Cancellation
ECN101S	1,408	38.7	427	111	35
PAC100Y	627	36	108	48	80
ECN102S	1,316	34.4	0	84	73
PEC1101	634	27.4	139	68	44
DEC1QT2	946	26.3	188	65	86
DEC1EC1	1,649	25.8	298	166	75
ACC112S	1,316	23.7	241	133	84
DEC1EC2	1,638	20.4	290	162	185
ACC111S	1,354	19.8	190	114	53
DAC1ST2	1,223	19.8	309	65	184
DAC1ST1	1,153	14.3	178	84	54
DAC1AC2	1,121	8.1	117	121	124
DAC1AC1	1,137	6.8	83	167	31
ECN202S	504	74	109	43	109
PAC200Y	245	36	21	78	82
DEC2EC1	1,215	33	340	104	0
DAC2IS2	781	32	13	337	89
DEC2EC2	1,304	28	278	196	0
ECN201S	567	16.3	106	48	75
ACC211Y	686	14	24	164	63
PEC2111	634	6.7	139	68	14
PEC2212	267	2.6	6	41	29
PEC2121	391	2.2	29	4	30

Source: Adapted from Mbali (2006).

Table 1-4: Highest Failure Rate and Attrition of Students in First and Second-year Modules, FMS, CLMS, UKZN, 2005

Module Code	Number of Students	Failure rate in (%)	Supp/fail	Dropout	Cancellation
ACCT101	2017	16.1	299	236	96
ACCT102	1994	10.4	209	240	353
ECON101	2987	44.4	900	213	258
ECON102	2678	34.2	503	220	417
ECON122	1301	43.3	241	123	527
ACCT2A0	724	81.3	321	32	113
ACCT200	1042	39.7	308	39	185
ACCT2IS	705	24.8	232	15	70
ECON201	2232	21.2	618	82	217
ECON202	2284	14.8	538	84	305

Source: Adapted from Mbali (2006).

Tables 1-3 and 1-4 show that substantial numbers of students dropped out of courses or modules in the FMS. In 2004, 337 students dropped out of Accounting Information Systems 2 (DAC2IS2 at the Howard College campus) and in 2005, 240 dropped out of Accounting 1 (ACCT102). From 2006, pass rates in first-year accounting 101 module decreased steadily for three successive years as illustrated in the following Table 1-5. Pass rates for the principles of microeconomics (ECON101) module alone dropped from about 65 percent in 2008 to 56 percent – a drop of about 16 percent.

Table 1-5: Pass Rates of First-year Accounting and Economics Modules Against Enrollment, FMS, CLMS, UKZN, 2005-2009

Modules	2005	2006	2007	2008	2009
ACCT101	82.9	91.1	89.7	88.0	75.2
ACCT102	88.1	88.3	86.7	90.6	83.1
ECON101	52.9	61.1	63.9	64.7	56.2
ECON102	63.6	55.9	63.7	67.5	62.6

Source: Pass and Failure Rate per Module (2005-2009), FMS, CLMS, UKZN. Accessible at http://www.ukzn.ac.za/dmi (Accessed 20 June 2010).

This indicates that pass rates for the Economics 101 alone dropped from about 65 percent in 2008 to 56 percent in 2009 – a drop of about 16 percent.

A report on exclusion appeals 2009 commissioned by the FMS to determine the factors that impede student academic progression in the Faculty undertook a frequency count of the exclusion appeals documents to determine the modules in which FMS students most often underperformed, i.e. achieved less than 50 percent in their final examination marks. These official documents were intended to be utilized by the Faculty's Exclusion Appeals Committee (FEACOM) to establish whether students either indeed are excluded from further study at UKZN or proceed (FMS, 2009). Table 1-6 reveals the results in the following modules in order of decreasing frequency.

Table 1-6: Modules Most Often Failed, FMS, CLMS, 2009

Ranking	Module name	Module code	Frequency
1	Principles of Microeconomics	ECON101	108
2	Principles of Macroeconomics	ECON102	92
3	Intermediate Macroeconomics and Application	ECON201	72
4	Information Systems and Technology 1A	ISTN101	70
5	Quantitative Methods 1	MATHS134	68
6	Intermediate Microeconomics and Application	ECON202	66
7	Information Systems and Technology 1B	ISTN102	61
8	Accounting 200	ACCT200	44
9	Accounting 101	ACCT101	42
10	Accounting 102	ACCT102	42
11	Accounting 300	ACCT300	41

Source: Adapted from report on exclusion appeals in the FMS (2009).

From Table 1-6, it is clear that the modules students most often underachieve in are Economics and Accounting subjects. Seven out of the 11 modules explicitly mentioned are first-year modules in the FMS. This is of concern as students enrolled for both the BCom (Accounting) and BCom (General) Degree follow a common programme during their first-year, taking 10 compulsory modules. Table 1-7 provides an overview of the identical approved curriculum with the exception of the mathematics (Maths) requirements.

Table 1-7: Approved Curriculum for the First-year in BCom (Accounting) and BCom (General), FMS, CLMS, UKZN, 2010

Module Name	Module Code	Semester
Accounting 101 (or Financial Reporting 1A)	ACCT 101 or FINR104	1
Accounting 102 (or Accounting 103)	ACCT 102 or ACCT103	2
Economics 101 (Principles of Microeconomics)	ECON 101	1
Economics 102 (Principles of Macroeconomics)	ECON 102	2
Information Systems and Technology for Business	ISTN 101	1
Information Systems and Technology Development Fundamentals	ISTN 102	2
Management 110 (at Westville) or Effective Writing for Commerce (at Pietermaritzburg)	MNGT 101	1
Management 120	MNGT 102	2
Quantitative Methods 1	MATHS134	1
Specialized Business Statistics or Business Statistics	STAT171 or STAT181	2

Source: Adapted from page 71 of Faculty of Management Studies Handbook (2010).

Students who wish to complete their degree with a specialization in economics take Quantitative Methods I (MATHS134) in their first semester and Specialized Business Statistics (STAT171) in the second semester, while students who wish to complete their degree with a specialization in accountancy take Business Statistics (STAT181) in the second semester (prior to the merger in 2004, accountancy students used to register for Business Maths (MATHS137) in the first semester but this module was phased out by the School of Mathematical Sciences). Economics 1 comprises two modules: ECON101 taken in the first semester and ECON102 in the second semester. Accounting 1 also comprises two modules: ACCT101 taken in the first semester and ACCT102 in the second semester. Unlike ECON101, which is not a prerequisite for ECON102, ACCT101 is a prerequisite for ACCT102 and students have to achieve at least 55 percent in both ACCT101 and ACCT102 before registering for ACCT200 (second-year level). From the second-year, there are compulsory and non-compulsory (referred to as electives) modules in the students' degree programmes that students may choose from among a large number of different courses/modules in different disciplines.

Many students have failed accounting and economics modules over the years. These modules are gatekeepers of all of the degree programmes and qualifications in the FMS, since they are a prerequisite at first- and second-year level for all students. To improve pass rates, both the School of Accounting and the School of Economics have enforced a duly performed (DP) requirement. Students who do not achieve a 40 percent class marks are excluded from writing the examination. These two subjects are becoming significant stumbling blocks, affecting students' progression.

At any university, the quality of intake, and thus, student enrollment influences teaching, learning, and research performance. Students' enrollment is a crucial parameter and one of the determinants of income and expenditure patterns in the higher education sector (Steyn and Villier, 2005). The CHE (2010) is planning to make enhancing the quality of teaching and learning processes the focus of its second round audit. Research on the first-year student experience is now viewed as a high-priority research area because of the significant consequences of student attrition and failure upon university reputations and finances (Palmer *et al*., 2009: 37).

One of the aims of this study is to conduct enquiries into student records data of the largest single Faculty at UKZN - the FMS - with the purpose of finding the salient predictors of student success and trends which will help improve admission criteria, retention, graduation and throughput rates in the CLMS through enhancing the quality of teaching and learning processes which have been receiving renewed attention by the CHE (2010).

To achieve this end, treating each academic year as a separate statistical entity, high failure and dropout rates in the undergraduate accountancy and economics modules over the years and the concerns in the Faculty gave rise to the following research questions:

1. What are the determinants of student performance in the undergraduate modules that can be discovered *via* student records, specifically, of first-year accounting and economics in the FMS?
2. Amongst these determinants that can be discovered *via* student records, which ones negatively affect (impede) or positively affect (contribute to) student performance?

The measures of student performance used in this study are: (1) the students' final examination marks in first-year accounting and economics modules (used as a discrete variable as explained in Chapter 3), (2) the students' final examination marks of 50 or above (i.e. percentage eligible to pass the module, used as a

dichotomous variable as explained in Chapter 3). Although, this study's econometric analysis deals with first-year accountancy and economics modules only, it acknowledges that the selected modules at second- and third-year level have also higher risk of failure. For example, Accounting3 pass rate in 2004 was 40 percent and in 2005, 17.15 percent (FMS, 2005). This study's conceptual model can also be extended in other studies to test non-incorporated modules at second- and third-year level.

Due to the high failure and dropout rates, the quality of matriculants who are admitted as students into HEIs is questioned at times in the South African public debate. The quality of the matriculation examinations has been hypothesized to be a predictor of university student success. Visser and Hanslo (2005) noted that in South Africa the matriculation certificate examination serves as the primary gatekeeper to selective HEIs. UKZN's Admission Points Score (APS) calculation determines the entry requirements for candidates to be eligible to apply for the different ranges of degree programmes offered. Prior to the 2009 academic year, admission in the BCom (Accounting) and BCom (General) degree at UKZN required 36 total matriculation[3] (matric) points as well as at least a D symbol for matric Maths on Higher Grade (HG) or a B symbol for matric Maths on Standard Grade (SG). The Dean's discretion is applied in the case of candidates with between 32 and 35 total matric points (UKZN, 2010). In 2009 academic year, with the introduction of the National Senior Certificate (NSC), the minimum requirements become 31 total matric points and level 5 in matric Maths. This is discussed in more detail in Chapter 2.

This study also aims to test the quality of the matric students being admitted at UKZN. Stakeholders hypothesize that the quality of matric students being admitted at UKZN is deteriorating. They have recommended that to address the high dropout and failure rates, admission eligibility criteria should be revised. Once students are admitted, academic development and support systems have to be integrated into the offered mainstream disciplines to ensure that as many students as possible graduate. Based on above rationale, the whole question of whether the APS defined in this study as total matric points, and selected designated matric subject scores are still key predictors of university success at undergraduate level in the FMS is tested.

[3] Throughout the rest of the thesis, the two terms "Matriculation" and "Matric" are used interchangeably.

To achieve this end, treating each academic year as a separate statistical entity, these hypotheses give rise to the following additional research questions:

1. Are total matric points and selected matric subject scores at school-leaving level predictors of university student success at undergraduate level in the FMS?
2. To what extent are total matric points and matric subject scores at school-leaving level keys, reliable and valid predictors of university student success at undergraduate level in the FMS?

This thesis therefore poses the following four research questions:

1. What are the determinants of student performance in the undergraduate modules that can be discovered *via* student records, specifically, in first-year accounting and economics modules in the FMS?
2. Amongst these determinants, which ones negatively affect (impede) or positively affect (contribute to) students' academic performance in undergraduate modules in the FMS?
3. Are total matric points and selected matric subject scores predictors of university student success at undergraduate level in the FMS?
4. To what extent are total matric points and matric subject scores keys, reliable and valid predictors of university student success at undergraduate level in the FMS?

1.3. NEED FOR THE STUDY

The brief introduction and overview of the higher education landscape in South Africa draws attention to the need for theoretical and empirical studies into important issues affecting the returns on investment into education and the generation of human capital in South Africa.

Concerns are still mounting in some quarters of UKZN about the high dropout and failure rates in the undergraduate accountancy and economics modules over the years, as they are gatekeepers for a range of different degree programmes and qualifications in the FMS. Various Exco meetings have agreed that they have to be investigated (FMS, 2006; FMS, 2005). The FMS (2006) specifically commissioned research into why this is so and into how students feel about the course teaching and contents. Contogiannis (2005) is of the opinion that economics has been difficult for students and that the high failure rates are a more general problem that has to be debated. Students' academic performance in the FMS is a microcosm of South African HEIs as a whole (DoHET, 2011; CHE, 2010).

At the macro-economic level, higher education is viewed as a cure for severe economic, political and social problems such as poverty (World Bank, 2006) and the twin evils of the South African economy, namely, unemployment and inflation. High dropout and failure rates, the slow progression of students, and poor graduation rates over the years, not just at UKZN but also at other South African universities, are of concern to both government and education stakeholders. The South African Institute of Chartered Accountants (SAICA) indicated that in 2008, there was already a shortage of 5 000 chartered accountants and a further 17 000 accountants of various technical grades (Enslin-Payne, 2011). This shortage is likely to have increased now that the country has recovered from the global economic recession and financial crisis. If these dropout and failure rates, and slow progression remain static or get worse, the number of graduates and the public subsidy per student would continue to shrink – resulting in a lack of trained accountants and economists much needed for the national economy. With South Africa producing fewer graduates for an economy that is targeting sustained growth and international competitiveness with emerging professional career paths, such trends could have dire consequences for the achievement of the country's macro-economic objectives (WENR, 2002). This makes the determinants of students' academic performance in South African universities an important research issue.

From the DoHET's perspective, education policy reform coupled with the funding formula are designed to transform the Higher Education system, improve throughput rates, meet the skills needs of the modern workplace, improve the performance and productivity of the labour force, and enhance the country's economic growth and international competitiveness. Existing studies argue that there have been impressive gains in some areas in which the HEIs have been responsive to important societal needs, yet significant challenges remain. Of concern is that the overall participation rate has not increased in the last five years, doctoral enrolments have stagnated, and the proportion of academic staff with doctoral degrees is low (CHE, 2010; OECD, 2008). Student success at the undergraduate level is important as it feeds into postgraduate studies.

It is hoped that the findings of this study will provide better-informed educational choices for the possible revision of the national plan for higher education, thereby assisting in the optimization of South Africa's education policies.

At the societal level, this thesis also holds a broader interest for education stakeholders and general readers having a concern for university education in South Africa and its multiplier effects across the full breadth of the South African economy. Knowledge about what influences academic performance and the attrition of

students may allow for strategic planning, institutional management, and policy development as well as the formulation of new strategies.

UKZN's vision is to be "The Premier University of African Scholarship", and its mission is to be "a genuinely South African University, a World-Class University, with a new culture and form, designed to meet the challenges of serving the country and the region in innovative and effective ways" (www.ukzn.ac.za). This study aims to incorporate available student records data, statistics and findings with existing studies, and to quantify various economic and educational variables that are of great importance to the FMS. An attempt is made to identify the variables that make students perform better. Knowledge of these enabling variables, their causes and reasons can enable the Exco, academics, administrators and support staff, students themselves, and other education stakeholders to understand students' areas of strength or weakness and develop active steps to alleviate, or find a permanent solution to overcome past shortcomings and problems challenging students' performance. It is expected that findings of this study might be used to implement interventions and strategic planning and aid in developing UKZN's policies aimed at reducing impediment to students' progression. UKZN would adopt and entrench the suggested policies and best practices that are consistent with its vision and mission.

The mission of the CLMS is to "play a constructive role in helping the two Faculties within the College achieve their undertaking to produce graduates able to play a leading role in meeting the challenges presented by the South African socio-economic environment and those of the continent and beyond. Graduates of this College are highly marketable and sought after giving to UKZN influential alumni and strong professional links in South Africa (http://clm.ukzn.ac.za).

At present, there are contradictions between the mission statement and the high dropout and failure rates or slow progression of students that the CLMS is experiencing. Premised upon the argument that Exco, whose overarching purpose is to implement educational interventions aimed at reducing barriers to student success at UKZN, is concerned with the poor graduation rate being less than 23 percent of registered students from the academic year 2006 to 2009 (FMS, 2009); examining determinants that negatively affect (impede) or positively affect (contribute to) student performance in accounting and economics modules in the FMS, is an important research issue for the Exco in particular and for the Higher Education landscape in South Africa at large. Examining the determinant of student performance in the CLMS is, therefore, a significant research issue.

In a nutshell, this thesis is important, needed, and timely. The study is expected to provide not only a holistic examination of quantitative and qualitative variables which contribute towards improving the trends of student success, retention, graduation and throughput rates but also catalyzes a stream of education policy implications that can be pointers for the UTLO's policies and strategic planning in enhancing the effective achievement of the CLMS's mission statement and UKZN's mission statement. Understanding the processes leading to dropout and failure rates, slow progression, student attrition, and poor graduation or low throughput will provide education stakeholders with multiple junctures in which to intervene.

1.4. OBJECTIVES

Using an educational production function approach and treating each academic year as a separate statistical entity, the overarching objective of this study is to examine the determinants of student performance that can be discovered *via* student records in the FMS[4]. More specifically, this thesis aims to:

1. Compare matric scores (total matric points and selected matric subjects scores) and students' final examination marks (student success) in the undergraduate accounting and economics modules in the FMS in Chapter 4.

2. Examine a cross sectional snapshot in one module - between students in first-year accounting or economics modules in Chapter 4.

3. Examine a cross sectional snapshot in different modules - between students in first-year accounting and economics modules in Chapter 4.

4. Provide a context for gaining insights into the reasons for high dropout and failure rates, or slow progression of students that are fueling student attrition, poor graduation and throughput rates in South African universities in Chapters 1 and 2; and particularly at UKZN *via* focus group discussions in Chapters 3 and 5. This is with a view to drawing the attention of the government, executive managers (Exco), Faculty members (academics, administrators and support staff), students themselves (or the SRCs), and other

[4] This thesis does not look at all of the potential determinants of students' performance that could be discovered from studies surveyed e.g. empirical findings, qualitative interviews, etc.

education stakeholders of the budgetary and financial implications, opportunity costs and other socioeconomic impacts as well as suggesting what it takes to keep students on the graduation path in Chapters 5 and 6.

1.5. SCOPE OF THE STUDY

This thesis has identified the need to examine high failure and dropout rates, slow progression and student attrition in the CLMS. The overall scenario suggests that students at risk of drop out, or slow progression are more likely to be pursuing a degree programme with a major in accountancy (BCom (Accounting)) or in economics (BCom (General) Degree) among others. Based on this assumption, this study is interested in the FMS only. The targeted student population incorporates active students enrolled for degree programmes and qualifications in the FMS who completed both semester one and two of the academic years across the selected five indicator academic years from 2004 to 2008; have final examination marks for the selected undergraduate accountancy and economics modules, and for whom all other supporting student records data (bio-data) are available.

There are two rationales for the scope of this study. First, the restructuring of the College model from 2012 is expected to have ramifications on the core activity of UKZN. This is one of the rationales for this study focusing on the CLMS at large and not on its constituent Faculties that are being phased out. Second, in 2009, students in the FMS represented 28 percent of students at UKZN, making it the largest single Faculty. Education research issues and developments in the CLMS are therefore a microcosm of what is happening at UKZN as a whole.

1.6. ORGANIZATION OF THE STUDY

This study is organized in 6 Chapters. The state of student success in South Africa, HEIs, UKZN and the FMS, CLMS have been outlined in the introductory Chapter 1. Chapter 2 discusses the landscape of the economics of education; followed by a brief review of South Africa's education policies; and reviews existing literatures on determinants of student performance. Chapter 3 outlines the theoretical framework, methodology and data. This is followed by the discussions of quantitative analysis based results in Chapter 4. Chapter 5 examines the qualitative analysis based results. Conclusions, policy implications, and limitations and further research issues follow in Chapter 6.

1.7. SUMMARY

The purpose of Chapter 1 was to set the scene for this study, which aims at analyzing econometrically the determinants of student performance in undergraduate accounting and economics modules in the FMS. The following tabulated bullet points are a snapshot describing the rationales discussed in this Chapter 1, which prompted the research reported in this study:

- High dropout and failure rates, poor graduation rates, or low throughput rates are crises that continue to cause damage to the South African higher education system and in the broader society.
- Student experience is short-lived, before the completion of their first academic year at university.
- There is a general recognition of the need for attention to the whole of student body to improve student performance at universities.
- School-leavers in South Africa are ill-prepared for higher education.
- The matriculation certificate serves as the primary gatekeeper to selective HEIs in South Africa.
- University admissions processes across South African universities are presently undergoing changes to grapple with the new NSC points scores and this is also the case at UKZN.
- Due to high dropout and failure rates and slow progression at the intake level, the quality of school-leavers admitted into HEIs is questioned at times and this needed attention.
- Existing ways of responding to these educational hindrances and various available forms of support failed to enhance student success, demanding that new paradigms continue to be sought (CHE, 2010).
- Education policies and reforms aimed at increasing educational achievements and effectiveness are in place, but are impeded by failure to implement them and the lack of resources (Rembe, 2005).
- Not denying the genuine value of government's commitments and public resources to address these challenges and hindrances, their persistence and intractability are making government's efforts seem like acts of tokenism.
- There is a paucity of studies on how to enhance student success in the higher education system in South Africa.

- Research issues with regards to the determinants of students' academic performance are still pertinent.
- Premised upon the paucity of studies, this thesis is needed and timely as it is an addition to the limited literature.
- This thesis aims at contributing to examining this existent puzzle of higher dropout and failure rates in the higher education system.
- To achieve this end, this study holds a broader interest to be a repository of useful information, insights, and pointers to a stream of needs that will emanate from both the evidence from the empirical results of the quantitative research method and the consolidation of the perceptions from the focus groups with randomly selected education stakeholders that is a qualitative research method.
- The whole question of whether the matric score is still a key predictor of university student success is tested in this thesis.
- Indirectly, this study aims at providing a context for gaining insights into understanding the reasons for high dropout and failure rates or the slow progression of students that are fueling student attrition, poor graduation, and low throughput rates in South African universities with the view to informing active institutional programmes and strategic planning to keep students on the graduation path and reverse the trend of these educational phenomena.

CHAPTER 2

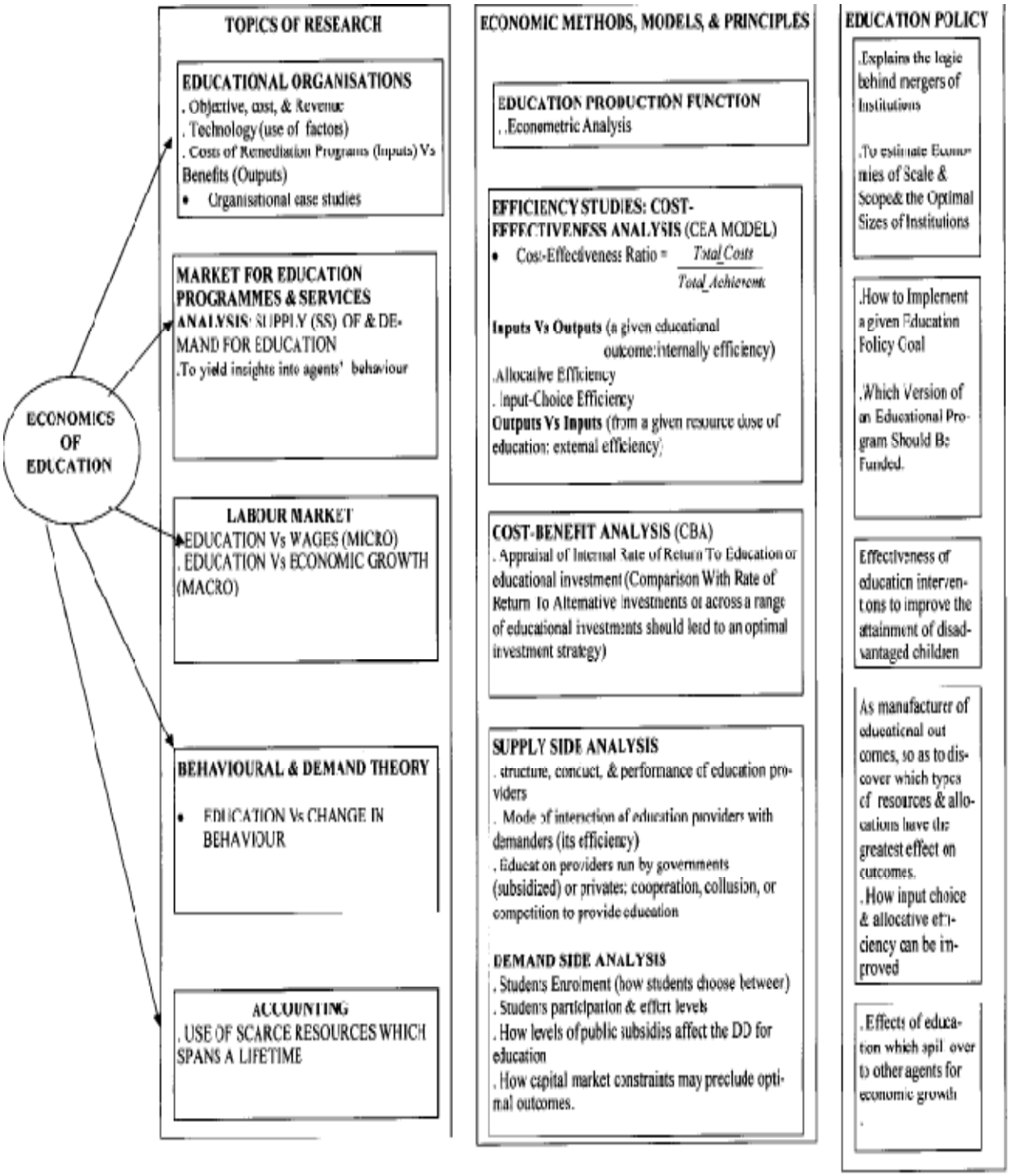
BRIEF SURVEY OF LITERATURE

The purpose of this chapter is to review three bodies of relevant literature that support the objectives of this study. This chapter is organized in three Sections. Section 1 discusses the landscape of the economics of education. This is followed by a brief review of South Africa's education policies in Section 2. Section 3 surveys the existent studies on the determinants of students' academic performance, which is the crux of this study.

2.1. BRIEF REVIEW OF THE ECONOMICS OF EDUCATION

Existing studies argue that education research issues become economic research issues only when monetary values are put on them. The economics of education is becoming a wide-ranging and growing sub-field of economics, offering a solid foundation for testing hypotheses in education research issues[5]. Education economists, both as accountants and in the general role of empirically-minded social scientists, are playing an essential role in computing education research issues in pecuniary terms, mapping educational disbursements and resource usage, and feeding them into education policy implementation, reform and strategic planning. Thus, there are plenty of avenues for applying the economist's way of thinking and economic principles to education research issues. The following Figure 2-1 provides a brief overview and links the various sub-fields of economics of education research issues, economic principles and methods used in education literature, and the education policies they are targeting.

[5] Substantive discussion is based on Belfied (2000).



Source: Author's own adaptation from Belfield (2000).

Figure 2-1: A Schematic Summary of Economics of Education Research Issues and Economic Principles Applied

Figure 2-1 suggests that there are, broadly, five education research issues and various economic principles that can be applied to them. A brief description of each education research issue is given below, followed by the relevant economic principles and methods used in education literature.

2.1.1. EDUCATION RESEARCH ISSUES

2.1.1.1. LABOUR MARKET RELATED ISSUES

The sustenance of knowledge-driven economic growth requires education systems that impart higher-level skills to a greater share of the labour force. As such, education economists have placed a great deal of emphasis on determining competencies, outcomes, profitability, and return on educational investment and the creation of human capital (Schultz, 2010; World Bank, 2006; Psacharopoulos and Patrinos, 2002). Schultz (2010) examined human resources competencies at a merged HEI. Education and the labour market are interlinked at both micro- and macro-economic levels.

At the micro-economic level, the economics of education relates to the labour market, as education is considered a primary determinant of earnings or wages. The demand for education (from early childhood development to higher education) is included in most estimates of earnings or wages. Existing studies hypothesize that earnings or wages drive the demand for education, since a higher education degree confers a stream of substantial advantages on graduates in comparison to non-graduates (World Bank, 2006). Studies that have estimated the rates of return to investments in education reveal how much of an effect each additional year of education has on individual's earnings or wages. Labour market related issues in education bring together the costs of education with the future benefits on the labour markets and this constitutes the core concept of human capital theory (Psacharopoulos and Patrinos, 2002).

At the macro-economic level, education and the labour market are also interlinked. For example, aggregating the effects that education has on individuals in the labour market, education may have macro-economic effects and raise economic growth in a typical country (World Bank, 2006). More broadly, education economists are interested in analyzing the ripple effects of education on earnings or wages, employment, economic growth and social equity. Human capital through education has been found to have strong and consistent positive effects on economic growth and productivity, and on cohesion and inequality within societies (World Bank, 2006; Wobmann, 2000).

2.1.1.2. BEHAVIOURAL AND DEMAND THEORY RELATED ISSUES

Education economists have placed a great deal of emphasis on studying how education changes behaviour and alters information sets by analyzing both: (1) what determines or creates education, and (2) what impact education has on individuals, societies, and the economies in which they live (Schultz, 2010; Teddlie and Sammons, 2010; De Lange and Olivier, 2008; George and Jones, 2007; Chalton, 2002; Hugh and Feldman, 1986). People are the basic building blocks of organizations and to understand the determinants of effective organizational performance, it is necessary to discover what determines the effectiveness of the performance of individuals (Schultz, 2010). The behavioural theory applies to individuals, households and communities, across all domains: at work, in consumption and during leisure, and in educational institutions (Teddlie and Sammons, 2010). However, whether any particular set of behaviours or actions constitute performance depends upon what the organization expects or demands of the person in terms of types of behaviours (De Lange and Olivier, 2008; George and Jones, 2007; Hugh and Feldman, 1986). There also human behaviours of highly effective organizations (Chalton, 2002).

2.1.1.3. EDUCATIONAL ORGANIZATIONS RELATED ISSUES

Education economists have placed a great deal of emphasis on identifying opportunities for improved efficiency, effectiveness, equity, and quality of education; and promoting effective education reform processes in educational organizations. Effectiveness and quality of educational institutions are products of people – faculty, administrators and support staff, students and stakeholders – who play differing roles in the pursuit of scholarship: teaching, learning and research, and in the discharge of these institutions' expected functions (De Lange and Maharaj, 2010; Makgoba *et al*., 2010; Makgoba and Mubangizi, 2010; Mubangizi and Bawa, 2010; Van Aswegen and Engelbrecht, 2009; George and Jones, 2007; Arnolds, 2005; Taylor and Harris, 2004; McPherson, 1993).

The economics of education in this case encompass the study of educational organizations such as schools or universities, their objective, organizational structures and operations, cost and revenue functions, their technologies including the use of factor inputs which highlight the role of resource endowments in enhancing the quality of educational outcomes, and the determination of student achievement in the education process (Van Aswegen and Engelbrecht, 2009; George and Jones, 2007; Arnolds, 2005). Taylor and Harris (2004) examined the organizational changes which have the potential to make an educational

organization more efficient. Complementary organizational case studies are also used to explain the logic behind mergers of educational institutions, university models: College, Faculty, or School models, and to estimate economies of scale and scope and the optimal sizes of educational institutions (Makgoba *et al*., 2010). UKZN is a restructured university College model, with all the organizational structures and operations this entails (Makgoba and Mubangizi, 2010; Mubangizi and Bawa, 2010).

2.1.1.4. DEMAND FOR AND SUPPLY OF EDUCATION RELATED ISSUES: A MARKET ANALYSIS IN ECONOMICS OF EDUCATION

The efficiency, equity, structures, and exchange mechanisms of the market for education merits attention (Rothschild and White, 1990). Studies on the demand for and supply of education have examined educational institutions' behaviour in a typical market structure, as well as the conduct and performance of education providers. The equilibrium between the supply of and demand for education depends on how the market for education is constituted in a typical country: the market for education may be competitive, monopolistic, monopoly, and oligopolistic or cartelized (Steyn and Villier, 2005; Clotfelter and Rothschild, 1990; Rothschild and White, 1990; Melck, 1982).

Steyn and Villier (2005) maintain that the educational market is far from being a perfectly competitive one and that the products and types of programmes supplied are not homogeneous in relation to the content and the method of instruction, making HEIs act as in a monopolistic competition. Based on the market for education structure, education as a commodity may be traded either through fees or no-fees, loans or income-contingent loans, vouchers, or be allocated by fiat or the national students financial aid scheme (NSFAS).

Others assessed the mode of interaction of education suppliers with demanders for its efficiency. The market for education programmes and services is equilibrated through demand and supply, and the study of each of these may yield insights into agents' behaviour (Clotfelter and Rothschild, 1990; Rothschild and White, 1990). On the demand side of the market for education, existing studies argue that to the extent that education is efficacious and the human capital model articulates how it could be, individuals will demand education. On the demand side, student enrolment, participation and effort levels have been investigated amongst others. These studies modelled this demand function for education by population cohorts, for qualification levels or for course/degree programmes (Tewari *et al*., 2008; Taylor and Harris, 2004). Of particular interest were how levels of public subsidy affect the demand for education and how capital

market constraints may preclude optimal education outcomes (Mubangizi, 2005). On the supply side of the market for education, many education providers are run by governments or subsidized, but they may still co-operate, collude or compete to provide education (Clotfelter and Rothschild, 1990; Rothschild and White, 1990). Existing studies, for example, maintain that the functioning of the labour market for academic staff members, specifically the supply of academic staff members, affects the quality of education in a central way.

On the price elasticity of demand for higher education, existing studies suggest that the demand is fairly inelastic but students from higher income groups are less sensitive to price changes than students coming from poorer communities. The reasons why the price elasticity of demand for higher education is relatively price inelastic include *inter alia* that (Melck, 1982: 122-125): (1) university fees are only a certain portion of a student's total costs, and (2) the forgone income of students is much higher than the university fees they have to pay. Melck (1982: 103-105) cautions that the positive externalities of education may result in the undersupply and overpricing of education if its provision is left entirely to market forces. Steyn and Villier (2005) indicate that the price of higher education programmes does play an important role in influencing the length of time that students tend to stay at HEIs. In the South African context, in respect of the two studies above, the payment of state subsidies are seen as correcting for market failures.

2.1.1.5. ACCOUNTING RELATED ISSUES

Education has become an increasingly important activity within all economies. For an educated individual, from early child development to higher education, the accumulation of knowledge and skills spans a lifetime, absorbing substantial, scarce resources (Jonhson and Kuennen, 2004; Belfield, 2000). The scrutiny of resources such as public funded expenditures on education, student financial aid and loans, non-market time of potential workers, indirect (or private) costs of schooling, the opportunity costs of students' time, etc; relevant to the accountancy profession, is becoming a significant education research area in which education economists are playing an important role (Taylor and Harris, 2004). For example the original data for input-output analysis of higher education finance in South Africa in the 1990s was done by a team from the Economics Department from the University of the Witwatersrand (author's verbal discussion with Professor Charlotte Mbali of the Centre for Higher Education Studies (CHE), Howard College, UKZN). The field of economics of education is becoming a tool to give insights to policymakers on how to hold managers of HEIs accountable for their level of achievement (Makgoba *et al*., 2010; Makgoba and

Mubangizi, 2010; OECD, 1997). Some questions that are specifically dealt with in this particular education research issue are, *inter alia*:

- What is the relationship between government (public expenditure packages) and private expenditure on education?
- How substitutable and relatively efficient are government and private expenditure at generating human capital?

2.1.2. ECONOMIC PRINCIPLES AND METHODS APPLIED IN EDUCATION RESEARCH ISSUES

Economic principles and methods used in education literature vary (Cohen and Geske, 1990). This study classifies them in two broad categories (Belfield, 2000) including: (1) the efficiency studies; and (2) the cost-benefit analysis (CBA). These are examined in the following sub-section.

2.1.2.1. EFFICIENCY STUDIES

A very simple idea of efficiency in economics involves getting the most out of the resources available and therefore has two sides: what is 'got out' – output - compared to what is 'put in' – input. Efficiency studies relate the transformation of inputs used by an educational institution and the outputs that it produces (Taylor and Harris, 2004; Athanassopoulos and Shale, 1997). Theoretically, both sides need to be considered: efficiency can be improved either if more output is obtained from the same inputs or if the same output is obtained, but with fewer inputs. Parkin (2010) explains that "allocative efficiency" occurs only when resources are used in the ways that people value most highly and when marginal benefit (MB) equals marginal cost (MC).

While the goals of efficiency studies in mainstream economics are comparisons of the market's to government's ability to allocate resources efficiently (Parkin, 2010), existing efficiency studies in the economics of education are more interested in both internal and external assessment of educational institutions (Taylor and Harris, 2004, Worthington, 2001, Athanassopoulos and Shale, 1997).

Educational institutions can be internally assessed in terms of the resource dose of educational inputs used to gain given educational outcomes/outputs. Educational institutions can also be externally assessed in

terms of subsequent educational outputs achieved from a given resource dose of educational inputs (Worthington, 2001). An input in education encompasses *inter alia* an incremental change of an educational programme, lecturer and tutoring staff capacity building, training or workshops; audiovisual equipment, media or technologies used in different modes of instruction, or an implementation of a given education policy such as enhancing mechanisms to monitor lecture attendance. An output or outcome encompasses *inter alia* the quality of teaching and learning, the completion of an education programme, progression rates, employment of students in specific professional careers, student learning and satisfaction, opportunity costs of students' and parents' time, enrolment or placement of alumni, retention rates, improvement of graduation, or throughput rates. According to the UKZN's Table of productivity payouts, the most important measurable outputs from the higher education sector in South Africa are inter alia research output (books, book editorial and chapter in books; articles in approved and DoE journals and journal editorial, conference proceedings, patents or licences, and research income), NRF rating, academic qualifications conferred and completed (degrees, diplomas and certificates) and number of graduating postgraduate students, academic staff who graduated with Doctoral degree, and creative contribution (local or overseas) (Taylor and Harris, 2004).

Behrman (1996, 345) distinguishes three main forms of efficiency: (1) allocative efficiency (internal assessment) is where inputs are distributed toward the production of various outcomes in order that the values of marginal products (MP) for each input are the same across all uses. That is, educational institutions in South Africa can be optimally deployed both on teaching, learning and research, for instance; (2) input-choice efficiency occurs where inputs are selected so that their marginal benefit (MB) equals marginal cost (MC). Here, incentives inputs (earnings, wages or salaries paid to academics and non-academics – administrators and support staff) can be compared with alternative prices of factors of production, educational technology, or infrastructure inputs in generating the desired educational outcomes or outputs; and (3) output efficiency (external assessment) applies when the educational outcomes or outputs are such that social marginal cost (SMC) equals social marginal benefit (SMB). Two measures of allocative efficiency: (1) the cost-effectiveness ratio (CER) and (2) Firm studies are discussed below.

(1) COST-EFFECTIVENESS RATIO

Education economists have used both the cost-effectiveness ratio (CER) and unit cost per outcome analyses to examine internal efficiency of HEIs (including efficiency of their personnel and students) by relating their incentive inputs (costs) to total achievement (the assigned or expected educational outcomes or

outputs) – assuming that outcomes can be effectively compared after those inputs have been used across different educational initiatives (Thomas, 1990). Kontolaimou *et al.* (2006), for example, measured the efficiency in an educational institution in Greece as the ratio of a weighted sum of outputs (educational outcomes) over a weighted sum of inputs (educational inputs).

The context with or without the educational interventions is crucial for assessing the incremental costs and benefits of the intended educational interventions. If an educational intervention has multiplier effects in terms of economic and fiscal impacts, sustainability or involves risks, then an efficiency study on this educational intervention and its alternatives can be done to decide "how to", rather than "whether to" go ahead with that typical intervention. The efficiency studies assess if benefits accrued to the educational institution, the programme, or the students after the educational interventions make it worth undertaking the intended educational interventions. Efficiency studies are helping educational institutions to decide "which version" or "which educational input" is to be used, funded, or rejected. Some questions that education economists are specifically dealing with in this particular efficiency analysis are:

- Is the educational intervention financially sustainable?
- What are the risks involved in an educational intervention?
- Are there any other externalities or environmental impact on an educational intervention?
- How would costs and benefits of alternatives to achieve the same educational interventions compare to the educational intervention in question? (i.e. asking a counterfactual question).
- Who gains and who loses if the educational intervention is implemented?

The appropriate choice of educational outcome to be considered may include achieving educational objectives such as increased participation rates, retention rates or throughput rates among others. Education economists therefore, assess the socio-economic impacts of educational inputs depending on *inter alia*: how widespread are the benefits or which outcome benefits the HEI the most, how the education gains depend on students' initial characteristics, and/or how individual students choose between educational programmes or majors. For example, an incremental increase in teaching and tutorial staff in a range of degree programmes and qualifications offered in UKZN's CLMS can be assessed internally or externally. The numbers of enrolments or cost of provision of courses/modules/undergraduate/postgraduate programmes in the CLMS at UKZN or any HEI can also be assessed to establish if they are sufficient to meet management skills preferences or professional skills expected in the law and management professional careers in South Africa, for example. Another example is to examine how the closure of a neighbourhood HEI (not offering

a course or module on campus) raises commuting costs for local families of students attending an out of neighbourhood HEI (or attending a course or module on another campus).

In the aggregate across the period 2004-2008, there was a substantial increase in the number and standards of qualifications obtained by undergraduate students in the CLMS. Combining this evidence with that on broadly static per-unit resources used and the number and standards of qualifications obtained at UKZN at large, there appears to have been a substantial increase in efficiency in the College – much higher academic outcomes with unchanged (or even declining) resources (assuming equivalence of resources allocation across UKZN's Colleges over time).

Some efficiency studies acknowledge the difficulties of selecting educational outcomes. For example, it is difficult to calculate a metric, an effect size, or a standardized mean difference, which can allow the comparison of two educational outcomes. Getting consistent and reliable cost information on alternative educational programmes is difficult and generally few cost studies have robust and full data available on actual expenditures on educational inputs used by educational institutions.

(2) FIRM STUDIES

Generally firm studies examine economic and technological efficiencies. Economic efficiency occurs when the firm produces a given output at the least cost, while technological efficiency occurs when the firm produces a given output by using the least amount of inputs. Parkin (2010) maintains that economic and technological efficiencies are key determinants of a firm's efficiency. Education economists are concerned about how input-choice and allocative efficiency, and value-added effectiveness could be improved in HEIs reflecting on the firm's model and theory. Some studies have modelled an educational institution as a firm that manufactures educational outcomes analogously to how firms produce outputs (Tewari *et al*., 2008). These studies use an educational production function approach to discover which types of resources (educational inputs) and allocations have the greatest effect on outcomes (educational outputs) in HEIs and then use the identified determinants in the provision of education to best effect (Taylor and Harris, 2004). These studies examine issues such as: how a higher quality of education may be achieved in the "production" of education in the education "industry" i.e. in educational institutions (Hanushek, 1986). This study follows similar a process with some particularity as explained in the methodology in the following Chapter 3.

While in firms' theory or in industrial sectors, performance is measured by *inter alia* firms' profits, income earnings, surpluses, or sales value per-employee; in education, point-estimate measures are used to similarly track the performance of an educational institution (Belfield, 2000). For example, studies have estimated the effect that family background, resource endowments and institutional features have on student performance in key curricular areas (Van Den Berg and Hofman, 2005). For modelling purpose, these studies typically use years of schooling, although one year of schooling is unlikely to be uniform across different population cohorts or academic levels. Educational institutions' quality measures are also incorporated in simple quantity estimates, particularly if the intention is to model education as an input into the production of other social outcomes. Similarly, the differences in prior ability or home endowment across population groups of students though hypothesized to be imperfectly observed were also modelled (notwithstanding value-added adjustments) in some studies. Students' performance in HEIs is modelled using an educational production function approach and empirically tested *via* regression analysis (Tewari *et al*., 2008; Parker, 2010) or non-parametric Data Envelopment Analysis (DEA) (Kontolaimou *et al*., 2006, Pseiridis *et al*., 2006; Taylor and Harris, 2002 and 2004; Worthington, 2001; Athanassopoulos and Shale, 1997). Athanassopoulos and Shale (1997) empirically tested the relative efficiency amongst 45 universities in the UK using DEA.

2.1.2.2. THE COST-BENEFIT ANALYSIS (CBA) STUDIES

These kinds of studies compare the costs of undertaking an educational programme with the benefits of that programme using pecuniary values (De Vreyer, 2010; Kaufman, 2010; Kamenetz, 2006; Belfield, 2000). Theoretically, CBA is used to identify whether or not a policy is worth undertaking, rather than how it should be undertaken. The fundamental rule is: if the benefits of a programme exceed the costs, then that programme is worth undertaking (if the costs are regarded as inputs, and benefits are the outputs, then a CBA is analogous to a study of efficiency). CBA across a range of educational investments leads to an optimal investment strategy. Three ways of examining costs and benefits in education were surveyed in the literature. These are (Kaufman, 2010; Kamenetz, 2006; Belfield, 2000; Brent, 1996; Levin, 1995; Hough, 1994): (1) the rate of return appraisal (RRA), (2) the discrete changes in education provision, and (3) the growth models. A brief discussion of each follows.

(1) THE RATE OF RETURN[6] APPRAISAL (RRA)

There is a difference between the internal (or micro-economic) and external (or macro-economic) rate of return. The internal rate of return (IRR) for funding proposed educational projects equalizes the discounted costs (bank lending rates, government discount rate) and benefits of undertaking it (Kaufman, 2010; Kamenetz, 2006; Belfield, 2000). The IRR is specific to the proposed educational programmes only, *ceteris paribus*. Typically, if the estimated IRR to a proposed project of education (at the end of a financial year or after the graduation, for example) exceeds the rate of return (RR) to alternative projects or of not undertaking the project (at the beginning of the financial year or enrollment); that is, if benefits exceed the costs, then the proposed educational project should be undertaken. The external rate of return (ERR) puts the proposed educational project in a broader macro-economic context and attempts to estimates the incremental return yielded by adding up returns from the ripple effects in the economy as a whole. In comparison, the ERR is more likely to be greater than the IRR. The ERR can also be negative and the IRR positive or *vice versa*. The IRRs and ERRs (as defined by those who had completed any level of education: primary, secondary or tertiary) in developing countries are normally higher for all levels of education – the sub-Saharan region having the highest of all regions – than rates of return in developed countries (De Vreyer, 2010; De Villier and Steyn, 2007; Psacharopoulos and Patrinos, 2002; Tilak, 1999).

Steyn and De Villier (2005) distinguish between the private and social rates of return of investment in education and found that on an average the world private rate of return for higher education is 8.2 percentage points higher than the social rate of return, suggesting that there is scope for individuals to pay more of the costs of higher education. However, they argue that the majority of countries in the world have almost fully subsidized higher education, which increases the private rates of return to artificially high levels, since the individual's contribution to their own education is very small. There are no private rates of return available for South Africa but studies done in metropolitan areas in KwaZulu-Natal to calculate the profitability of investment in education suggested that the social rate of return for all levels of education is higher than the average for the world (De Villier and Steyn, 2007).

Studies have done CBA of the choice of going to higher education and the fact that job market remains grim for graduates (Kaufman, 2010; Kamenetz, 2006; Lissenburgh and Bryson, 1995). These studies opined that the costs of higher education continue to skyrocket whilst jobs remain scarce for newly-minted graduates questioning conventional wisdom that graduating in higher education is the most sensible paths toward

[6] Psacharopoulos and Patrinos (2002) define this concept as the financial rewards accrued by individuals (graduates) and the tax revenues they generate.

success and –for those who seek it – prosperity. Measured in terms of graduating student loan debt and financial and economic challenges facing newly-minted graduates, costs of earning a degree outweigh its benefits. These studies are suggesting alternatives cheaper ways to gain job training and a liberal education (Kamenetz, 2006).

(2) THE DISCRETE CHANGES IN EDUCATION PROVISION

The aim is to estimate the change in the volume of university provision. Existing studies caution that any type of innovative restructuring of the education system or a HEI merits serious consideration and comparison against other re-organizations as empirical evidence suggests that they can increase costs by 15 to 20 percent (Makgoba and Mubangizi, 2010; Belfield, 2000). For example, lengthening the academic year as a result of a strike or an increment in the number of tutorial staff are expected to raise total expenditure in a typical HEI.

(3) THE GROWTH MODELS

The growth models are used mainly for external efficiency of educational institutions. Economic activities of educational institutions such as UKZN affect other economic entities, for good or for bad, in ways that these institutions do not usually take into account when making their own economic choices. Negative externalities are a source of market failure while positive externalities are a major source of market efficiency.

At a macro-economic or an aggregate level, with positive externalities education raises economic growth, that is, the effects of education spill over to other economic entities beyond its effect on the educated individual (World Bank, 2006). Higher education fulfills the potential of all its graduates in terms of their role in society as citizens, and also in the role that the skills, competences and knowledge acquired play in social and economic growth (CHE, 2010). Education enhances the productivity of a country through attacking ignorance, imparting knowledge, building skills, changing outdated attitudes and values, empowering the poor and raising their earnings as well as their quality of life (UNESCO-PROAP, 1997).

At a micro-economic or a more disaggregated level, UKZN is an important site of economic activities during its life span. The university attracts staff and students into a region (a province such as KwaZulu-Natal or a city such as Durban). Staff and students buy locally produced goods and services, which has

multiplier effects that further spill-over and ripple on the full breadth of the local economy and the economy of South Africa at large. As such, the socio-economic direct and indirect impacts assessment of UKZN's economic activities may be estimated using a multiplier analysis, where injections into and leakages outside the region or local economy are compared through a coefficient linking the total change in economic activities of UKZN to the initial economic activities (outside UKZN) using an input-output analysis. If this coefficient is greater than one, positive multiplicative effects are evident and a net accrue in the economy of the region is unlocked from the UKZN's economic activities (Bleaney *et al*., 1992).

In summary, education economists are helping to discover which types of resources and allocations have the greatest effect on outcomes, how input choice and allocative efficiency can be improved, the effects of education which spill over to other agents for economic growth, to assess the effectiveness of a university model, and to set up organizational structures and operations in a university. They are also explaining the logic behind mergers of educational institutions, estimating economies of scale, economies of scope, and the optimal sizes of educational institutions; which version of an educational programme should be funded or implemented, and assessing the effectiveness of educational interventions to improve the attainment of children from disadvantaged socioeconomic backgrounds.

South Africa's education policies are briefly discussed in the following sub-section 2.2.

2.2. SOUTH AFRICA'S EDUCATION POLICIES [7]

In order to understand and interpret the contextual education issues, trends and key documents and policies in the whole education spectrum, and the determinants of South African students' academic performance, a brief overview of the developments in the education sector in South Africa is needed. This sub-section provides a broad overview of education policies in the core areas of regulation of the education sector, Councils and statutory education bodies, state funding formulae, teaching and learning, research, strategic planning, curriculum development, and students' experience amongst others.

[7] Substantive discussion is based on the review of South Africa's policies for education (OECD, 2008), National gazettes, DoE documents in government gazettes, and the Constitution of the Republic of South Africa (1996) or http://www.info.gov.za/aboutsa/education.htm.

2.2.1. THE EDUCATION STRUCTURE IN SOUTH AFRICA

Presently, South Africa has a single national education system that includes nine provincial sub-systems responsible for implementing education policy and programmes aligned with national goals. The Constitution of the Republic of South Africa demonstrates the government's commitment to transform and democratize education in general, in accordance with the values of human dignity, equality, human rights and freedom, non-racism and non-sexism, and guarantees the right to basic education for all, including Adult Basic Education. The National Education Policy Act of 1996 sets out the political agenda and national norms and standards for education planning, provision, governance, monitoring and evaluation. Key policy documents and initiatives were subsequently approved to restructure the racially binary divided education system between Blacks and Whites, and also strengthen the post-apartheid education policy space, namely the Bill of Rights contained in the Constitution of the Republic of South Africa 1996, the South African Schools Act of 1996, the Further Education and Training (FET) Colleges Acts of 1998 and 2006, the Adult Basic Education and Training (ABET) Act No. 52 of 2000, and the White Paper of 2001 on Early Childhood Development (ECD). The Preamble to the South African Schools Act of 1996, which became law in November 1996 and was included in the 1996 South African Constitution, explains the rationale for the Act as follows:

South Africa requires a new national system for schools which will redress past injustices in educational provision, provide an education of progressively high quality for all learners and in so doing lay a strong foundation for the development of all our people's talents and capabilities, advance the democratic transformation of society, combat racism and sexism and all other forms of unfair discrimination and intolerance, contribute to the eradication of poverty and the economic well-being of society, protect and advance our diverse cultures and languages, uphold the rights of all learners, parents and educators, and promote their acceptance of responsibility for the organisation, governance and funding of schools in partnership with the State; ...(The Bill of Rights of the Constitution of the Republic of South Africa, 1996a).

Formal education in South Africa comprises three broad bands/layers/levels as recognized by the South Africa's National Qualifications Framework (NQF) that incorporates: (1) General Education and Training (GET), (2) Further Education and Training (FET), and (3) Higher Education and Training. The 1996 Constitution determines that the national sphere of government has exclusive legislative responsibility for Higher Education and Training, whereas the legislative responsibility for all other levels of education is

shared concurrently by the national, provincial and local governments. A brief discussion of the relevant Acts follows.

The Schools Act aims to provide for a uniform system for the organization, governance and funding of schools. The Act seeks to ensure that all learners have the right of access to quality education without discrimination, and it makes schooling compulsory for all children from the year they turn seven to the year in which they turn 15 (or the end of Grade 9, whichever comes first). The education system commences at level one, access to GET which incorporates grade R (also referred to as grade 0 or the reception year) to grades 1-3 (the Foundation Phase of GET); progressing to grades 4-6 (the Intermediate Phase), and to grades 7-9 (the Senior Phase). Early Childhood Development (ECD) falls under the White Paper of 2001, which aims to achieve the full participation of five-year-olds in Grade R education by the financial year 2010, as well as improve quality, curricula and educator development. Grade R is not compulsory; however, government was planning to increase the number of learners enrolled in this grade to 800 000 by 2010 (http://www.info.gov.za/aboutsa/education.htm).

Learners progress to the second level FET from grades 10-12. The newly Department of Basic Education (DBE) deals with this pre-university education, as well as adult literacy programmes. Education White Paper 6 on inclusive education (2001) describes the government's intent to implement inclusive education at all levels in the education system by 2020, facilitating the inclusion of vulnerable learners and reducing barriers to learning.

Public school educators account for 95 percent of all educators and are employed by provincial education departments but their terms and conditions of employment are governed under the national Employment of Educators Act of 1998. National collective bargaining is undertaken in the Education Labour Relations Council between provincial DoEs and educators' unions in terms of the Labour Relations Act of 1995. The registration and professional development of educators and the setting, maintenance and protection of ethical and professional standards is the responsibility of the South African Council for Educators (SACE) under its own Act of 2000.

The Further Education and Training (FET) Colleges Act of 2006 supersedes the Further Education and Training Act of 1998 and its aim is to regulate all learning and training programmes leading to qualifications at levels two to four of the National Qualifications Framework (NQF) or equivalent levels determined by the South African Qualifications Agency (SAQA); these are above GET but below Higher

Education and Training. FET, therefore, comprises the senior secondary component of schooling (from Grades 10-12) as well as career-oriented education and training provided in other FET institutions (also referred to as FET or Technical Colleges). The final three years of FET are also not compulsory (The Bill of Rights of the Constitution of the Republic of South Africa, 2006a) but premised upon the Constitution, government has the responsibility to oversee all of the layers of the education system. In South Africa, learners acquire a FET qualification in one of the following three different ways: (1) by completing Grade 12 in the schooling system, (2) by attaining equivalent certification from a public FET College (formerly there were 152 public FET Colleges which were rationalized down to 50 (www.teacher.org.za)), or (3) through opportunities offered by private colleges. The statutory Umalusi undertakes the quality assurance and certification (for all non-higher education) in terms of the General and Further Education and Training Quality Assurance Act of 2001.

Government announced the National Schools Nutrition Programme and no-fee schools in which learners do not pay fees, where the schools are subsidized per capita of learners (http://www.info.gov.za/aboutsa/education.htm). About eight million learners are benefiting from school-feeding schemes (Zuma, 2011b).

The Adult Basic Education and Training Act, No. 52 of 2000 provides for the establishment of public and private adult learning centres, funding, governance and quality assurance mechanisms.

The revised National Curriculum Statement (NCS) designed to be an "Outcomes Based Education (OBE) curriculum" which has undergone substantive change from the NATED 550 Higher and Standard grade curriculum was adopted in 2002 and has been phased in gradually throughout the grades. This culminated in the phase-in of the new curriculum in grade 12[8] in 2008 (DoE, 2002b). Therefore, the first cohort of learners following this new Curriculum for the National Senior Certificate (NSC) qualification reached matric level in 2008. Due to their importance for university entrance and high enrolment numbers, 13 matric subjects were categorized as gateway subjects. Ranked on the basis of highest enrolment numbers, these matric subjects are (Umalusi, 2009): English Second Language (presently referred to as English First Additional Language or English FAL), Biology or Life Sciences, Mathematics, Geography, Business Economics, Afrikaans Second Language, Physical Science, Economics, Accounting, Agricultural Sciences, History, English First Language, and Afrikaans First Language. Table 2-1 compares the mark distribution of the old NATED 550 Higher and Standard Grade subjects with NSC grades.

[8] The school-leaving level in South Africa also referred to as matric level.

Table 2-1: Mark Distribution of the NATED 550 Higher and Standard Grade Compared to NSC Grade, 2010

NATED 550 Higher and Standard Grade							
Symbol			A	B	C	D	E	F
High Grade (HG) subjects			8	7	6	5	4	3
Standard Grade (SG) subjects			6	5	4	3	2	1
National Curriculum Statement (NCS) Grades 10-12 (General) (from 2009- up to date)								
Achievement level	7 (80-100%)	6 (70-79%)	5 (60-69%)	4 (50-59%)	3 (40-49%)	2 (30-39%)	1 (0-29%)	

Source: Compiled from the Central Applications Office (CAO) handbook entry (2010, p. 45) and the National Senior Certificate (NSC) statement for 2010.

Umalusi (2009) commented that the NSC is closer to the old NATED 550 Standard Grade than the Higher Grade. In the old NATED 550 Higher and Standard grade curriculum, matriculants had to pass five out of six matric subjects and achieve an aggregate of 720 marks to pass the matric examination. With the NSC, matrics must achieve a minimum of 40 percent in three matric subjects, one of which has to be his/her own home first language. Matriculants are granted a pass even if they achieve 30 percent in the other four matric subjects or fail one of them, provided that the complete portfolio of evidence in the school-based assessment component is submitted.

After the grade 12, level three, the system is broken down to Adult Basic Education and Training (ABET), Special Needs Education (SNE), and Higher Education (HE). The newly DoHET deals with universities, which incorporates comprehensive universities (that include access, foundation and extended curricula programmes) and vocational universities. Figure 2-2 explains the conceptual model of levels of formal education in South Africa.

BAND	SCHOOL GRADE	NQF LEVEL	QUALIFICATIONS
HIGHER		8	Doctors Degree
		7	Masters Degree
			Honours Degree
			Postgraduate Diploma
		6	General first degree
			Professional first degree
			Bachelor's degree
		5	First diploma
			Higher certificate
			Certificate
FURTHER	12	4	Diploma
	11	3	Certificate
	10	2	Certificate
GENERAL	9	1	Grade 9 Adult Basic Education and Training level 4
	8		
	7		
	6		
	5		
	4		
	3		
	2		
	1		
	R		

Figure 2-2: Levels of Education in South Africa
Source: Compiled from the DoE (Department of Education).

There is also a policy tangle, as in terms of the Skills Development Act of 1998, the DoHET jointly with the Department of Labour deals with the human resource development strategy and the whole field of skills development and training covering all sectors of the economy, private and public. These include post-school education and training, the 24 Statutory Sector Education and Training Authorities (SETAS), the National Skills Authority (NSA), the National Skills Fund (NSF), as well as coordination of the National Human Resource Development Strategy (NHRDS) (http://www.info.gov.za/aboutsa/education.htm). This is discussed in more detail in the following sub-section.

2.2.2. HIGHER EDUCATION ACT, RETENTION AND THROUGHPUT RATES

Challenges within the whole education spectrum in South Africa have been discussed above. A brief overview of the developments in the higher education sector in South Africa is also needed. The agenda and strategies to strengthen and redress the higher education system are briefly discussed below.

The Higher Education Act of 1997 and the White Paper on Higher Education in 2004 provided for a single, nationally coordinated system of higher education, overseen and quality assured by the Statutory Council on Higher Education (CHE). The higher education sector in South Africa is predominantly public and government has reduced the number of HEIs from 36 (21 universities and 15 technikons) to 24 to distinguish seven universities of technology (formerly referred to as technikons), 11 traditional and six comprehensive universities, and two National Institutes for Higher Education (NIHE) (OECD, 2008; Steyn and Villiers, 2005). Comprehensive universities are academically orientated, theory-based and designed to prepare students for advanced research programmes and highly qualified professions, while vocational universities are practice orientated (Van Den Berg and Hofman, 2005; OECD, 2000).

The NSFAS Act of 1999 provides for the granting of loans and bursaries to eligible students at public HEIs, as well as the administration of such loans and bursaries. Some R 2.1 billion in funding has been pledged for the NSFAS in the financial year 2009/2010 (Pandor, 2009). The South African student population increased from about 473 000 in 1993 to about 799 658 in 2008. The national average student-lecturer ratio in public HEIs was 46-1 in 2005 (DoE, 2008). The NSFAS, due to historical reasons, helped thousands of black Africans students (the racial breakdown of the students that received funds is 90.2 percent Blacks, 4.7 percent Coloureds, 2.5 percent Indians, and 2.6 percent Whites) but presently the demand for funds exceeds the supply by far and ways to increase the available pool of NSFAS funds are being explored. An income-contingent loan scheme like in the UK is also considered at the postgraduate level (Steyn and Villier, 2005).

Graduation, retention, or attrition of students varies greatly between countries. The average number of years taken by a student to graduate (also referred to as the study duration) and the numerical pass rate at universities (also referred to as the university student success rate) has been a relevant topic in European education policy (Van Den Berg and Hofman, 2005). The graduation rate is of great significance to any country since arguably the primary purpose of universities is to produce graduates (De Villier and Steyn, 2007). Graduation rates vary from a low of 47 percent to a high of 85 percent for individual countries

around the world and in general about 30 percent of students who begin a tertiary degree do not complete their programme (Dietsche, 2009).

Generally, student retention is defined as the ability of a typical educational institution to maintain continuous enrollment of the same student for each consecutive semester until graduation. The core indicators of the effectiveness of the higher education system and the achievement of equity and redress in South Africa include *inter alia* the extent to which the system manages to retain the majority of its students on the graduation path (CHE, 2010) and the number of qualifications (degrees, diplomas and certificates) that it awards per year. In the US, the successful retention-to-graduation rate benchmark is 150 percent of allotted time. Using a cohort approach, a successful retention-to-graduation in a four-year programme, would be defined as graduation in six years (www.innovativeeducators.org/product_p/562.htm). In European countries, student attrition ranges from over 60 percent in Italy, to 45 percent or less in Austria, France, Portugal and Turkey. In the UK, the attrition rate is 20 percent (OECD, 2000; Van Den Berg and Hofman, 2005).

In general, there are various requirements to enter tertiary education in South Africa that include: (1) achievement in the NSC or equivalent examination for South African students or on academic achievement at the school-leaving level for international students, (2) the old Matriculation Exemption, (3) completion of a national diploma; and (4) Dean's discretion in selected HEIs. The matriculants of August 2008 were the first to enter university education having written the NSC based on the new NCS where all provinces wrote the same papers with the same curricula and assessments. For entrance eligibility into South African universities or their degree programmes, matriculants must achieve between 50 to 59 percent in four subjects, as well as a minimum of 30 percent in the language of instruction (generally matric English score) of the HEIs (Daily News, 12 Oct. 2008). Only 15 to 18 percent of grade 12 pupils who sit for matric every year obtain a pass with endorsement, which qualifies them automatically for university and this percentage is decreasing.

The university admissions process across South African universities is presently undergoing changes as individual universities grapple with the NSC points scores. Higher Education South Africa (HESA) (formed on May 9, 2005 to represent the voice of Vice Chancellors – leadership- of South Africa's public universities) is presently trying to convince all the HEIs to adopt its national benchmark tests (proficiency in academic literacy, quantitative literacy, and skills in Maths) intended to identify students who are more likely to succeed at university. However, the HEIs have their own *ad hoc* designated Admission Point Score

(APS) systems aggregated or calculated from the matric subject scores used in conjunction with a prerequisite of one or more combinations of specific designated matric subject scores that usually include a Maths score, a Maths literacy score, or an English score. A few HEIs including Stellenbosch University and the University of Cape Town have adopted HESA's tests, questionnaires or interviews to select appropriate students.

Ramphele (2008) points out that the biggest challenge in South Africa is the state of the education system. Lefera (2010) feels that the education system in South Africa is to blame for the low matriculation pass rates, lack of skills and critical thinking, poverty and high crime rates because of its ineffectiveness and irrelevance to the South African context. Memela (2010) points out that the lack of skilled high school educators in critical subjects such as Mathematics, Science, Economics, and Accounting; and the alarming number of 11 000 under-qualified and unqualified educators on the payroll of the DoE largely explains the high dropout and failure rates at universities.

The OECD (2008) indicates that the graduation rate for South African universities as a whole was 17 percent in 1993, but fell to 16 percent in 2000 whereas the corresponding fall for Universities of Technology was from 10 percent to 9 percent. Strydom *et al.* (2010) warn that the graduation rates in South African HEIs are unacceptable. Patterns of intake and graduation rates reveal that the higher education system in South Africa is not effectively achieving its crucial human resources development function (Subotzky, 2003). Letseka and Maile (2008) surveyed students from seven of the historically white and black universities and concurred that about 40 percent of South Africa's university students dropped out in their first year and that a mere 15 percent graduated in the allotted time. Academics are shifting blames to the schools that feed higher education while schools are blaming parents (Macfarlane, 2006). Africa (2005) concurred that a large number of black students admitted in HEIs are being drawn from schools that are poor, with poorly qualified staff, and in many instances have a dearth of qualified Mathematics and Science educators. Groves (2009) maintains that compared to western countries, South African students lacked the prerequisites and skills needed to compete and succeed at university level and that the root of the problem is that South African high schools are not producing university-calibre students.

Despite the fact that subsequent democratic government administrations have stressed the need to prioritize education and improvements in throughput rates in South African universities (Zuma, 2011a), the actual throughput rates do not meet the targeted levels. It is widely agreed that the South African economy can only progress when the country's higher education system produces more university graduates (Gordhan,

2011). The DoHET (2010) specifies that vital factors for university success should be provided to learners when they are within the scope of the school system, which as discussed falls under the Department of Basic Education.

The participation rate refers to the proportions (percentage) of the 20-24 year old age group in higher education. The World Bank figures on tertiary education participation rates for selected countries indicated that from a peak in 1995 of 17.5 percent, the was a drop in South Africa participation rates to 15.3 in 2004 and this was about 16.3 percent in 2007. Ganpath (2010) notes that a mere 18 percent of this age group have access to higher education in South Africa. The DoHET is targeting a participation rate of 20 percent by 2015; the bulk of which has to be sourced from previously disadvantaged population groups. If this participation rate is to be attained, it can be calculated that the enrolment numbers in higher education in South Africa should increase by more than 4 percent per annum. However, government's proposed enrolment growth restriction for the period between 2006 and 2009 allowed for an average annual university student growth (to be subsidized by means of state funding allocations) of about 0.6 percent. This contradicts the NPHE participation rate target (OECD, 2008). The dilemma facing HEIs is whether they are responsible for upgrading the poorly prepared students they admit or whether this responsibility should be borne by another level of educators (for example from pre-university education) and not university academic staff. The next sub-section provides a brief assessment of progress and development in the funding of HEIs.

2.2.3. THE HIGHER EDUCATION FUNDING FORMULA IN SOUTH AFRICA

HEIs in South Africa have various main sources of funding: (1) state subsidy, (2) tuition fees, (3) assets use e.g. charging for use of facilities, (4) donations (e.g. from alumni), and (5) research, consultancy, or entrepreneurial undertakings, where applicable. The state subsidy influences student enrolments, staffing, research outputs, and the financial situation of the HEIs in South Africa (Steyn and Villiers, 2005). In terms of the South African DoHET, state funding allocations depend on a number of factors: (1) the intake of students (weighted by study fields and qualification levels with a greater subsidy being allocated to postgraduate students), (2) the graduation rates, and (3) the research output of each public HEI. HEIs' past performance in enrolling and graduating students (referred to as their throughput rates) determines the state subsidy and enrollment of disadvantaged and disabled students attracts an additional allocation of funds. The DoHET implemented these educational incentives to steer the HEIs towards widening access, ensuring high quality teaching and learning, and focusing on research output. These *ad hoc* sources of funding and

the state funding mechanism resulted in different HEIs having different wealth profiles with older ones like the former University of Natal (UN), Cape Town, and Stellenbosch having more endowment income, money stream income and grants from research output and projects, alumni, and charging for use of the assets.

HESA's commitments are two folds: (1) achieve adequate funding levels for HEIs and students, and (2) keep balance between institutional autonomy, academic freedom and public accountability. Existing studies differ as to the level of state funding in higher education in South Africa. This makes it difficult to ascertain the proportion of higher education in the total education budget and compare it with the norm for upper middle countries' spending and investment at each level of education. For the academic year 2009/2010, the DoHET pledged some R19.3 billion in funding for higher education. The figure for 2010/2011 was R21.3 billion.

Lefera (2010) points out that relatively speaking far more is being spent on education in South Africa than before, yet the pass rates are dismal (with an easier curriculum) and are not better or in fact worse than pre-1994. Some studies argue against public investment in higher education, suggesting that more emphasis should be placed on a 100 percent enrollment in primary and secondary education. Other studies caution that the argument against public funding of higher education ignores the multidimensional role of higher education and the difference between higher education relative to primary and secondary education in training of individuals to feed the labour market and economic development (Cemmell, 2004).

Funding incentives linked to the achievement of these strategies and institutional funding are, therefore, important issues to be examined (Jimenez, 1986; Jimenez *et al.*, 1986). Shifts over time in the size of the HEIs, expenditure on staff and students, academic and cost efficiency are evident in South Africa and impact on the HEIs' performance indicators. Education spending was some 49 percent larger in real monetary terms in 2005 than it was in 1994 (DoE, 2006). Expenditure in education is also becoming the largest item of all government's expenditures. It stood at R165 billion in the 2010/2011 financial year, and will rise to R190 billion in 2011/2012 and to R215 billion in 2013/14 (Gordhan, 2011). In addition, millions of rands are received in foundation programme grants. Provincial and local education departments also spent some R93 billion in the 2006/2007 financial year. Additional public and private spending, for example, health departments on nursing colleges and agriculture departments on agricultural colleges was also undertaken. Between 1994 and 2009, government allocated on average some 18 to 20 percent of total government expenditure to the education budget. Both GDP and budget expenditure proportions have been declining over the past decade from as high as 7 percent of GDP in 1996 (OECD, 2008) to 5.3 percent

(DoE, 2011; OECD, 2008). Education spending as a proportion of the GDP as per the UNESCO benchmark is about 6 percent. South Africa is presently spending below some international norms in the context of comparable countries.

The profile of the would-be student, enrolment and placement of students into appropriate curricula, the design and development of curricula, development of teaching material, teaching and learning processes, academic development and support programmes, and students' academic performance are important education research issues in the higher education landscape in South Africa (CHE, 2010). A brief survey of literature on the determinants of students' academic performance is provided in the following section.

2.3. THE DETERMINANTS OF STUDENTS' ACADEMIC PERFORMANCE

Determinants of students' academic performance have been the subject of ongoing debate among educators, academics, education stakeholders, policy makers, and students in countries all over the world (Horn *et al*., 2011). South Africa is no exception. Studies have probed educational processes both from a theoretical and from an empirical perspective, in an attempt to grasp the role that various factors play in predicting student success, using a cross sectional or a longitudinal analysis.

In the American and European literature, several determinants of student performance have been identified and studied. For example, building a case for integrative first-year experiences at the University of Cincinnati (Person *et al*., 2009), the process of admission as a means of predicting academic performance in higher education in Mexico (Flores and Lever, 2010), exogenous and endogenous factors have been identified as influencing students' academic performance in undergraduate accounting modules in the UK (Guney, 2009); teacher quality affected students' academic performance in Italian Universities (Maria De Paola, 2009), and student and faculty factors impacted on student success in university education (van den Berg and Hofman, 2005). Other studies included aspects such as: the social and academic integration of students (Spady, 1970); the interaction of students with their institutions (Bean, 1982); the influence of past behavior on the intention of students to withdraw from college (Fishbein and Ajzen, 1975); students' inefficiency (Pseiridis *et al.*, 2006); schooling resources, educational institutions, students' academic performance (Wößmann; 2000); and faculty role models (Rask and Bailey; 2002).

Since the DoHET in South Africa is greatly concerned about improving the participation and throughput rates of universities and Universities of Technology, South African studies have focused on tertiary

education pass rates in South Africa (Delvare, 1995), an econometric evaluation of academic development progammes (Edwards, 2000), reading ability and academic performance in South Africa (Pretorius, 2002), a data envelopment analysis of relative efficiency among ten South African universities (Taylor and Harris, 2004), profiling of the successful first-year accounting student (Du Plessis *et al*., 2005), higher education transformation in South Africa (van Wyk, 2005), possibilities and challenges to approaches to predictive studies (Visser and Hanslo, 2005), some reflections on legal issues and implications of government funding of universities in the new South Africa (Mubangizi, 2005), reflections on equity and diversity at HEIs in South Africa (Cassim, 2005), exploration of first-year students' and their lecturers' constructions of what it means to read in a humanities discipline (Niven, 2005), students' characteristics on achievement in introductory micro-economics in South Africa (Parker, 2006), constraints in first-year economics teaching and learning (van der Merwe, 2006), testing the predictive value of school performance on the success of students in the accountancy stream at the University of Natal (Millar, 2006), explaining the academic performance of students in accounting and economics courses at UKZN (Tewari *et al.*, 2008), analyzing first-year students' performance in the commerce faculty at the University of the Witwatersrand (Yathavan, 2008), a focus on first-year experience and success: perspectives emerging from South Africa and beyond (Leibowitz *et al*., 2009a; Van Schalkwyk *et al*., 2009), the first step to student success is the assessment of students' strengths (Schreiner and Hulme, 2009), first-year experience is more a terrain of failure than platform for development demanding critical choices for higher education sector to avoid this situation (Scott, 2009), factors influencing success in first-year accounting at the Stellenbosch University: a comparison between lecturers' assumptions and students' perceptions (Steenkamp *et al*., 2009a).

Other studies in South Africa included aspects such as: students' perceptions of the factors influencing their success in first-year accounting at the Stellenbosch University (Steenkamp *et al*., 2009b), the way HEIs interact with students, create learning environments and engineer opportunities for specific experiences: each personalization of the postsecondary experience has to be small steps to a big idea (Dietsche, 2009); building on social anthropological expertise and insight to illustrate the extent and make sense of first-year student life transitions as ethnographic process (Green *et al*., 2009), managing diversity through orientation innovation by weaving the invisible institutional climate and cultures (Strydom and Mentz, 2009), student and staff portals as channels for the first-year academy at the Stellenbosch University (Van Der Merwe and Pina, 2009), a 3-tier model for supporting reading-to-learn at the North-West University (Potchefstroom Campus) (Nel and Nel, 2009), student perceptions of the factors influencing their success in first-year accounting at the Stellenbosch University (Steenkamp *et al*., 2009), techniques of introducing a 'law' course to 'non-law' students such as commerce students at the Nelson Mandela Metropolitan University (NMMU) (Govindjee, 2009), factors influencing the learning process in first-year chemistry (Adendorff and

Lutz, 2009), research and the first-year student: opportunities for learning (Granville and Dison, 2009), infusing adjustment issues into the curriculum in a science foundation programme (Davidowitz, 2009), lecturers' and students' reflections on a bilingual programme (Ngcobo, 2009), 'tutoring is fun': a study investigating tutor motivation (Burgoyne *et al*., 2009), how teaching explicitly from the challenge of disciplinary discourses can make lecturers of first-year students bring hidden tacit knowledge and understandings for the benefit of the students they are teaching (Jacobs, 2009), what makes a 'good' first-year lecturer who plays an important role in guiding novice students into this new phase of their lives (Leibowitz *et al*., 2009b), the usefulness of National Senior Certificate (NSC) Mathematics marks as predictors of academic performance at the University of the Witwatersrand is a blurred signal (Schöer *et al*., 2010), if attendance at South African universities does benefit students of introductory economics (Parker, 2010), the impact of podcasting on students' lecture attendance (De Lange and Maharaj, 2010), an exploratory analysis of factors explaining the academic success of second-year economics students at the Stellenbosch University (Horn *et al*., 2011).

A forthcoming book will include studies on aspects such as access to higher education in South Africa is reflective of under-prepared students or under-prepared institutions? (Dhunpath and Renuka, forthcoming), academic development for improved efficiency in the higher education and training system in South Africa (Boughey, forthcoming), the context of access and foundation provisioning in South Africa (Mckenna, forthcoming), interrogating the cycles of curricular change over ten years in the humanities access programme at UKZN (Jackson *et al*., forthcoming); access, redress, success: exploring an alternative access programme in education and development (Harley and Rule, forthcoming), critical reflections on access programme in the Faculty of Management Studies (Zhikali and Bokana, forthcoming), the UKZN centre for science access – an appraisal Part I: theoretical framework and educational discourse (Kioko *et al*., forthcoming (a)), the UKZN centre for science access – an appraisal Part II: graduation and throughput rates (Kioko *et al*., forthcoming (b)); dissonant discourses, why access courses, academic literacy practices and mainstream education talk past each other (Patel, forthcoming), widening access to higher education through Open Distance Learning (OPL): reflections on the challenges of epistemology and quality (Letseka and Ntshoe, forthcoming), on teaching reading for epistemological access (Mgqwashu, forthcoming); access, success and curriculum: aspects of their organic relationship (Scott, forthcoming), and access and quality in South African higher education: the twin challenges of transformation (Akoojee and Nkomo, forthcoming)

Van Den Berg and Hofman (2005) used Figure 2-3 to explain that study progress (defined in this thesis as students' academic performance) in the Netherlands and other European countries is influenced at three levels: the student level, the course/institute level, and the government level.

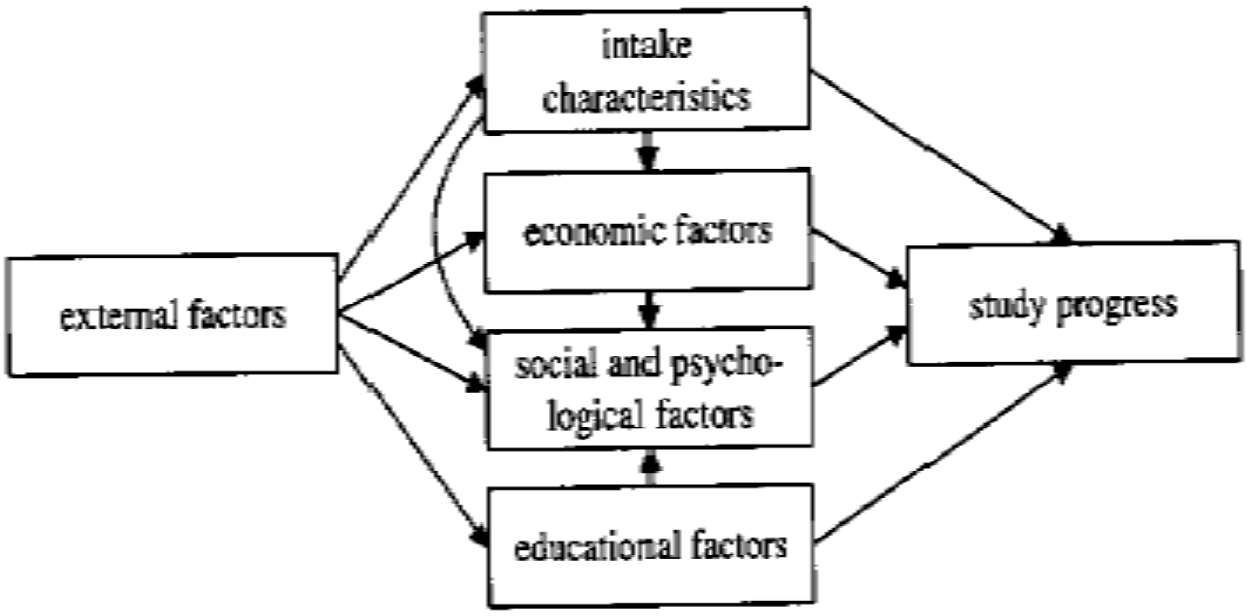


Figure 2-3: A Schematic Model to Explain Possible Characteristics that Determine the Student Success in the FMS, CLMS Adapted from Van Den Berg and Hofman (2005).

In Figure 2-3, the government is indicated by 'external factors'. The effects of government policy on student success occur indirectly *via* student and course factors. Courses and higher education institutes are denoted by 'course and institute factors', and students are indicated by 'intake factors, economic factors, social and psychological factors. Course factors have both direct and indirect (*via* the student factors) effect on student success and student factors also have a direct and indirect (*via* economic factors, social and psychological factors) effect (Van Den Berg and Hofman, 2005).

This study follows a similar process in terms of surveying the literature and identifying three sets of variables attached to the general characteristics of students (the student level), Academic and non-academic staff members (course/institute level), and the institution (the government level as UKZN is a public university) are hypothesized to influence student performance. However, this study uses a different methodology for its analysis. Each of the three characteristics is discussed in more detail below.

2.3.1. VARIABLES ATTACHED TO THE GENERAL CHARACTERISTICS OF STUDENTS

Horn *et al.* (2011) and others identified the characteristics of students that affect their performance (McGuckin *et al*., 1979; Chizmar *et al.,* 1983; Beron, 1990; Park and Kerr, 1990; Romer, 1993; Anderson *et al.*, 1994; Tay, 1994; Bailey and Rask, 1996; Koh and Koh, 1999; Belfield, 2000; Edward, 2001and 1999; Krieg and Uyar, 2001; Gracia and Jenkins, 2003 and 2002; Borg and Stranahan, 2002; Schuetze and Slowey, 2002; Dolton *et al*., 2003 and 2001; Gammie *et al*., 2003; Duff, 2004; Van Den Berg and Hofman, 2005; Johnson and Kuennen, 2006; Millar, 2006; Parker, 2006; Pseiridis *et al*., 2006; Tewari *et al.,* 2008; Guney, 2009; Leibowitz *et al*., 2009; Cappellari *et al*., 2010; Ganpath, 2010; and Lubben *et al.*, 2010). A list of these variables (non-exhaustive and not in any particular order) is presented in Table 2-2.

In the US and European countries, Van Den Berg and Hofman (2005) suggested that approximately 95 percent of total variance in student performance is ascribed to student-related factors. Furthermore, they found that the first- and second-year at a university are significantly more challenging for a student than the following years, and in general first- and second-year students have different study success, lifestyles, and study and work behaviour than third-year and upwards. Wößmann (2000) estimated a micro-econometric student-level model based on data from 39 countries and found that international differences in educational institutions explain the large international differences in student success in cognitive achievement tests.

Table 2-2: Factors/Variables Attached to the General Characteristics of Students

Socioeconomic Background

- Socio economic status/ poverty/ family structure / minority /gender/race/ from own-race (racial match or mixed-race) (Ferber, 1995)
- Investment in children, children's age in student's household; student birth order, student's childhood, student's birth weight; parental contribution/involvement in education

School Endowment

- Higher/lower quality of School attended. DoE's quintile ranking of school attended
- Language proficiency (Medium of instruction)
- Twelfth grade of high school average score in courses or grades on specific subjects/ total grade (Matrics) or average achieved in one or more courses (Tewari *et al.*, 2008)
- Cumulative number of credits; proportion of passed exams to exams taken or number of passed exams, GPA (Yathavan, 2008; Walstad *et al*., 2001)
- Pass rate or failure rate in courses

Study Environment

- Worse home/ neighborhood (creates setbacks and is less conducive to high educational attainment)
- Interaction, identification, socialization with other or across students of different races and like
- Difficult courses offered, study period; conditions, satisfaction from studies' time table: evening classes, etc (Lubben *et al*., 2010; Cohen et al., 2009; Walstad *et al*., 2001; Rutter, 1979).

Personality

- Ability, age, ambition, attendance, attitude, goals, preparedness, envisioning skills (Marburger, 2001)
- Home language (Lubben *et al*., 2010)
- Systematic differences in self-control and motivation, peer group (Coleman *et al*., 1996)

Financial Incentives

- Bursaries, financial aid, subsidies, tuition, sponsorship, loans, working status, etc.
- Lost of parent

Others

- Trauma, ill-health, personal circumstances.

Source: Based on survey of literature of existing studies as reviewed in Section 2.3.1.

Pseiridis *et al.* (2006) used a comprehensive model to explain student performance in terms of the average of high school grades in mathematics and economics, weekly hours of lecture attendance, money spent per month, gender, etc. Romer (1993) found that class attendance is reflected significantly on the students' Grade Point Average (GPA). Anderson *et al.* (1994) found that the most important factors that affect

student performance in university introductory economics course were the overall achievement level and taking a course in calculus. With regard to gender, they found that male students outperform their female counterparts. Kennedy and Tay (1994) concluded in their survey article that research on the factors affecting student performance in economics points to students' aptitude as the most important determinant of university success. However, study effort and the age of the student have also positive effect on student performance.

Studies in the US and Europe have also found other sundry characteristics attached to student performance. These include: memory and note-taking affecting learning in the introductory courses in economics (Cohn *et al*., 1995), previous GPA, class attendance, motivation and financial status (students who support themselves financially) affecting positively the current student performance (Devados and Foltz, 1996). Statistics anxiety and attitude, and computer experience are linked to student performance in statistics courses (Zimmer and Fuller, 1996). On the one hand, the likelihood of a student making a grade of A or B in principles of economics significantly decreases as the number of absences increases, when the student is a member of fraternity or sorority, and as the number of credit hours carried by the student during the semester increases. On the other hand, the chance of a student making an A or B in the course significantly increases with having taken a calculus course, a higher GPA, and higher SAT (Matric) scores (Ellis *et al.*, 1998). Age and students' attitude toward accounting have a significant effect on student performance on an introductory undergraduate financial accounting course (Lane and Porch, 2002). The chilly classroom climate for women and minority students and differences by gender in mathematics ability or preparedness are a possible cause of low pass rates for these groups (Ferber, 1995).

In the United Arab Emirates University, Asia, the most important factors with a positive effect on student performance are a student's competence in English, having positive attitudes towards the university, and class participation (non-national students outperform national students and female students outperform male students). On the other hand, the most important factors that have a negative effect on student performance are missing too many classes, credit hours achieved (progression of the students in his/her study plan), and the student's economic background captured by the crowding variable of the number of people who live in the student's household divided by number of rooms in the house (Harb and El-Shaarawi, 2006).

In South Africa, success of students in an introductory accounting course at the University of South Africa (UNISA) is attributed primarily to proficiency in English language and prior experience in accounting and mathematics (Du Plessis *et al.*, 2005). With regard to background variables, high school performance and

school achievement have positive effects on student performance, while there was no statistical evidence of significant association between family income level and students' academic performance (Karemera, 2003). Millar (2006) who tracked the progress of two cohorts of students (the cohort of 1999-2003 students and the cohort of 2000-2004) in one of the constituents of UKZN, the former UN, found that at the undergraduate first- and second-year modules in BCom (Accounting) there were positive relationships between students' final examination marks and both the total matric points (or APS) and matric Maths results. At third- and fourth-year of university studies, matric Maths became a better predictor of student success than the overall total matric points. Success of first-year economics students at South African universities is attributed to lecture and tutorial attendance, age, gender, and matric scores (Horn *et al.*, 2011).

2.3.2. VARIABLES ATTACHED TO THE GENERAL CHARACTERISTICS OF ACADEMIC AND NON-ACADEMIC STAFF

Guney (2009) and others provide academic/non-academic staff members' characteristics that can affect the academic performance of students at various stages of schooling (Kennedy and Tay, 1994; Jacobs, 1995; Solnick, 1995; Lopus and Maxwell, 1995; Dynan and Rouse, 1997; Bauer and Zimmermann, 1998; Neumark and Gardecki, 1998; Turner and Bowen, 1999; Turner *et al*., 1999; Rask and Bailey, 2002; Gammie *et al*., 2003; Tinto, 2003, 1999, an 1975; De Paola, 2009). A list of these variables (non-exhaustive and not in any particular order) is presented in Table 2-3.

De Paola (2009) suggested that lecturer's quality has significant effects on students' grade but less clear effects when relating lecturer's quality to student involvement with a subject. Kennedy and Tay (1994) suggest that a good match between a student's learning style and an instructor's teaching style has a positive effect on student success. Rask and Bailey (2002) confirmed that faculty role models can affect the choice of majors on the part of students and hence their performance. Ferber (1995) points out differences in mathematics preparedness, courses bias, or examination methods bias as a possible cause of low pass rates. Guney (2009) maintains that a heavy workload, bad teaching and improper evaluation procedures discourage students from having positive learning approaches, encouraging surface learning; whereas, effective and quality teaching, genuine commitment by lecturers to subjects and a good attitude towards students encourages students to adopt a deep learning approach. Bauer and Zimmermann (1998) noted that re-organisation of lectures and the courses has positive effects on students' performance. Gelisli (2009) notes that a student-centred tutoring approach encourages deep learning and improves students' self-esteem

which is more effective as students gain an in-depth understanding of the material and take control of their own learning process.

Table 2-3: Factors/Variables attached to the General Characteristics of Academic/Non-academic (support and admistrators) Staff Members

Socioeconomic Background

- Socio economic status/ poverty/ family structure / minority / gender/race/from own-race (racial match/ mixed-race) /own-gender
- Minority or disadvantaged population groups, race role-model effects

School Endowment

- School attended, hours in school during education and completed education (level of education)
- Language proficiency, foreign teaching staff (Borjas, 2000; Norris, 1991).
- Individual's perceived comparative aptitude for the field or field of study (Lopus and Maxwell, 1995)

Work Environment

- Conditions of service, employment benefits, unions and negotiations/consultations with employers, worker solidarity, nice/worse home/residence or neighbourhood: residing in rural, urban, inner city, suburban, larger metropolitan areas, technology in education (De Lange and Maharaj, 2010)

Personality

- Personality type/genetic make-up
- Perceptions of ability and/or expectations toward students; interaction, consultation with students and parental contribution/involvement/lecturer's quality (De Paola, 2009; Kennedy and Tay, 1994)
- Teacher quality in the determination of students' results (Coleman *et al*., 1996).

Financial Incentives

- Tenure: year of related experience, education, merit pay status or wage
- Labour supply-curve/ alternative labour market opportunities
- Non-wage job characteristics: safety, length of the academic year

Others

- Assessment methods or results; pass or failure rate in courses; work load (Guney, 2009)

Source: Based on a survey of literature as reviewed in Section 2.3.2.

2.3.3. VARIABLES ATTACHED TO THE GENERAL CHARACTERISTICS OF EDUCATIONAL INSTITUTIONS

De Lange and Maharaj (2010) and others (Willms, 1992; McPherson, 1993; Luyten, 1994; Sammons, Thomas and Mortimore, 1996; Kennedy and Siegfried, 1997; Becker and Powers, 2001; Worthington, 2001; Xin, 2001; Abbot and Doucouliagos, 2003; Casu and Thanassoulis, 2003; Flegg *et al*., 2004; Roland, 2004; Taylor and Harris, 2004; Fandel, 2005; Johnes, 2005; Joumady and Ris, 2005; Hanushek and Rivkin, 2010; Makgoba and Mubangizi, 2010; Teddlie and Sammons, 2010) attempted to develop meaningful indicators of performance to assess the efficiency of educational institutions, including how universities, faculties, departments, and schools can impact on students' academic performance. A list of these institutional broad variables (non-exhaustive and not in any particular order) is presented in Table 2-4.

To hold educational institutions accountable, several governments now calculate and publicize value-added measures of educational institutions effectiveness (McPherson, 1993; Ladd and Wash, 2002; Hanushek and Rivkin, 2010; Teddlie and Sammons, 2010). Studies agree that educational institutions provide some "added-value" to the academic achievement of students (Willms, 1992; Hanushek and Rivkin, 2010). Sammons *et al.* (1996) report that appropriate and valid ways of reporting educational institutions' performance is of vital importance because up to 25-30 percent of the variation in student success is explained by the impact of individual educational institutions on student success. Karemera (2003) found that student performance is significantly correlated with satisfaction with the academic environment and the service received. The study also found that the existence of professional development programmes and internship opportunities are associated with better academic performance.

Wößmann (2000)'s findings revealed that international differences in educational institutions explain the large international differences in students' performance in cognitive achievement tests. The study suggested that positive effects on students' performance stemmed from centralized examinations and control mechanisms, school autonomy in personnel and process decisions, competition from private educational institutions, parent involvement, and scrutiny of achievement. De Lange and Maharaj (2010) argued that significant investment in state-of-the-art technology as a learning tool at university will not lead to increased absenteeism. When students have the capability and willingness to use the technology to enhance their learning, it will not cause them miss classes.

Table 2-4: Factors/Variables attached to the General Characteristics of the Educational Institution/University

Comparability across institutions

- Intake/throughput/graduation/ progression/ completion rate, ranking of the institution
- Academics' education (if they have PhD., Masters, or Honours)
- Academic qualifications completed and supervisions (degrees, diplomas, or certificates) (Taylor and harris, 2004)
- Research output (books and Chapter in books, DoE journal articles, creative contribution, patents, licences, research income and productivity pay-out, conference proceedings, NRF rating)

Approved curricula/courses/programmes

- Demand for the institution services, racial/gender composition, equity, affirmative action, minority, non-traditional, discrimination, examination and control mechanisms (Wößmann, 2000)

Types of Institutions

- Private/public institution; higher/lower standard or quality of the institution

Learning and Resource Environment

- Internet hook-up or computers available
- Country's policy for the distribution of funds: bursaries, financial aid, subsidies, tuitions
- Average class size, other infrastructure (Coleman *et al*., 1996)

Service Environment

- Interaction/interface students-institution, standard of the assessment
- Campus security, measurement of a students' environment, academic support (Karemera, 2003)

Financial Incentives

- Free lunch, public policy: cost and technical efficiency; parental contribution/involvement (Coleman *et al*., 1966; Jencks *et al*., 1972)

Others

- Ethical standards of management, neighbourhood characteristics (Coleman *et al*., 1966; Jencks *et al*., 1972)
- Value-added measures of effectiveness (McPherson, 1993)

Source: Based on a survey of Literature as reviewed in Section 2.3.3.

Educational institutions receive variable intakes of students and students' outcomes are not totally determined by their intakes (Sammons, Thomas and Mortimore, 1997). Xin (2001) noted that (1) students were differentially successful in different subject areas, (2) Educational institutions were differentially effective in different subject areas and (3) the differential success was more obvious among students than among educational institutions calling for a new type of programmes that aim to ensure that students progress equally in different subject areas and for stronger institutional policies that systematically coordinate teaching or institutional practices. Family and neighbourhood characteristics have a greater impact on student performance than individual educational institution's characteristics (Jencks *et al*., 1972; Rutter *et al*., 1979; Mortimore *et al*., 1988; Goldstein *et al*., 1993). HEIs with high proportions of medicine, science, or engineering students will have higher costs per student since these degrees take longer to complete and are more expensive to offer than other (Taylor and Harris, 2004). Institutional climate refers to spheres of university life that include *inter alia* norms, goals, values, safety, interpersonal relationships, teaching and learning practices, organizational structures, the environment; as well as to larger organizational patterns that include inter alia from fragmented to cohesive or shared vision, healthy or unhealthy, conscious or unrecognized based on more than patterns of stakeholders' experiences of university life (Cohen et al., 2009).

2.4. SUMMARY

This literature review began with a brief reference to the economics of education. It can be inferred from the studies surveyed that there is substantial growth in research into the economics of education. Data on educational activities have also grown in volume and have become more accessible to economists, typically cross-sectional, longitudinal and sample surveys. These resulted in substantial changes in the focus of education research and public debate on themes such as the endowment and resourcing of educational institutions, their external and internal accountability, high dropout and failure rates, funding and subsidies, graduation rates, organizational performance, structures and operations of educational institutions, participation rates, pass rates, progression rates, resource allocation in educational organizations, retention rates, throughput rates, universities' accountability and effectiveness, and universities' value-added amongst others.

The literature review proceeded to discuss South Africa's education policies. University education has multiplier effects that ripple across the full breadth of the South African economy. A review of South Africa's education policies reveals that the higher education sector is an underachiever. Student attrition,

poor graduation rates, and low throughput rates at South African universities are pricking the conscience of government and various education stakeholders. There is mounting pressure on them to do address these issues.

Key policies, documents, initiatives in education, and state subsidies were approved to restructure and strengthen the higher education system. These have played a key role in addressing and redressing the injustices and challenges inherited from apartheid that included *inter alia* issues of governance and financing, inclusive education and equity, ways of delivering education and curricula, education legislation, learning materials and assessment, early childhood education, adult and basic education and training; vocational education and human resource development; educators and teaching, and higher education (OECD, 2008).

The DoHET acknowledged that it still needs to promote a rethink, and tangible and visible activities and programmes (DoHET, 2010). Three sets of ideas in higher education reform emerged as a landmark for a transformed higher education system in South Africa: (1) increased participation by stimulating enrolments, (2) greater responsiveness to South Africa's needs and interests, and (3) increased co-operation and partnership in governance structures between the state, HEIs, and various stakeholders. Ways are being sought to enhance human capital generation, improvement of throughput rates, and enhance the effectiveness and quality of teaching, learning and research (CHE, 2010). Mechanisms are needed to select and admit candidates to HEIs, curriculum design and development, and admissions decision-making and placement of students into appropriate curricula and programmes routes in HEIs.

Finally, this chapter surveyed studies on the determinants of student academic performance in Africa, America, Asia, and Europe which together form the crux of the theoretical and conceptual models used in the empirical analysis in this thesis. These studies were either qualitative or quantitative. Some studies were characterized by a variety of methodological deficiencies (Edwards, 2000). The empirical analyses which appear in some of these studies were sometimes limited in terms of statistical requirements or simply did not use rigorous quantitative techniques. Many simply relied on various methods of determining the correlation between predictions (or post predictions) and actual student performance (Edwards, 2000); as a result, their findings are sometimes contradictory or derived from specific contexts in such a way that they cannot be generalized to South African HEIs, including UKZN.

As it can be seen from the literature surveyed, there are contextual and cultural differences between western societies, Middle Eastern societies and traditional African societies. South African society also has differing contexts, cultures, languages, and socio-economic backgrounds and such differences may play a role in shaping the factors that are determinants of student performance. Premised upon this contention, the findings and indicators in existing studies have to be used with circumspection and only as ballpark figures because they are context specific (Steyn and Villiers, 2005). As each context is unique, important factors that are relevant to South African society at large and in particular to the South African university student population have to be critically examined; this study contributes towards the debate and analysis of the determinants of student performance. The methodology used is discussed in the following Chapter 3.

CHAPTER 3

THEORETICAL FRAMEWORK, METHODOLOGY, AND DATA

This chapter discusses the theoretical framework, methodology, and data. The discussion is organized under four sections. Section 1 discusses the theoretical framework. Section 2 discusses the methodology. This is followed by the discussion of data in Section 3. Section 4 provides a summary.

3.1. THEORETICAL FRAMEWORK

Although acknowledging the existence of several schools of thought advocating different qualitative and quantitative methodologies, Gujarati (1995: 3) maintains that the traditional or classical quantitative methodology still dominates empirical research in economics. Kent (93: 373) points out that any specific education challenge or research issue such as the determinants of students' academic performance in the FMS, can be examined in three major phases: (1) the description phase –- saying what is so; (2) the explanation phase– saying why it is so; and (3) the remedies phase – saying what might be done about it.

The empirical research in this thesis is done along six lines that include *inter alia*: (1) statement of theory or hypothesis; (2) specification of the mathematical model of the theory; (3) specification of the econometric model of the theory; (4) obtaining the data; (5) estimation of the parameters of the econometric model; and (6) hypothesis testing. Since the statement of the problem is provided in the introductory Chapter 1, this Chapter 3, Section 1 begins with the modelling consideration. It is worth acknowledging that this study is at the same time cautious that its modelling considerations do not overwhelm what is feasible and relevant in terms of education research.

3.1.1. MODELLING CONSIDERATION

An attempt is made in this thesis to test various characteristics or factors most associated with university student success, placing special focus on the relationship between student achievement at the high school leaving level – as measured by their total matric points and matric subject scores – and their performance in modules at university –- as measured by the their final examination marks in the students' records data.

First, this study examines the FMS, CLMS at UKZN as an educational enterprise that uses educational inputs (funding, policy, resources, and technologies, etc.) to educate students to achieve educational outputs (educational outcomes such as mitigating the attrition of students, improvement of the retention, achievement or attainment of students, graduation and throughput rates, etc.) analogously to how firms produce outputs.

Second, for the functional form, this study uses linear and logistic educational production function approaches and embeds a number of determinants (independent variables or educational inputs) that are likely to determine student performance (dependent variable or educational output or outcome) within the FMS. Economic methods and principles sourced from existing economics of education studies are then applied to assess the efficiency of these embedded educational inputs to enhance the effects of educational outcomes or outputs (Horn *et al*., 2011; Tewari *et al.*, 2008; Park, 2006; Berg and Hofman, 2005; Dolton *et al*., 2001, 2003; Edward, 1999, 2001; Belfield, 2000; Edwards, 2000; Hanushek, 1995; Chizmar *et al*., 1983; McGuckin *et al*., 1979).

Third, variables that are used to define or signify students' academic performance in existing studies are varied and controversial. The most commonly used variables are (Kontolaimou *et al*., 2006): the grade achieved in one or more taught courses (Borg and Stranahan, 2002); the total or average grade in courses taken within a year of study (Gammie *et al.*, 2003; Gracia and Jenkins, 2002; Koh and Koh, 1999); and the cumulative number of credits in a number of years (Hakkinen, 2004). Some studies consider other measures such as the proportion of passed exams to exams taken in a year; or progression rates calculated for a group or for individuals (Baxter and Hutt, 2000; Cantwell *et al*., 2001).

Existing studies stress the relevance of the need for early intervention and enhancement of first-year student success because of the overwhelming influence of schooling and the challenges that the transition from school to university presents (Leibowitz *et al*., 2009; Tinto, 2003 and 1999; Yorke and Thomas, 2003). In addition, HEIs internationally are presently focusing on the intricacies of coping with the first-year experience at university (Yathavan, 2008). The student's final examination mark earned at the end of the first-year of university is the single best predictor of student persistence after controlling for students' entering characteristics (Pascarella and Terenzine, 2005). Borg and Stranahan (2002) suggest that a student's course grade is usually the student's first (and perhaps only) indicator of how successful the student is in a subject, and that the grade received usually determines whether the student chooses to continue in the study of the subject.

As the final examination marks have been extensively used as dependent variable for student success in various existing studies that applied the educational production function approach (Horn *et al.*, 2011; Cappellari *et al*., 2010; Tewari *et al*., 2008; Yathavan, 2008; Millar, 2006; Parker, 2006; Johnson and Kuennen, 2006; Krieg and Uyar, 2001; Edwards, 2000; Park and Kerr, 1990), this thesis follows a similar process and proceeds to use the students' final examination marks achieved in first-year undergraduate accounting and economics modules in the FMS, as dependant variables.

Fourth, the grade or mark used is also measured on various scales, e.g. percentage grades (Woodfield *et al*., 2005); the ABCDF scale (Borg and Stranahan, 2002); the degree classification scale (first class, upper second class, lower second class, etc (Gammie *et al*., 2003); the GPA scale, which is a 7-point scale (Cantwell *et al*., 2001, Kahn *et al*., 2002), or the probability of getting a pass or fail grade (Park and Kerr, 1990).

The percentage scores of the students' final examination marks on modules are available in this thesis' data-bases. The grading scale at UKZN is from 0 to 100, with 50 and above considered a pass. If a student fails an examination in any course or module with a score between 40 and 49, UKZN grants him/her a supplementary examination. For progression purposes, UKZN overwrites the first-sitting marks with the one from the second sitting if the latter is higher than the former. Pass marks determine whether students will progress and major in these courses or modules in the second- or third-year of the university programme. Final examination marks at UKZN is, therefore, a continuous variable – in the range, say, 0 to 100 and it can take any value depending on the precision of measurement (the actual final examination marks achieved by a student). However, Park and Kerr (1990: 102) argue that final examination marks or course grades when used as the dependent variable have to be treated as a discrete variable (also referred to as categorical variable). This has implications for this thesis. The percentage final examination marks are used as the dependent variable in some models when they are continuous (ratio data) and take on any value in some interval of percentage value. In other models, final examination marks are converted into the probability of getting a pass (a final mark of at least 50) or a fail (a final mark of 49 and below) i.e. are converted to discrete variables (dichotomous or rank order) and take on only a finite number of values or countably infinite. Consolidating both continuous and discrete measurements is valuable for a holistic examination of student performance and for comparison purpose as is explained later in the regression analysis in Sub-section 3.1.5.

3.1.2. CONCEPTUAL MATHEMATICAL MODEL

This sub-section explains the conceptual mathematical model of determinants of student performance. To achieve this end, this thesis relies heavily on economics of education research issues, economic principles and methods used in the surveyed higher education studies discussed earlier. More specifically, this thesis builds on efficiency studies that have examined an educational production function using theories of a firm model.

Following Tewari *et al.* (2008) and Van Den Berg and Hofman (2005), students' academic performance is determined by sets of determinants that are classified into three major categories: (1) characteristics of academic/non-academic (administrators/support) staff members; (2) characteristics of HEIs; and (3) characteristics of students. The functional form of the educational production function is the following:

$$P_{ij} = f(S_{ij}, A_{ij}, I_{ij}, U_{ij}) \qquad (3\text{-}1)$$

where,

P_{ij} is the final marks of i^{th} student at the end of the academic year, obtained in j^{th} course;

S_{ij} is (are) the i^{th} student characteristics that can explain his/her academic performance in j^{th} course;

A_{ij} is (are) the characteristics of academic/non-academics (administrators/support) staff members that impact the academic performance of the i^{th} student in j^{th} course; and

I_{ij} is (are) the HEIs/institutional/UKZN characteristics that can explain the performance of the i^{th} student in j^{th} course.

U_{ij} denotes the stochastic error term.

The inclusion of the stochastic error term in the model is important otherwise the Equation (3-1) would have assumed that there is an exact or deterministic relationship between student performance (educational output) and sets of educational inputs embedded in the educational production function. But relationships between economic variables are generally inexact making the educational production function not to be deterministic. This error term is contributing to the acknowledgment that any social and personal

phenomena including teaching and learning processes have many possible determinants that cannot easily be counted, mapped, measured, or modelled in an educational production function.

The equation (3-1) states that, *ceteris paribus*, students' academic performance is related to conjointly the HEI's/institutional/UKZN's characteristics, characteristics of academics/non-academics (administrators/support) staff members, and characteristics of students. However, appropriate specifications of educational production functions are varied and controversial. Although existing studies postulate a relationship between student performance (as an educational outcome/output) as dependent variable and sets of educational inputs as explanatory variables, they did not concur on the precise form of the functional relationship between them (Horn *et al*., 2011; Cappellari *et al*., 2010, 2008; Guney, 2009; Tewari *et al.,* 2008; Johnson and Kuennen, 2006; Millar, 2006; Parker, 2006; Dolton *et al*., 2003 and 2001; Edward, 1999, 2001; Krieg and Uyar, 2001; Belfield, 2000; Park and Kerr, 1990; Hanushek, 1986; Chizmar *et al*., 1983; McGuckin *et al*., 1979). An attempt is made below to specify an econometric model of the relationship between student performance (which is an educational output) and miscellaneous educational input variables that will be transformed in the educational production function in the FMS, to educational outcome/output.

3.1.3. SPECIFICATION OF THE ECONOMETRIC MODEL

To allow for the inexact/unspecified functional relationships in the educational production function reflected in equation (3-1) above, this thesis modifies it and suggests a linear functional form as follows:

$$P_{ij} = \theta + \sum_{k-1}^{n} \partial kSij + \sum_{k-1}^{n} \lambda kAij + \sum_{k-1}^{n} \beta kIij + U_{ij} \quad (3\text{-}2)$$

where,

P_{ij} denotes the academic performance (e.g. final examination marks) of i^{th} student at the end of the academic year, obtained in j^{th} course;

S_{ij} denotes the i^{th} student characteristics that can explain his/her academic performance in j^{th} course;

A_{ij} denotes the characteristics of academic/non-academic (administrators and support) staff members that impact on the academic performance of the i^{th} student in j^{th} course;

I_{ij} denotes the HEIs/institutional/UKZN characteristics that can explain the performance of the i^{th} student in j^{th} course; and

U_{ij} denotes the stochastic error term.

θ denotes the constant

∂, λ and β denote the unknown parameters of the model to be estimated.

Equation (3-2) is an example of an **econometric single linear regression model**. This equation hypothesizes that, *ceteris paribus*, student performance is linearly related to conjointly the HEI's/institutional/UKZN's characteristics, the characteristics of academic/non-academic (administrators and support) staff members, and the characteristics of students. *Ceteris paribus*, if these three categories of determinants are dysfunctional in a single HEI, they yield poor student success. Indirectly, poor student success in the process raises the incidence of slow progression and lower retention, high dropout rates and student attrition, poor graduation rates, and low throughput rates in that typical HEI.

Theoretically speaking, determinants of students' academic performances across the HEIs in South Africa can be econometrically examined by estimating this all-encompassing econometric model of educational production function reflected in Equation (3-2) using various estimation techniques. However, this thesis focuses, specifically, on examining the likely determinants of students' academic performance in the FMS, CLMS at UKZN. To achieve this end, the above suggested econometric model in equation (3-2) is then modified to be fit for estimation within an individual HEI – UKZN. This is discussed in more detail below.

3.1.4. SPECIFICATION OF THE ECONOMETRIC MODEL OF STUDENT PERFORMANCE AT UKZN

Following Van Den Berg and Hofman (2005)[9], who stressed the dominance of individual student factors in study success at university, in this thesis the HEI's/institutional/UKZN's characteristics (I_{ij}) and characteristics of academic/non-academic (administrators and support) staff members (A_{ij}) in Equation (3-2) are treated as constant. This assumption is also justified on the ground of two additional rationales. The

[9] Van Den Berg and Hofman (2005) suggest that 95 percent of the total variance in student success at university is ascribed to student-related factors, where the other 5 percent of the total variance is due to course factors.

first rationale recognizes that the characteristics of academic/non-academic (administrators and support) staff members and HEIs/institutional will vary significantly when compared across HEIs rather than within the same HEI. Also, no data are systematically collected by South African HEIs on the characteristics of academic/non-academic (administrators and support) staff members (or if collected, they are kept secret and not easily accessible). The second rationale is that within an individual HEI, the same lecturer teaches the same class, there are the same administrators and support staff members, and students' records data are only for a single year. So it is hence better to treat this information as constant.

From Equation (3-2), the student characteristic S_{ij} is now differentiated into three broad subcategories S_v, S_x, S_z representing respectively the personal, student demographics, socio-economic backgrounds, and others. *Ceteris paribus*, the following Equation (3-3) suggests the final revised econometric educational production function model, which contains the specification for predicting the performance of the i^{th} student in j^{th} course or module within a single HEI - the FMS, CLMS at UKZN in the case of this study.

$$P_{ij} = \theta + \sum_{k-1}^{n} \alpha k Svij + \sum_{k-1}^{n} \beta k Swij + \sum_{k-1}^{n} \partial k Sxij + U_{ij} \quad (3\text{-}3)$$

where,

P_{ij} denotes the final marks of i^{th} student at the end of the academic year, obtained in j^{th} course;

S_V denotes the matrix of different school-related characteristics. It measures the influence of school-related characteristics on academic performance;

S_w denotes the matrix of different non-school related characteristics such as ability, ambition, attitude and motivation and other intangible characteristics of students;

S_x denotes the matrix of different and controversial issue of socio-economic characteristics of a student such as age, race, gender, and income group;

θ denotes the constant;

α, β, and ∂ denote the unknown parameters to be estimated;

U_{ij} denotes a vector of stochastic error terms.

3.1.5. REGRESSION ANALYSIS

Theoretically, a regression analysis estimates or predicts the average value of the dependent variable defined and specified above on the basis of the fixed values of the explanatory, independent, or predictor variables. It should be cautioned that there is a fundamental difference between correlation and regression analysis. Although closely related, correlation analysis is conceptually different from regression analysis. Correlation analysis measures the strength or degree of linear association between two variables whereas regression analysis estimate or predicts the average value of the dependent variable on the basis of the fixed values of the explanatory variables.

For example, this study is interested in testing the contention that matric scores are good predictors of university success in the FMS. To this end, an attempt is made to ascertain the strength or degree of linear association between achievement on matric subject scores and final examination marks at university. More specifically, this study is interested in finding to what extent a matric Maths score or a matric English I or II[10] score is a good predictor of student performance in first-year accounting and economics modules in the FMS to test the hypothesis that a student with a high matric Maths score or English score is more likely to perform well in introductory accounting and economics modules.

To distinguish the two in the case of this study, regression analysis examines whether the average performance of a student in first-year accounting or economics modules can be predicted by knowing the student's score in matric Maths. Correlation analysis is not interested in such a measure; instead, it is interested in finding the pair-wise coefficient of correlation between that student's score in matric Maths and his/her final examination marks in first-year undergraduate accounting or economics modules to ascertain their degree of association. It is worth mentioning that existing studies assume randomness of variables in correlation analysis, whereas regression analysis is conditional upon the assumption that the dependent variable is random, statistical or stochastic (having a probability distribution) but the explanatory variables are fixed or nonstochastic.

[10] English First Language is referred to as English I, and English II denotes English Second Language.

For the selection of educational inputs to be included in the model, existing studies have suggested one or a combination of the following determinants that include *inter alia* students' knowledge gained during the high school years (matric subject scores or total matric scores), university endowments and performance combined with biographical details, student demographics, personal and socio-economic background and other non HEIs-related characteristics seen as giving a measure of students' aptitude to successfully pursue their university studies. Building from the above, a non-exhaustive tabulation of educational inputs is far more complex and might include *inter alia* teaching and learning practices, curriculum design and development, education technology, levels of fees, ways of engagement, supply or provision of education; legislative, state and institutional education policies, public funding, and research or financial inputs. However, due to empirical tractability, availability of data, and sundry constraints when developing the suitable specification of the chosen econometric model as discussed in the data section, many of these variable were omitted. Conditional to the availability of data, a list of empirically tractable variables selected from the three broad subcategories discussed earlier is given in the following Table 3-1.

Table 3-1: List of Empirically Tractable Variables for Predicting the General Academic Performances of Students in the FMS, CLMS.

School-related (S_v) Variables	**Non-school related (S_w) Variables**	**Socioeconomic (S_x) Variables**
• Total Matric Points • Matric Accounting score • Matric Business Economics score • Matric Economics score • Matric English I or II score • Matric Maths score • Accounting level 1 modules • Accounting level 2 modules • Accounting level 3 modules • Economics level 1 modules • Economics level 2 modules • Economics level 3 modules • Management level 1 modules • Information and System and Technology level 1 module • Maths level 1 module • Statistics level 1 module	• Admission Points Score (APS) • Total Matric Points equal or above 36 • Higher Grade in matric subjects • Standard Grade in matric subjects	• Age • Gender • Race • Home first language • Interaction effects of above variables. • Matric Maths scores

Source: Author's Own Selection

3.2. METHODOLOGY

Premised upon the above, predicting student performance is the sum of complex and multifaceted factors and not easily represented by student characteristics measures that can be discovered *via* student records alone, demanding that several other contextual factors might also substantively influence the variance in the relationship between the institution, lecturers, students, and student achievement. Therefore, both quantitative and qualitative research methodologies are used in this study to ensure consistency of

applications carried out in the literature surveyed. These are individually discussed in the following sub-sections.

3.2.1. QUANTITATIVE ANALYSIS: REGRESSION AND LOGISTIC MODELS

Determinants of students' academic performance in the FMS, CLMS are examined using inferential statistics, economics and higher education theories, and appropriate methods of mathematics. To achieve this end, this study entails conducting two enquiries, namely: (1) to compare through pair-wise correlations sweep the total matric points (APS systems used as gatekeeper in HEIs) or selected matric subject scores (designated matric subjects used in conjunction with APS systems to admit students) with the final examination marks of students in undergraduate accounting and economics modules; (2) to use the educational production function approach to model the relationship between educational inputs (explanatory, independent, or predictor variables) and the educational outcome or output, the students' final examination marks in the first-year accounting and economics modules. The specification of models used in this study has been alluded to in the theoretical framework detailed above. Treating each academic year as a separate statistical entity and making assumptions about the probability distribution of the disturbances, two sets of quantitative models are used: (1) continuous dependent variable continuous variables when P_{ij} can take on any number between 0 and 100 using the ordinary least squares (OLS) regression as econometric method and (2) discrete or dichotomous variable when P_{ij} can take either the coding 1 (to denote a pass or success) or a coding 0 (to denote a failure) using Logistic regression as econometric method. The independent or predictor variables are selected from hypothesized influencing factors or variables discussed earlier in the modeling consideration.

3.2.1.1. ORDINARY LEAST SQUARES REGRESSION METHOD

The OLS method allows one to predict the average value of the dependent variable on the basis of the fixed values of explanatory variables (Gujarati, 1995; Park and Kerr, 1990). As discussed above, if the students' final examination marks are treated as continuous variables that can take on any number between 0 and 100, then the OLS method can be applied. Therefore, in the educational production function reflected by the suggested equation (3-4) below, the "students' final examination marks" is the dependent variable and educational inputs variables selected amongst the three major categories of determinants discussed earlier are the explanatory variables that the FMS, CLMS transforms in the educational production function to educational output (student success). The suggested linear regression model has the following format:

$P_{ij} = \beta_0 + \beta_1$totalmatric-points $+ \beta_2$matric-accounting $+ \beta_3$matricbusiness-economics $+ \beta_4$matric-economics $+ \beta_5$matric-english $+ \beta_6$matric-math $+ \beta_7$management 1 $+ \beta_8$information-systems&technology 1 $+ \beta_9$quantitative-method 1 $+ \beta_{10}$totalmatricpoints-equal-above 36 $+ \beta_{11}$student-age $+ \beta_{12}$student-gender $+ \beta_{13}$student-race $+ \beta_{14}$homelanguage $+ \beta_{15}$interaction-variables $+ \varepsilon_i$ (3-4)

where,

P_{ij} denotes the percentage scores of the students' final examination marks (the dependent variable when it is continuous).

Stud-race denotes the race of the students. Lifeblood

Stud-age denotes the age of the student at the point of admission.

Stud-gend denotes the gender of the student.

Totalmatric-points denote the total matric points (or APS)**.**

Matric-accounting, matricbusiness-economics, matric-economics, matric-english, and matric-Maths denote respectively the selected matric subject scores.

Homelanguage denotes a student who declared English as their home first language and therefore has received instruction in his/her own home first language. In this study student home first language is a dichotomous variable, that is students recorded as having English as home first language were coded with the number equals 1, and number equals 0 otherwise (for students recorded as having non-English as home first language).

Interaction or dummy variables denote some of the interaction effects or non-readily quantifiable variables which influence the performance of students.

$\boldsymbol{\varepsilon_i}$ denotes a vector of stochastic error terms.

The parameter vectors β_1,..., β_z denote regression coefficients to be estimated to determine their weights – their estimates (i= 1.....z where z is the number of independent predictors variables) and β_0 denotes the constant.

In addition to the OLS regression method, this study also mines pair-wise correlation coefficients between, on the one hand, the total matric points or designated matric subject scores for students who matriculated pre-2008 and, on the other hand, their performance in undergraduate accounting or economics modules. The correlations sweep attempts to capture the student's proficiency (quantitative and verbal ability) in individual matric subjects during the high school years that includes: matric Maths scores (Mathscor), matric English scores (engscor), matric Economics scores (econscor), matric Accounting scores (acctscor), and matric Business Economics scores (becnscor). Under *ceteris paribus* condition, this study expects the individual matric subject scores to be positively related to students' academic performance in courses/modules for which they are designated or prerequisites. This is of interest as selected HEIs and programmes in South Africa require one or combinations of these designated matric subject scores as minimum entrance requirements, while others require these designated matric subjects as prerequisite to their undergraduate modules. This is examined in more detail in Chapter 4.

3.2.1.2. LOGISTIC REGRESSION METHOD

As hypothesized, here, the students' final examination marks are converted into the probability of getting a pass (a student's final examination mark of at least 50 = 1) or a fail (a student's final examination mark below 50 = 0) i.e. the observed students' final examination marks (as the dependent variable) discussed earlier are treated as discrete variable or dichotomous, taking either the coding 1 (to denote a pass or success) or a coding 0 (to denote a failure).

The contention is that the OLS regression method procedure to estimate the above parameters is not appropriate and cannot be used because basic assumptions of the OLS regression method will be violated. To circumvent the violation of these basic assumptions of OLS regression method there are three other approaches to estimating such a model: (1) the Linear Probability Model (LPM), (2) the Logit (Logistic) Model, and (3) the Probit Model. Of these three, the LPM is the least satisfactory as it violates some of the assumptions of the OLS although easy computationally. The Logit (Logistic) and the Probit, because of the reason discussed earlier, are the models most frequently used when the dependent variable happens to be discrete. Gujarati (1995: 497) explains that from a theoretical perspective, formulation of Logit (Logistic) and Probit approaches is comparable but their estimates of the parameters are not directly comparable as their variances have different values. The difference being that the Logit Curve (also referred to as the Logistic Curve) has slightly flatter tails, that is, the Probit Curve approaches the axes more quickly than the Logistic Curve. Therefore, the choice between the Logistic and Probit formulation is one of mathematical

convenience. On this score, the Logistic Model is generally used in preference to the Probit Model because of its relative computational ease.

As hypothesized in Park and Kerr (1990), this thesis uses the following Logistic regression model to predict the probability of university student success in the FMS. The following Equation (3-5) represents what is known as the **Cumulative (Logistic) Distribution Function (CDF)** as Student Performance$_{ij}$ or P_{ij} is nonlinearly related to the right hand side of the equation.

$$P_{ij} = \left(\frac{p}{q}\right) = P\left(\frac{event}{X_1,\ldots,X_z}\right) = \frac{\exp[\alpha_0 + \beta_1(X_1) + \ldots + \beta_z(X_z)]}{1 + \exp[\alpha_0 + \beta_1(X_1) + \ldots + \beta_z(X_z)]} \qquad (3\text{-}5)$$

The Equation 3-5 can be logarithm-transformed to convert the nonlinear relationship into linear one so that the framework of linear regression model can be applied. Therefore, taking the natural logarithm (log) of Equation 3-5 makes it in a linear form model in X_i and also in the parameters as presented in the following Equation 3-6.

$$\text{Logit}\ (P_{ij}) = \log\left(\frac{p}{q}\right) = \text{Log}\ P\left(\frac{event}{X1,\ldots,Xz}\right) = \text{Log}\ \frac{\exp[\alpha 0 + \beta 1(X1) + \ldots + \beta z(Xz)]}{1 + \exp[\alpha 0 + \beta 1(X1) + \ldots + \beta z(Xz)]} = x_i\ \beta + \varepsilon_i \qquad (3\text{-}6)$$

where,

p denotes the probability of observing a pass/success (the dichotomous or discrete dependent variable),

q (equals to 1-p) denotes the probability of observing a failure,

Event denotes a dichotomous variable coded 1 for pass/success and coded 0 for failure,

X_1, ..., X_z denote the independent predictors variables similar as in Equation 3-4 discussed earlier,

$\frac{p}{q}$ denotes the odds ratio of the probability of observing a pass or success divided by the probability of observing a failure i.e. the odds ratio in favour of passing the final examination in first-year accounting and economics modules to the probability that he/she will not pass the final examination.

Exp = e= 2.71828 denotes the base of the natural logarithm.

ε_i denotes the disturbances error having a logistic distribution with mean equals 0 and variance equals $\pi^2/3$.

The parameter vectors $\beta_1,...,\ \beta_z$ denote beta logistic regression coefficients and are the parameter vectors measuring the regression weights – the estimates (i = 1, ..., z is the number of independent variables).

Conventionally, each estimated coefficient is the expected change in the logarithm odds of students achieving the final examination marks for a unit increase in the corresponding predictor variable holding the other predictor variables constant at certain values. When exponentiated, each estimated coefficient become the ratio of two odds or the change in odds in the multiplicative scale for a unit increase in the corresponding predictor variable holding variables at certain values[11]. Roncek (1991) argue that interpreting logistic coefficients for dichotomous dependent variables remain a problem in sociological research because of lack of consistency as illustrated by the variation in the ways that logistic coefficients are used. The study's contention is that the logarithm of the odds ratio is not easily related to probabilities because the logarithm is a nonlinear function of the odds ratio, which itself is a nonlinear function of the probability of being in the category of interest.

In terms of interpretation in this study, estimated beta logistic regression coefficients (β_i), indicate by how much the natural logarithm of the predicted odds ratio, i.e. the log ($\frac{p}{q}$) = Logit (P_{ij}), changes as a result of a one unit change in a specific independent variable holding the other predictor variables constant at certain values (Roncek, 1991; Studenmun and Cassidy, 1987; Aldrich and Nelson, 1984). That is (β_i**)** tells how the logarithm of the predicted odds ratio in favour of a student passing the final examination changes as the corresponding independent variable changes by a one unit, holding the other predictor variables constant at certain values. Negative logistic coefficients give odds ratios less than unity, and positive ones give odds ratios more than unity. Odds larger than one show that it is more probable to observe a pass (a university student success), whereas coefficients 0 mean that the odds are the same between groups. Results of previous studies provide *a priori* expectations about the signs of the predicted coefficients of the independent variables.

[11] See explanation at http://www.ats.ucla.edu/stat/mult_pkg/faq/general/odds_ratio.htm

Hypotheses tested on each of the coefficient (β_i) of independent variables in both OLS and logistic regression methods are briefly discussed in the following sub-sections.

3.2.1.3. HYPOTHESES TESTED

(a) RACE OF THE STUDENT (β13)

Students at UKZN are generally classified according to four race groups: White (with coding of number 1), Coloured (with coding of number 2), Indian (with coding of number 3), and black African (with coding of number 4). Existing studies surveyed have been inconclusive concerning the effect of the race of the student on academic performance. A handful of studies surveyed found that in a multiracial HEI, non-whites students performed relatively poorly, which might be due to poor preparation, learning styles gained during the high school years (generally in poorly endowed high schools), and lack of academic role models (same race graduates) (Lopus and Maxwell, 1995; Watts and Bosshardt, 1991; Borg and Stranahan, 2002). However, other studies have found no significant effect of race on academic performance (Sosin and McConnell, 1979). South Africa has a history of apartheid which created racially based unequal expectations and individual subjectivities. Access to quality schools in the past political system erected institutional barriers to non-whites and undoubtedly affected their school education. Race is a factor in determining socio-economic background, family income, and quality of schooling in South Africa (Parker, 2006). The majority of students in South African universities are black Africans, followed by Indians. However, the majority of academic staff members in these universities are white. As there are few black academic staff members to serve as role models for black students, this study did not stick with the traditional four categories as per UKZN's student records but generated a dichotomous variable of the race of the student. In these data generated, white students are coded with the number equals 1, and number equals 0 otherwise (for non-white students: Blacks, Coloureds, and Indians). Because of the positive causal effect of own race (match between white students and educators of the same race), this study expects the coefficient of race of the students, β13, to have a positive relationship with the student performance

(b) AGE OF THE STUDENT (β11)

The age of the students at the time of university entrance is available in the data-bases. In some studies, students who were relatively older when admitted to university did not perform as well as younger students did (Van Den Berg and Hofman, 2005). In others, however, students of more than 25 years of age performed as well as or better than younger students (Siegfried and Fels, 1979; Attiyeh *et al*., 1971; Bonello *et al*., 1983). This study expects the coefficient of the student's age, β11, to be negatively related to the students' academic performance.

(c) GENDER OF THE STUDENT (β12)

The role of gender as one of the determinants of students' academic performance is a contentious issue (McNabb, 2002; Edwards, 2000; Lumsden and Scott, 1987; Siegfried, 1979). Many professions (for example: accountancy, economics, law) in South Africa are male-dominated. In addition, the stereotyped roles females have been assigned in different races and cultures of South Africa are perpetuating male dominance and women's under-representation in professions and in broader society. Several studies have reported that male students also outperform female students in economics and business courses (Dynan and Rouse, 1997; Anderson *et al*., 1994; Tay, 1994). Other studies found that although males outperformed females on both essay and multiple choice questions (MCQs) types of assessment, females did relatively better on just essays (Ferber *et al*., 1983; Lumsden and Scott, 1987; Harris and Kerby, 1997). These differences between the sexes and the definite gap that appears during the high school years continue to persist at university level (Siegfried and Fels, 1979). However, some studies found that student gender had no significant effect on academic performance (Borg and Shapiro, 1996). Gender wise, Williams *et al.* (1992) found no evidence to support the hypothesis that significant and consistent gender differences exist in student performance in economics exams. Although positive correlation coefficients between student performance at university and males students are generally found (Anderson *et al*., 1994), Edwards (2000) found no conclusive evidence that females are at a disadvantage in university performance (Siegfried and Fels, 1979). The gender of the students is available in the UKZN's student records from which this study generated a dichotomous gender of the student variable. That is male students are coded with the number equals 1, and number equals 0 otherwise (for female students). In these data generation, female students constitute the omitted category. This study expects the coefficient of gender of the students (β12), to have a positive relationship with the student performance.

(d) TOTAL MATRIC POINTS (β1)

Whether total matric points (or APS system) is a good predictor of student success at the intake level in South African universities is a controversial issue. A survey carried out at UKZN pointed out that total matric points (or APS) of at least 45 were a good predictor of student success but below 45 were not (HDC, 2006). Another study conducted at UKZN concurred that there has been a gradual deterioration in the value of matric scores so that a total matric points (or APS) of 35 several years ago (pre-2004) is not the same as a total matric points of 35 now (2004 onward). If the rate of depreciation was known, and UKZN compensated for it by raising the required total matric points entrance requirement (or APS system), then the quality of student would not have changed – although their matric scores would have (HDC, 2006). The students' matric scores are available in the UKZN's student records. Although many recent students after 2008 would come with a matric from the NSC, there are others who matriculated pre- 2008 or matriculated from other national assessment bodies such as the Independent Examination Board (IEB) or equivalent assessment bodies for international students. To generate the students' total matric points where applicable, the matric scores of students who matriculated pre- 2008 downloaded from the UKZN Data Management and Information (DMI) system were standardized to "Swedish" matric scores using a formula that gives appropriate weighting to matric score on high grade (HG) and to matric score on standard grade (SG) at the various students' matric pass grades or symbols. This standardation allows this thesis to examine, using regression and correlation analyses, the whole argument of whether total matric points is a good predictor of student success in the FMS. This study expects the coefficient of total matric points, β_1, to be positively related to student success.

(e) MATRIC SUBJECT SCORE (β_2, β_3, β_4, β_5, β_6)

The matric Maths score was found to be the most useful predictor of university student success, specifically for students who are majoring in the BCom (Accounting) and BCom (General) degree. Several South African studies have established robust and positive relationships between university student success in economics courses/modules and matric Maths scores (Mitchell *et al*., 1997). A satisfactory and well-rounded knowledge of Maths is considered a requirement for completion of many of the degree programmes and qualifications offered in the FMS (would-be students are required to achieve at least level 5 in their matric Maths scores). This is because accounting and economics modules are quantitative-based with a specific discourse. Students who have difficulties with Maths often have difficulties in grasping abstract concepts in accounting and economics modules. In addition to matric Maths score, matric English

score also was generally found to be a useful predictor of university student success. Debates at UKZN suggest that the overall total matric points need to be disaggregated in order to be a useful predictor of student success. In America and Europe, studies have found that having high Maths scores in the American College Test (ACT) or having taken Maths in high school, or mastery of very basic Maths concepts are positively and statistically significantly related to student success, and have a significant and beneficial effect on student grades in economics courses (Ballard and Johnson, 2004; Johnson and Kuennen, 2006). Maths requirements or recommendations for admission to universities have been increasing over the years (Becker, 1997). Increasing the Maths requirement in economics degrees produced a dramatic change in the mix of students taking courses and majoring in economics (Kasper *et al.*, 1991; Kasper, 1996). Some studies provide evidence that one cannot compensate for low matric Maths scores by remedial Maths at university (Tewari *et al*., 2008; Edwards, 2000). Neither university Maths courses nor the score on a Maths skills test had any significant benefit for achievement in economics at university level (Cohn *et al*., 1995). A few other studies confirm that prior exposure to and proficiency in a course before university improves performance in the course done at the university (Tewari *et al*., 2008; Attiyeh *et al*., 1971).

Since a satisfactory and well-rounded knowledge of Maths and proficiency in English that is used as medium of instruction are hypothesized to be predictors of student success and requirements for the completion of the BCom (Accounting) and BCom (General) degree, this study is interested particularly to test via correlations sweep if the matric Maths score and matric English score have a positive linear relationship with the student success in the FMS. Matric English and Maths scores are also included among the predictors to be tested in the regression analysis. Important potential non-random differences between students in terms of proficiency in the English language are the differences in English skills possessed by each of them. These differences include: students for whom English is their second language, students where English is not spoken at home, and students who attempted matric English I or II. This study is expecting the coefficients of selected matric subject scores (β_2, β_3, β_4), English (β_5) and Maths scores (β_6)) mainly, to have positive relationships with the students' final examination marks.

(f) HOME FIRST LANGUAGE (β_{14})

English is the medium of instruction for most of the HEIs in South Africa and university success is likely to be influenced by proficiency in English language. In South Africa, this is not an insignificant problem with 11 different official languages (more than any other country in the world). The medium of instruction is the second or third language of the majority of its students and of academic and non-academic

(administrators/support) staff members. In countries where the language of instruction and the students' home first language are the same, there is no need to expect students to demonstrate their proficiency in this language for education purposes. The language of management studies represents a discourse very different to that encountered by students in other mainstream disciplines. Second language students experience particular difficulty in developing the grasp of the vocabulary and discourse of courses (Lubben *et al.*, 2010). Language ability or proficiency in the language used as the medium of instruction improves students' academic performance (Mamogethi, 2009; Du Plessis *et al*., 2005). It is therefore reasonable to expect that students who enter the FMS have to demonstrate the requisite proficiency in the English language or have to acquire it to pursue any of the different degree programmes and qualifications offered. Mamogethi (2009) from a decade-long study of schools in three provinces of South Africa (Gauteng, Limpopo, and North West) suggests a perspective on multilingualism in Maths education. Not the development of a Maths register or terminology in South African languages but local languages used alongside English to develop learners' proficiency in Maths. This study expects the coefficient of the proficiency in English declared to be student's home first language and medium of education, β_{14}, to be positively related to the students' final examination marks.

(g) INTERACTION EFFECTS VARIABLES (β_{15})

In regression analysis, the dependent variable is frequently influenced not only by variables that can be readily quantified on some well-defined scale, but also by interaction variables that are essentially qualitative in nature (Gujarati, 1999: p.499). Since such interaction qualitative variables usually indicate the presence or absence of a "quality" or an attribute such as male or female, black or white, rich or poor, pass or fail, one method of "quantifying" such attributes is by constructing artificial, dichotomous, dummy, proxy, or surrogate variables that are coded on values of 1 or 0. Coding of 0 indicates the absence of an attribute and coding of 1 indicates the presence (or possession) of that attribute. These qualitative in nature interaction variables do enhance the scope of the regression model. Interaction variables can measure the student's effort e.g. in terms of hours spent studying and how to account for the likelihood that one student's hour will be more effective than another student's hour. Prior knowledge acquired either in private, public, or independent schools can give a proxy measure of the student's socio-economic background. Private schools are assumed to be expensive and generally, they accommodate only students from wealthier backgrounds.

For example, the FMS has an Education Unit (FMS-EU) to support teaching and learning, and administer fully-fledged student support programmes. There are two programmes: (1) the students' Academic Monitoring Programme to implement interventions for students and focus on student development, and (2) the Faculty Access Initiative known as the Management Studies Extended Curriculum programme (referred to as BCom4), and the Enriched Management Studies Programme (EMS). The BCom4 recruits students who exhibit a lower level of academic ability as measured by their performance in the matric examination and are from under-resourced schools (categorized in lower deciles by DoE classification). These students do not achieve the minimum entry requirement (or APS) for the mainstream degree programmes in the FMS. The FMS-EU provides BCom4 students with one extra year to complete the mainstream degree and additional academic support through extended modules and small-group tutorials.

Mainstream modules in the FMS, have certain built-in assumptions that expect students to have acquired prerequisite knowledge up to certain levels from high school. Due to poor primary and secondary schooling resulting in unpreparedness of matriculants for university studies, support and bridging programmes in the FMS-EU have foundational, augmented and mainstream modules contents that attempt to fill these gaps and help prepare these unprepared students from high schools for mainstream accountancy and economics disciplines.

The support system in the FMS-EU is set up to give admitted students access to succeed in a mainstream discipline in terms of developing students' academic literacy and Maths proficiency. Maths and/or statistics modules are also augmented for the BCom4 students to improve these students' preparedness in quantitative skills, which are hypothesized to be key determinant of success in management studies. One way in which self study is encouraged in the BCom4 programmes is through the weekly "mock tests", which requires students to remain up to date with their reading and lectures. The students are also given the opportunity to write a "mock exam" during which they write an unseen past paper under exam conditions and then discuss the solutions with tutors or moderators some days before their real exam. These mock assessments alert tutors or moderators (and indeed the students themselves) to any problems or gaps in the students' understanding of the mainstream disciplines materials.

FMS-EU provides also support to mainstream students who were admitted meeting the minimum entrance requirements and the EMS programme which screens, attracts, and recruits high-achievers in matric examinations amongst previously disadvantaged groups of population and links them up with various firms,

foundations, and civil society organizations (CSOs) or non-governmental organizations (NGOs) which provide financial sponsorship to allow them to complete a degree in the FMS. The large amount of material covered in mainstream disciplines necessitates tutorials and consultations with academic development officers (ADOs) commissioned by the FMS-EU, although the tutorials and student consultations are not designed to cover all the content delivered in the mainstream lectures. The key concepts from lectures are discussed, and appropriate study strategies and skills are developed to enable students to work through the remaining material efficiently. In addition to the tutorials and consultations with ADOs during the semester, the FMS-EU has set up a Writing Place, which helps students to apply their mind to essay writing, therefore preparing them to be research-informed and research-led graduates. These strategies allow students to familiarize themselves with the structure of the exam, practice their time management techniques (or realize their lack thereof) and to assess the progress of their learning process.

This requires that this study attempt to capture the interaction effects between some of the variables that the FMS-EU is transforming along with other educational inputs in the educational production function, to student achievements/outcomes/outputs. This study has generated dummy variables (also referred to as artificial, dichotomous, proxy, or surrogate variables) for selected non-quantifiable and qualitative in nature variables that include *inter alia* attitudinal, motivational, and psychological characteristics of students, and their socio-economic backgrounds perceived in focus group discussions as influencing student performance in the FMS. To this end, non-white students having English as first home language, students with English and matric Maths scores, students with economics and matric Maths scores, students with matric Accounting and matric Maths scores, a symbol D in matric Maths HG and the age of the student are tested. This study expects the coefficient of the interaction variable ($\beta 15$) to have a positive relationship with the students' academic performance.

In a nutshell, because of these assumptions and conditional to the availability of data, variables attached to the general characteristics of students reflected in regression models in equation (3-4) using OLS method and equation (3-6) using logistic method are the ones fitted in the econometric educational production function model and estimated within a single HEI – at UKZN. It is cautioned that the relationships reflected in these two equations are not exact; they are subject to individual variation i.e. student performance also depends on other factors apart from the ones incorporated in the econometric educational production function model. Considering the breakdown of variance in the students' final examination marks, the total variance is partitioned into the variance which can be explained by the independent variables in a specific equation – the model – and the variance which is not explained by the independent

variables but explained by the stochastic error terms – the residual. This is relevant in the South African context where many students claim that a certain proportion of their academic performance is determined by one or two predictor variables in this study's proposed model but the remainder of the factors is to be found in their belief systems. These belief systems or unknown causal factors either were not incorporated in the model, and thus not counted, such as some of the factors mentioned in the following section and in the findings of focus group discussions reported in Chapter 5, or even conceptualized in "non-conventional belief" such as the spirit of Ubuntu, cleansing, ancestors' prayers, divine and fasting prayers, superstition, guardian angels' wings, or lucky charms.

3.2.1.4. A SUMMARY OF ESTIMATION METHODS

In a nutshell, this study conducts the t-statistics tests of significance and their corresponding two-tailed p-values to test whether a given coefficient in the educational production function's regression equation is statistically significant and different from zero (0) using the conventional 0.05 alpha level that reflect 95 percent confidence interval. However the 0.01 and 0.10 alpha levels are also reported as statistically significant just extending the confidence interval to include 90 and 99 percent confidence intervals (confidence limit for lower bound and upper bound) for the coefficients. The confidence intervals selected in this study are related to the p-values such that the coefficient will not be statistically significant if the confidence interval includes zero (0). This allows putting the estimates from the coefficients in the regression equations into a broader perspective by inferring how much their values could vary. A two-tailed p-values test of significance suggests that the null hypothesis is stating for empirical purposes as one of no predicted relationship between the specified student success – the dependent variable and the corresponding independent or predictor variable, *ceteris paribus* and the alternative hypothesis is stating otherwise. Each regression equation will also present the R-Square (R^2) value (OLS regression) or Pseudo R-Square (pseudo-R^2) value (logistic regression), which is an indication of the 'goodness of fit' of the regression equation to the data. The usefulness of all these statistic tests will be discussed in more detail in Chapter 4.

3.2.2. QUALITATIVE ANALYSIS: FOCUS GROUPS

A qualitative educational analysis is also undertaken in this study, through focus group discussions with randomly selected education stakeholders to ascertain the perceived causes and reasons for poor student success, slow progression, student attrition, poor graduation rates, and low throughput rates in South African universities at large, and in the FMS, CLMS at UKZN in particular.

Poor student success, student attrition, poor graduation rates, or low throughput rates are long-term, complex, multi-dimensional and multi-faceted processes that are influenced by a wide variety of HEI and out-of-HEI experiences with broad social and cultural implications which can be captured only by using a qualitative research methodology. For example, the causal effect of some staff characteristics and student's personality, aptitude and attitude, study effort, time allocation and preference, time-use, and motivation on students' academic performance referred to in the literature are either qualitative or not to be found in UKZN's student records (Foster *et al*., 1993). This perspective suggests that there are more active and subjective forces at work in determining poor student success, student attrition, and poor graduation or low throughput rates that are not captured by a quantitative research methodology (Gracia and Jenkins, 2002).

Disciplines such as anthropology, education, philosophy, psychology and sociology amongst other have their own methodology for quantifying research into these factors, but these have to involve large tests or surveys which in many instances are beyond the scope of this thesis. As a methodology for collection of both individual and group level data, this study uses discussion sessions in focus groups with randomly selected faculty (academic and non-academic (administrators and support) staff members), students, and various education stakeholders to elicit their perceptions as well as sensible views on the reasons for poor student success, student attrition, and poor graduation or low throughput rates.

Focus group discussions were chosen as they have become an established and accepted part of the range of methodological tools available to social researchers. The focus group methodology is different from quantitative research methodology in its purposes, procedures, and results (Morgan, 1993; Krueger and Cassey, 2000).

The first step was to get authorization from the Executive Dean of Students for the purpose of conducting focus group discussions with students and faculty members within UKZN. As this entails the use of human subjects, the study had to comply with the requirements of the relevant Ethics Sub-committee taking cognizance of the relevant professional Code of Ethics. A second protocol was submitted to the Humanities and Social Sciences Ethics Committee. Relevant requirements have been fulfilled and the protocol has been given full approval as evidenced by the Ethical Clearance Letter appended in Appendix F, page 254.

A short list of questions concerning the determinants of students' acdemic performance (attrition, failure, retention, progression, and graduation or throughput rates) in South Africa at large and at UKZN in particular was prepared. However, participants were encouraged to raise anything they believed to be relevant. The randomly selected participants were carefully chosen and purposefully invited because it was

believed that their individual experiences at university as faculty members, students, or education stakeholders would allow them to provide information and perspectives helpful to aiding an understanding of the causes of high dropout and failure rates, or slow progression that are fueling the student attrition, and poor graduation or low throughput crises in South African universities and at UKZN in particular. Guided by the author's experiences and drawing parallels with education facts elsewhere in the world, participants were expected to reflect on and discuss their individual experiences and the experiences of others.

The specific questions this study addressed are:

- Why do students leave the HEIs before graduation?
- What are your perceptions of the characteristics that have a causal effect on students' performance (attrition, failure, pass, progression, retention, and graduation or throughput)?
- What are your perceptions of the reasons for high dropout and failure rates, and slow progression specifically that are fueling student attrition, and poor graduation or low throughput rates in South African universities in general and at UKZN in particular?
- Do you perceive that universities/UKZN and university personnel (faculty, administrators and support staff) understand their students' particular needs?
- What expectations of ways of addressing challenges in education do you have? And which entity should address: government, HEIs, faculty, administrators and support staff, students themselves, CSOs/NGOs or community members?
- What kinds of entitlement, difficulties, challenges, needs or rights on the part of education stakeholders have come to your attention?
- What are the international perceptions, best practices, success stories, in addressing similar education crisis?
- What are the tasks that government, CSOs/NGOs, or stakeholders must perform in their particular settings to best serve education in South Africa?

Many other sundry questions were asked to probe for more information, clarification, and to encourage interaction among the participants. Randomly selected participants had to be informed about the remit and scope of the overall research reported in this study, the kinds of issues it was interested in discussing, the processes of data transcription, analysis and dissemination which would ensue; and the confidentiality and anonymity promised to participants. Where a recording device was used, participants were asked to freely state their name (real or pseudonym) at the onset of each group discussion, so that during the transcription

process, the transcriber could attribute specific names to specific voices as an initial point of reference. However, as this was a group discussion, they were also informed that the study could not guarantee that other focus group members would retain confidentiality. The assessment of organizational performance and institutional environment within UKZN, drawing parallels with South African universities and others elsewhere in the world, has been also tabled.

A total number of 64 education stakeholders were selected randomly using the author's extensive social network, lectures sessions and student consultation times within UKZN. About 45.4 percent of participants in the focus groups were UKZN students; 14 percent of participants were academic staff members at UKZN; 14 percent of participants were administrators (eight from UKZN and one from the Cape Peninsula University of Technology (CPUT); 26.6 percent of participants were members of CSOs/NGOs and communities, including three students from the University of South Africa (Unisa), one from the University of the Witwatersrand in Johannesburg, and one from Durban University of Technology (DUT). They participated face-to-face in different focus group sessions.

At first glance, it seems quite simple to recruit participants, gather them in a setting and get the discussions rolling but focus groups produce high quality data only if they are employed for the right purposes, using the right procedures (Morgan, 1993). In order to provide comparisons between groups' perceptions for greater detail, information, insights, perspectives and themes, six rounds of focus group discussions of between nine and 12 participants and which lasted from 60 to 90 minutes were used to generate ideas in group brainstorming sessions. Three rounds took place at Westville campus, one at the Howard College campus and two rounds off university premises. To avoid a complex undertaking, the table presenting the salient characteristics of participants in the focus group discussions is not reported in this study but can be provided on request.

The focus group discussions were audiotaped and the author took detailed notes. After each focus group session, the author listened to the tapes and expanded on the notes. In doing so, this study followed the "note-expansion" approach in which "the transcriber (note taker) listens to the tape in order to clarify certain issues or to confirm that all the main points, perspectives or themes are included in the notes" (Bertrand, Brown and Ward, 1992, p. 202). The notes were then inductively examined for major points, perspectives or themes, and coded and categorized. After independently analyzing detailed notes of focus group discussions, this author compared notes with the themes or perspectives that emerged in existing literature, and settled on the major categories and similar results found in others existing studies.

Focus group discussions' data are analyzed by different methods that include thematic, discourse, and triangulation. Thematic analysis (also referred to as content analysis) examines ideas, meanings, phrases or words within a wide range of conversation or speeches. This approach examines the presence and frequency or repetition of certain words and phrases. Inferences can be made about the latent content, the underlying meanings, and the speaker. Discourse analysis structures the ways in which participants can think about the research question. This approach examines the language beyond the sentence by looking for language patterns or a family of terms which are related to a particular activity, theme, or topic. Discourse analysis develops chunks of ideas focusing on discourses and power relations, and views meaning as being culturally constructed but fixed in language through a system of signs specific to that language. Triangulation analysis uses mixed methodologies which engage in cross-data validity as well as calls for observation from different angles, conceptualizations, evaluations, perspectives, or viewpoints allowing for a more meaningful inquiry into the research questions. In this approach, inconsistency can be enlightening and can offer deeper insights into the relationship between the methods used and the phenomenon under study.

This study has chosen thematic analysis to capture the self-disclosed assessment, perceptions, and perspectives on the determinants of student performance and reasons for students' poor performance as well as the root reasons for the crisis of student attrition, and poor graduation or low throughput rates in South African universities at large and at UKZN in particular. The advantage of the thematic method is that it lends itself to greater reliability of focus group discussions as the researcher is able to revise the coding after repeated readings of transcripts as well as the potential for studying beliefs, attitudes, themes, perspectives and human relations. By listening to the content of discussions, contradictions, ironies, feelings, emotions, and tensions, the researcher learns or confirms not only the educational facts but also the meanings, information and insights behind these facts. In terms of methodological issues and the manner in which participants were approached for sampling, recruitment, organization, facilitation of focus group discussions and analysis of participants' standpoints, this study followed a similar process as in Parker and Tritter (2006) and Morgan (1993).

The need to understand the complexities and multi-faceted factors related to poor student success, student attrition, and poor graduation and low throughput rates, a literature survey was also conducted to uncover similar lived experiences in existing local and international studies. This enhanced the ability to analyze and interpret the findings of this study to provide practical and theoretical information, insights, perspectives, and themes which possess a sufficient degree of generality to other comparable context.

The study surveyed studies in the US and Europe. A brief survey of these studies is presented here and include studies on: a theoretical synthesis of recent research on dropouts from higher education (Tinto, 1975), the influence of past behaviour on the intention of students to withdraw from US colleges (Fishbein and Ajzen, 1975), locating the dropout crisis by locating which high schools produce the US's dropouts, where are they and who attends them (Balfanz and Legters, 2004), depicting the effects of institutional features of European education systems on educational outcomes in a simple model of educational production (Bishop and Wößmann, 2004), closing dropout factories by studying the graduation rate crisis and what can be done with it (Balfanz and Legters, 2006), identifying the dropout factories amongst high schools in the US (Zuckerbrod, 2007), the Italian experience of degree flexibility and university dropout (Di Pietro and Cutillo, 2008), determinants of grades in Maths for students in economics (Cappellari *et al*., 2010), and tackling early school leaving: a key contribution to the Europe 2020 Agenda (European Commission, 2011).

Despite the concern expressed by the DoHET about poor student success, student attrition, and poor graduation or low throughput rates in South African universities, few studies have been conducted on them. Studies have been conducted on: the University of KwaZulu-Natal audit of student failure (Africa, 2005), shock at South Africa's varsity dropout statistics (Macfarlane, 2006), and the threat of high university dropout rates to South Africa's future (Letseka and Maile, 2008).

What the existing studies reveal is that student attrition, poor graduation, and low throughput rates mean different things to different parties and vary according to the context within which they are being studied (Tinto, 1975). Although there is no universally accepted definition, in this study, the term "student attrition" encompasses all forms of leaving education and training before completion (also referred to as dropout, non-completion, early school leaving, stop-out or withdrawal). In the US, studies used high school enrollment data to compare the average cohort retention rates. If a cohort retention rate is on average over three years less than 60 percent, that high school is labeled a 'dropout factory'. These studies suggested that dropout factories are educational institutions that are mechanically organized to routinely and continuously mass produce dropouts, have high proportions of students from disadvantaged backgrounds or minorities, are located in large cities or high-poverty rural areas and have many vacancies (Bosman, 2007; Heintz, 2007; Zuckerbrod, 2007; Balfanz and Legters, 2004 and 2006; Breyfogle, 1998).

Cappellari *et al*. (2010) confirmed that student attrition in the Italian university system was the highest among the European countries with a 58 percent dropout, among which 20 percent were first-year students in degree courses. Strong disparities in rates of student attrition, and poor graduation or throughput rates

might indicate structural problems in certain geographical areas or educational tracks, demanding that policy design be based on precise information in order to improve targeted measures (European Commission, 2011).

Generally speaking, this study attributes student attrition to a number of possible determinants (variables) that are classified into the same three major influencing categories discussed earlier in the methodology. These incorporate: (1) characteristics of academic and non-academic (administrators and support) staff members; (2) characteristics of educational institutions; and (3) characteristics of students. As discussed earlier in the methodology section, if these three categories of determinants are dysfunctional they yield poor student success and in the process indirectly raise the incidence of student attrition and poor graduation or low throughput rates.

The focus group discussions transcriptions, literature review, and previous knowledge on the determinants of students' academic performance and the causes of student attrition were a useful part of the methodology used to obtain data relevant to answering the research questions discussed earlier in the introduction section. While there are many instances where focus groups as a methodology is helpful and recommended, there are equally as many instances where focus groups are not recommended. The pros and cons of using focus groups are discussed briefly in the following sub-sections.

3.2.2.1. ADVANTAGES AND STRENGTHS OF FOCUS GROUP DISCUSSIONS

Focus groups are the only recourse if information, perspectives or insights are needed rapidly and at little cost. In terms of the pertinence and usefulness of the data gathered, it is the dynamic aspects of interaction within the focus group which endow participants with the power to reflect on their own and on the experience of others and generate unexpected and unpredictable information and insights. As questions are asked in an interactive group setting where participants are free to talk with other group participants, data and insights that focus group discussions produce would be less accessible without interaction brainstormed in a group setting. Listening to others' verbalized experiences stimulates memories, ideas, and experiences in participants. Participants engage in chaining or cascading ideas that are linked to, or tumble out of, the topics and expressions preceding it (Lindlof and Taylor, 2002). Participants discover a common language to describe similar experiences, which enables the capturing of a form of discourse to understand the situation.

Focus groups elicit information and insights that paint a portrait of combined local perspectives and themes – this allows one to see how social and semi-public perspectives and themes fit together.

Focus group discussions have the advantage of generating both individual and group level data, being time and context specific, and are dependent on the characteristics of participants and the nature of the discussions. In this study for example, focus group participants agreed that attrition encompasses perspectives and themes on students who were excluded from HEIs on academic grounds, dropped out, or withdrew from HEIs for miscellaneous reasons.

Morgan (1993) recommends that good focus group discussions must ebb and flow by allowing participants to laugh, relax, open up and tell personal stories, think deeply, revisit an earlier question, disagree or contradict themselves, interrupt, consider alternatives, and for synergy to occur against the need to stay focused. Discussions in focus group sessions, therefore provides an opportunity for disclosure in a setting where participants are validated, not restricted and generally are allowed to say anything they would like. Students particularly, often find themselves in situations where they experience a lack of "voice" and feelings of isolation. Focus groups therefore serve as both an efficacious and ethical venue for collecting data on students' university experience (Tracy *et al*., 2006).

Some studies argued that focus groups should not be used as a ruler to provide precise measurements on which to base final decision-making since results are not statistically valid (Morgan, 1993). Rather focus groups should be used as a thermometer to test the temperature. Some criticisms of, and disadvantages and problems of focus groups are discussed in the following sub-section.

3.2.2.2. DISADVANTAGES AND WEAKNESSES OF FOCUS GROUP DISCUSSIONS

A few studies have argued that the focus group methodology is not a reliable technique. The issue of researcher dependency (the researcher is not a detached observer but is always one of the participants) raises questions of external validity as the data and results obtained are influenced by the researcher, exposed to his/her method of questioning, the design of the focus group that includes *inter alia* participant selection, the questions asked, how they are phrased, how they are posed, in what setting, by whom, and the group effect, which all affect the answers obtained from participants. While focus groups may be less costly, if the groups are not variable and discussions are not conducted correctly there may ultimately be

costs involved with incorrect interpretation of the perceptions, perspectives or themes. This is because the participants may either hold back on their perceptions and/or try to answer the researcher's questions with answers they feel that the researcher wants to hear. There is anecdotal evidence of focus groups rebelling or growing bored and impatient and perceptions can be completely flawed when this is not picked up by the researcher.

Another fundamental difficulty with focus groups is that the researcher has less control over participants and thus time can be lost on issues irrelevant to the research question. Participants' perceptions are tough to analyze because the talking is in reaction to the comments of other participants. The noisy environment of focus groups can allow for a group's overall reactions to be gauged, but makes it an inappropriate setting in which to assess an individual's knowledge of content (in providing his/her opinion, the individual might be just supportive and not honest). Social norms get in the way and it is difficult to determine an individual's authentic point of view (Morgan, 1993).

Another issue with the focus group setting is the lack of anonymity and the fact that there cannot be any guarantee of confidentiality. The number of participants in focus groups generally is not large enough (between 9 to 25) to be a representative sample of a population; thus, the information, insights, perceptions, perspectives, or themes obtained are not necessarily representative of the whole population. To get a cross section data of views from participants, it is necessary to conduct multiple sessions which will allow for an understanding of multiple perspectives of different groups of people. The researcher needs to be highly trained because if participants are variable and of different backgrounds, it can be tricky to get them together in a focus group (Krueger and Cassey, 2000).

This said, focus groups helped this study also produce highly useful information on reasons for high dropout and failure rates - student attrition, and poor graduation rates or low throughput rates that would have been missed by using only quantitative research methodology. Regardless of its methodological limitations, there is general agreement that imperfect information or the result of a very small sample of focus groups is better than no information at all. Chapter 5 discusses information gleaned from the focus group discussions. The findings of the focus group discussions supplement the empirical findings in various policy issues that are discussed in Chapter 6. Primary and secondary data collections for this study are discussed in the following sub-sections.

3.3. DATA

Data are considered the vital part of econometric analysis and as such has to be clean, in the correct format, and relevant for econometric analysis if it is to address the specific research questions set in this study (Wegner, 2007). This study uses primary and secondary data. The secondary data set used in this thesis is generated by merging student records from mainly three UKZN Student Trends Data-bases: (1) the "CHES Student Trends Data-base", (2) downloads from UKZN statistics on line provided by UKZN's DMI system (www.ukzn.ac.za/dmi), and (3) data from the Deputy Vice-Chancellor (DVC): Teaching and Learning, the Faculty Office of the FMS, the School of Accounting, and the School of Economics and Finance. In addition, various other official sources of information were used in this study, as indicated in the tables with information in the text and in references. The "CHES Student Trends Data-base" is a repository of a large micro data-base of all UKZN student information since 1990, archived and maintained by the Centre for Higher Education Studies (CHES) in Statistical Package for Social Sciences (SPSS). Originally started as a former UN data-base, with the merger in 2004, the data-base has been enlarged to include all students of the former UDW. The CHES Student Trends Data-base has been updated by downloads from the merged UKZN's Data Management Information (DMI) system. It now spans two decades and has data for more than 223 000 students. The key variable of interest is the university identity number (student number) of all students who registered between 1990 to date (2009 is the last academic year for which downloads are available): it does not contain student names (http://innerweb.ukzn.ac.za/depts/chesdata).

3.3.1. DATA RELEVANCY

To narrow the search for relevant and appropriate data, other faculties are filtered out before any analysis as the scope of this study is the FMS only. The targeted student population incorporates active students registered for qualifications in the FMS, who registered for both semesters one and two across the selected five indicator academic years measured: 2004. 2005, 2006, 2007, and 2008; have final examination marks in the selected undergraduate accounting and economics modules; and for whom all other supporting data are available.

The main challenge of this study is the measurement of educational facts. UKZN's Student Trends data-bases provided cross sectional data of students' records such as transcripts records, bio-data and student demographics, the grade point average (GPA), the students' final examination marks (student scores) for

each university module, and some before-university information. More specifically, data available include inter alia: (1) University identity number, (2) semester/year registered in, (3) course/module registered in, (4) Faculty student is registered in, (5) Campus specific, (6) qualification student registered for, (7) academic year when student gained qualification (year of graduation), (8) the major course student registered for, (9) achievement/students' final examination marks, (10) grade point average (GPA), (11) credits accumulated, (12) result code, (13) academic year and semester of cancellation of registration, (14) academic year and semester of student exclusion, (15) academic year and semester of student readmission, (16) drop out code, (17) gender, (18) race, (19) date of birth, (20) home first language, (21) matric authority (also racially specific for pre-1995), (22) school attended, (23) year of matriculation, (24) total matric points, (25) matric subject score, and (26) matric subject symbol (HG or SG). The sheer size of these data-bases means that there are umpteen possible research questions pertaining to UKZN that can be explored and checked against empirical evidence. The selection of the most relevant data and appropriate measures by which the specific research questions set in this thesis can be addressed is important. A brief discussion of variables incorporated and tested in the regression analysis using both OLS and Logistic regressions is provided below.

3.3.2. DATA PREPARATION AND CLEANING

There is an expectation that every database contains some "dirty data" (Wegner, 2007). When captured available data contain errors, outliers (also referred to as extreme values), come in varying formats, or is inappropriate, incomplete, inconsistent, irrelevant, and unnecessary to the proposed research question under analysis. When processing UKZN's Student Trends data-bases, various clerical errors and biases were found. It was an essential prerequisite to clean data to ensure for reliable and valid econometrical findings that are not distorted by dirty data in the data-bases.

Though the three UKZN Student Trends data-bases and focus groups assisted this study to research student trends in the FMS, to undertake the estimation of the parameters of the econometric model, several modifications were made to the original data. This study sets up a system to catch these clerical errors and biases, correct them or omit them where possible before undertaking the econometric analysis. Data pertaining to student demographics are the most affected, in some cases demanding knowledge of likely spelling and re-ordering of words. In some cases data on student identity numbers had to be cleaned up case by case through some SPSS and Stata software processing. These include *inter alia* re-ordering of student

identity numbers with both alpha and numeric form, and spotting likely duplicates of student identity numbers. Duplicates in student numbers were eliminated systematically using a dummy variable which allowed for dropping unwanted student numbers. It was also identified that only about 42 percent of the 223 000 students (about 105 634 of the students) in the data base had a school code that could be linked to the national system of the DoE (also referred to as Natemis quintiles system). It can be assumed that the remaining 58 percent of the students encompass South African students from schools not in the national system or schools that ceased to exist or changed name before the national system was set up, and foreign students. The age of the student was generated but some dates of birth were given as a date after matriculation, which had to be cleaned by rewriting in SPSS these faulty cells as missing. Students whose marks were "zero" and did not have the UKZN code to justify the discernible reasons why they missed the compulsory final examinations were referred to as "Ghost". This is not an insignificant problem since a zero mark leads to many complications in econometric analysis that could give a false reading of the results. These ghost students were also eliminated systematically using a dummy variable which captured them and provided their descriptive statistics and therefore allowed for them to be omitted from the students examined in this study. Unfortunately, there was no indication available on the dropouts and students who had unfinished (non-completed) degrees.

These biases in the UKZN Student Trends data-bases downloaded from UKZN's DMI system can stem from various speculative sources. These include *inter alia* administrative staff of UKZN – specifically the ones close to selection and admission services – failing to capture all of the details either because of poor application and registration forms-filling or because they failed to accurately key in the details that were given. Students' exclusion and readmission are not accompanied by students' records update, nor were Dean's discretion prerogatives in fast-tracking or transferring students between degrees, majors, programmes, or qualifications. These biases are not insignificant problems in a situation of a fine grained longitudinal research for strategic planning and implementation of education policies based on the information sourced from UKZN's DMI system.

For example, if the proportion of students who according to the UKZN's DMI system are still registered, but have in fact dropped out or submitted a form for cancellation from the modules in the Faculty office before the due date for cancellation and are mistakenly included in the empirical analysis as still active students, this inclusion will give a false reading and interpretation of important descriptive statistics including *inter alia* the pass rates, failure rates, retention rates, and graduation or throughput rates.

The contention is that, to investigate *via* the data downloaded from UKZN's DMI system, it is imperative to first fine grain these data (clean and select the most relevant) to incorporate corrections and modifications that in the case of this study are huge and complex. This study, therefore, has several unusual features, omitting students with inaccurate data and correcting for obviously erroneous data. Data used in this study were transformed into meaningful measures and are relevant to the research questions under analysis. This quality of data ensures the reliability and validity of the econometrical findings on which it is based.

The study uses both rank order and ratio data – the examination final marks and matric scores themselves – as there is no evidence and agreement amongst studies surveyed on which is the most used. The student identity numbers was not incorporated in the analysis to preserve student anonymity prescribed by the UKZN Ethics Committee. In order to identify those explanatory variables which are most significant in their influence on students' academic performance, the stepwise approach was used for selecting variables as in Taylor and Harris (2004). Where a causal relationship was identified between a variable and student performance, that variable is incorporated in the model. Some 30 explanatory variables covering empirically tractable characteristics for predicting the general academic performance of students as reviewed in Section 2.3.1 were examined to ascertain whether any causal inter-relationships existed among these variables. On this basis, their appropriateness for incorporation in the regression models was determined (Taylor and Harris, 2004). In some cases the study also had to omit some variables and outliers to minimize endogeneity and heteroscedasticity. Some pair-wise correlations coefficients were not computed because at least one of the variables was constant.

A series of 16 regression models was run. The results of this study run into thousands of pages since models were run and re-run for different first-year accounting and economics modules separately to ascertain the degree of consistency between different regression model results (Taylor and Harris, 2004) and detect also any possible discrepancy and distortion in the results. To control the challenge of summarizing the above results and findings in the most efficient displays, five indicator academic years have been chosen (2004, 2005, 2006, 2007 and 2008). Three measurement academic years at roughly three-yearly intervals: 2004, 2006, and 2008 were used as representing a cohort's years to graduation for the BCom (Accounting) and BCom (General) Degree. These measurement academic years have the merit of catching 2004 which is the academic year of the merger (the initial year) which brought with it all the legacies of pre-1994 and the year 2000 which is the academic year when some Faculty re-organization took place at the former UDW and UN (including its constituent campuses). These measurement academic years also have the merit of catching one mid-year, 2006, during what some studies at UKZN refer to as "the academic year of the merger chaos

or hiatus" when the physical articulation and re-organization of Faculties to a single UKZN campus occurred. These measurement academic years also have the merit of catching 2008 which is the most stable and complete year for which complete student trends data are available. This does not however suggest that major changes and policies at UKZN did not occur out of these indicator years. Though the study failed to undertake a longitudinal analysis, the results are gained for five indicator academic years in terms of cross sections suggesting that trends across time can duly be discerned as discussed in the following Chapter 4. The regression results are similar and available on request (these results are to be published in another follow up study).

The primary data are computed from the focus group discussions with students, academic and non-academic (administrators and support) staff members at UKZN, and various education stakeholders in Durban. Focus group discussions are important as they emphasize the variables this study cannot grasp and the ones that are beyond measurement.

3.4. SUMMARY

The first section began with a brief reference to the theoretical framework. This thesis warrants that its modeling considerations do not overwhelm what is feasible and relevant in terms of education research. The methodology proceeded to discuss the regression analysis. Students' academic performance is determined by sets of determinants that are classified into three major categories: (1) characteristics of academic/non-academic (administrators/support) staff members; (2) characteristics of HEIs; and (3) characteristics of students. Following Van Den Berg and Hofman (2005), in this thesis the HEIs's/institutional characteristics (I_{ij}) and characteristics of academic/non-academic (administrators and support) staff members (A_{ij}) are treated as constant.

Student success is the sum of complex and multifaceted factors and not easily represented by the characteristics of students measures that can be discovered *via* student records alone, demanding that several other contextual factors might also substantively influence the variance in student success. Quantitative and qualitative research methodologies are used in this study to ensure consistency of applications carried out in the literature surveyed.

The quantitative methodology proceeded to present an econometric model of student performance in the FMS, which is examined using two different econometric approaches: OLS and Logistic regression

analyses. OLS regression model in which the students' final examination marks are used as the dependent variable when they are continuous variables (ratio data) was differentiated from the Logistic regression model in which the students' final examination marks are used as the dependent variable when they are treated as discrete variables (dichotomous/rank order). Therefore, regression analysis that incorporates the OLS regression model and the Logistic regression model are experimented. The difference being that, OLS method attempts to predict the average value of students' final examination marks in first-year undergraduate accounting and economics modules in the FMS (continuous dependent variable) by knowing the fixed values of the educational inputs selected amongst the three broad categories of the student characteristics discussed earlier (independent variables). In Logistic method, the dependent variable is transformed to a qualitative, discrete, categorical, or specifically dichotomous variable in the case of this study and Logistic estimation technique is used. Therefore, student performance in this study is considered either discrete or continuous and the results of both the OLS and Logistic estimation techniques are reported in this study as discussed in the following Chapter 4.

In addition to the OLS and Logistic methods, this study is interested in testing the whole question of whether total matric points (or APS) or selected designated matric subject scores are good predictors of students' academic performance in the FMS. The strength or degree of linear association between achievement on matric subject scores and final examination marks at university is one that can best be researched and tested by mining statistically significant pair-wise correlation coefficients between total matric points (or APS) or selected designated matric subject scores and final examination marks achieved by students in the undergraduate accounting and economics modules in the FMS. This study is interested more specifically, in finding to what extent a matric Maths score or a matric English I or II score is a good predictor of student performance in first-year accounting and economics modules in the FMS to test the hypothesis that a student with a high matric Maths score or English score is more likely to perform well in introductory accounting and economics modules.

The difference between correlation and regression analyses is that, in correlation analysis the final examination marks achieved by students and selected predictors variables are treated symmetrically and assumed to be random, while in the linear regression model the final examination marks achieved by students and selected predictors variables are treated asymmetrically. The dependent variable (the final examination marks achieved by students) is assumed to be statistical, random or stochastic having a probability distribution whereas the selected predictors (independent) variables are assumed to have fixed values in repeated sampling and estimates of parameters of the model are obtained at these level (Gujarati, 1995).

The chapter proceeded to discuss qualitative research. Focus group discussions allow this study to deal with measurement challenges that would typically render the grasp or measurement of qualitative and empirically intractable determinants of student success infeasible.

Finally in the data section, this thesis acknowledges a sizeable number of ghost students across the five indicators academic years measured. The amount of investment wasted, both of school achievement and tuition fees by this category of students before dropping out makes it imperative to try to find out more about this category of students who are increasing the incidence of student attrition in the FMS. The focus group discussions, dealt with in Chapter 5, specifically tackled the whole question of poor student success, student attrition, and poor graduation or throughput rates.

Four key empirical analyses are, therefore, the salient features of this chapter. First, total matric points hypothesized to be a key predictor of student success is tested using the pair-wise correlations sweep across the five indicator academic years: 2004, 2005, 2006, 2007, and 2008. Second, this analysis is then broken down for a number of designated matric subject scores and the pair-wise correlations sweep looked at whether designated matric subject scores are good predictors of student success. Third, an estimation of the parameters of the econometric model is undertaken using the OLS regression analysis. The model attempts to predict the attainment of students in first-year accounting and economics modules– as measured by student's actual final examination marks (as dependant variable) – from selected independent predictors variables. Four, estimation of the parameters of the econometric model is undertaken using the Logistic regression analysis. The model attempts to predict the attainment of students in first-year accounting and economics modules– as measured by student's actual final examination pass or fail marks (as dependant variable) – from selected independent predictors variables. It is worth mentioning that results and findings presented in the following Chapter 4 are from active students: they actually received final examination marks, as opposed to those who dropped out. Both SPSS and Stata software are used for econometric analyses.

Results are discussed in Chapters 4 and 5. Each of the four analyses listed above are expanded in the following Chapter 4 which is devoted to discuss all the quantitative analysis based results while Chapter 5 is devoted to discuss all the qualitative analysis based results.

CHAPTER 4

EMPIRICAL RESULTS AND DISCUSSIONS OF QUANTITATIVE ANALYSIS

This chapter is devoted to discuss all the quantitative analysis based results. The discussion is organized under five sections. Section 1 discusses the correlations sweep. Section 2 discusses the OLS method. This is followed by the discussion of Logistic method in Section 3. Section 4 discusses the empirical findings and hypotheses. Section 5 is the summary.

4.1. CORRELATION ANALYSIS

Two types of correlations were tested: (1) between total matric points and student success at the University (as defined in this study); and (2) between matric subject scores and student success at the University. Both sets of results are discussed in separate sub-sections below.

4.1.1. TOTAL MATRIC POINTS AND STUDENT SUCCESS

The majority of South African HEIs consider total matric points to be the most salient predictor of a student's success at university. This is also the case in the FMS. In order to examine this hypothesis, this study tests if total matric points has statistically significant correlations with student success as measured by their performance in the final examination marks in the undergraduate accounting and economics modules in the Faculty across the five academic years from 2004 to 2008. The results are presented in the following Table 4-1.

Table 4-1: Correlation Sweep between Undergraduate First-year Accounting and Economics Modules and Total Matric Points, FMS, CLMS, 2004-2008

Modules	Years				
	2004	2005	2006	2007	2008
ACCT 101	0.078**[12]	0.057*	0.060*	0.020	0.103*
ACCT 102	0.001	0.049	(a)	-0.033	0.082**
ECON 101	-0.015	0.033	0.036	-0.004	0.057**
ECON 102	-0.065*	0.028	(a)[13]	-0.032	0.055*

**significant at the 0.01 level (two-tailed)

*significant at the 0.05 level (two-tailed)

A perusal of the table reveals the following:

- Student success in ACCT101 and total matric points are correlated for the cohorts of 2008, 2006 and 2005.
- Student success in ACCT102 and total matric points are correlated for the cohorts of 2008 only.
- Student success in ECON101 and total matric points are correlated for the cohort of 2008 only.
- Student success in ECON102 and total matric points are correlated for the cohorts of 2008 and 2004.

In summary, the results indicate in absolute terms that there is some evidence of correlation between total matric points and student success at university. However, the magnitudes of these statistically significant coefficients are low, demanding further examination. This is discussed in more detail in Sub-section 4.4.

[12] The figures flagged with stars are statistically significant coefficients, conventionally, using an alpha of 0.05 reflecting 95 percent confidence intervals for the coefficients (limit for lower bound and upper bound).
[13] Estimate not computed because at least one of the variables is constant.

4.1.2. MATRIC SUBJECT SCORES AND STUDENT SUCCESS

The correlations between matric subject scores (Maths, English, Accounting, and Economics) and student success at the university are also estimated. The results are presented in Tables 4-2 to 4-6. A perusal of these tables reveals the following:

- Student success in ACCT101 (ACC111S at the former UDW) and matric Maths scores are correlated for the cohorts of 2005 and 2004.

Table 4-2: Correlation Sweep between Undergraduate First-year Accounting and Economics Modules and Matric Maths Scores, FMS, CLMS, 2004-2008

Modules	Years				
	2004	2005	2006	2007	2008
ACCT 101	0.084*	-0.386**	0.006	-0.032	-0.051
ACCT 102	-0.124**	0.034	(a)	-0.013	-0.038
ECON 101	-0.034	0.067**	-0.016	-0.006	0.020
ECON 102	-0.047	0.029	(a)	-0.024	-0.026

**significant at the 0.01 level (two-tailed)

*significant at the 0.05 level (two-tailed)

- Student success in ACCT102 (ACC112S at the former UDW) and matric Maths scores are correlated for the cohort of 2004 only.
- Student success in ECON101 and matric Maths scores are correlated for the cohort of 2005 only.

Table 4-3: Correlation Sweep between Undergraduate First-year Accounting and Economics Modules and Matric English I Scores, FMS, CLMS, 2004-2008

Modules	Years				
	2004	2005	2006	2007	2008
ACCT 101	-0.071	0.094**	0.047	-0.010	0.004
ACCT 102	-0.138**	0.089**	(a)	0.016	-0.018
ECON 101	-0.051	0.130**	0.007	-0.006	0.058*
ECON 102	-0.111**	0.061*	(a)	-0.017	0.021

**significant at the 0.01 level (two-tailed)

*significant at the 0.05 level (two-tailed)

- Student success in ACCT101 and matric English I scores are correlated for the cohort of 2005 only.
- Student success in ACCT102 and matric English I scores are correlated for the cohorts of 2005 and 2004.

- Student success in ECON101 and matric English I scores are correlated for the cohorts of 2008 and 2005.
- Student success in ECON102 and matric English I scores are correlated for the cohorts of 2005 and 2004.

Table 4-4: Correlation Sweep between Undergraduate First-year Accounting and Economics Modules and Matric English II Scores, FMS, CLMS, 2004-2008

Modules	Years				
	2004	2005	2006	2007	2008
ACCT 101	-0.024	-0.457*	0.092*	-0.031	0.052
ACCT 102	0.049	0.069	(a)	0.100	0.016
ECON 101	0.005	0.054	0.057	0.025	0.032
ECON 102	0.026	0.050	(a)	0.055	-0.044

**significant at the 0.01 level (two-tailed)

*significant at the 0.05 level (two-tailed)

- Student success in ACCT101 and matric English II scores are correlated for the cohorts of 2006 and 2005.

Table 4-5: Correlation Sweep between Undergraduate First-year Accounting and Economics Modules and Matric Accounting Scores, FMS, CLMS, 2004-2008

Modules	Years				
	2004	2005	2006	2007	2008
ACCT 101	-0.095*	0.083*	0.051	-0.008	-0.031
ACCT 102	-0.105*	0.078*	(a)	-0.032	-0.084
ECON 101	0.103*	0.146*	-0.001	-0.016	0.036
ECON 102	-0.018	0.073*	(a)	-0.024	-0.016

**significant at the 0.01 level (two-tailed)

*significant at the 0.05 level (two-tailed)

- Student successes in ACCT101, ACCT102, and ECON101 have correlations with their matric Accounting scores for the cohorts of 2005 and 2004.
- Student success in ECON 102 and matric Accounting scores are correlated for the cohort of 2005 only.

Table 4-6: Correlation Sweep between Undergraduate First-year Accounting and Economics Modules and Matric Economics Scores, FMS, CLMS, 2004-2008

Modules	Years				
	2004	2005	2006	2007	2008
ACCT 101	-0.099	0.231	0.182**	0.074	0.034
ACCT 102	-.200*	0.149*	(a)	0.113	0.098
ECON 101	-0.047	0.105*	0.128*	-0.127	0.042
ECON 102	-.096	0.077	(a)	0.008	-0.054

**significant at the 0.01 level (two-tailed)

*significant at the 0.05 level (two-tailed)

- Student success in ACCT 101 and matric Economics scores are correlated for the cohort of 2006.
- Student success in ACCT 102 and matric Economics scores are correlated for the cohorts of 2005 and 2004.
- Student success in ECON101 and matric Economics scores are correlated for the cohorts of 2006 and 2005.

In summary, a perusal of results across the five academic years reveals that in absolute terms, the designated matric subject scores have some correlations that have statistically significant coefficients with student success in the first-year accounting and economics modules. This is discussed in more detail below.

4.1.3. SUMMARY OF CORRELATIONS SWEEP

The whole question of whether the total matric points or designated matric subject scores are good predictors of student success in undergraduate first-year accounting and economics modules in the FMS is tested with the above comprehensive correlations sweep across the five academic years measured.

The first observation concerns the statistically significant coefficients mined. Results across three out of five indicator academic years indicate in absolute terms that total matric points have some correlations that have statistically significant coefficients with student success in the ACCT101 module. Results across two out of five indicator academic years indicate in absolute terms that total matric points have some correlations that have statistically significant coefficients with student success in ACCT102 module. The result of only one out of five academic years indicates in absolute terms that total matric points have some correlations that have a statistically significant coefficient with student success in the ECON101 module. Results across two out of five indicator academic years indicate in absolute terms that total matric points

have some correlations that have statistically significant coefficients with student success in the ECON102 module. These results are consolidated by the frequency distribution in the following Table 4-7.

Table 4-7: Frequency Distribution for Correlations between Total Matric Points and Student Success, FMS, CLMS, 2004-2008.

Modules	Frequency	Relative frequency (in %)
ACCT 101	3	60
ACCT 102	2	40
ECON 101	1	20
ECON 102	2	40

Source: Compiled from the Table 4-1.

In Table 4-7, there is some evidence of correlation between total matric points and student success at university, but not fully supported by probabilities which are very low, ranging from 20 to 60 percent.

In terms of correlations between matric subject scores and student success, the results indicate that student success in ACCT101 and matric Maths scores, matric English I scores, matric English II scores, and matric Accounting scores are correlated. The results indicate that student success in ACCT102 and matric Maths scores, matric English I scores, and matric Accounting scores are correlated; that student success in ECON101 and matric Maths scores, matric English I scores, and matric Economics scores are correlated; and that student sucess in ECON102 and matric Maths scores, and matric English I scores are correlated. These results are consolidated in the following Table 4-8.

Table 4-8: Consolidation of Correlations between Matric Subject Scores and Student Success, FMS, CLMS, 2004-2008.

Modules	Matric Maths	Matric English I	Matric English II	Matric Accounting	Matric Economics
ACCT 101	0.235 (40)(a)	0.094 (20)	0.2745 (40)	0.089 (40)	0.182 (20)
ACCT 102	0.124 (20)	0.1135 (40)	- (0)	0.0915 (40)	0.1745 (40)
ECON 101	0.067 (20)	0.094 (40)	- (0)	0.1245 (40)	0.1165 (40)
ECON 102	- (0)	0.086 (40)	- (0)	0.073 (20)	- (0)

(a) Average coefficients in absolute value and in parenthesis are the corresponding frequency distribution in percentage.

Source: Compiled from the Tables 4.3 to 4.6.

Interestingly, the results indicate that matric English II scores which is written by students whose home first language is not English, are not correlated with their academic performance in the ECON101, ECON102,

and ACCT 102 modules. However, their performance in ECON102 has correlations with matric English I scores.

Premised upon the evidence in Sections 4.1.1. and 4.1.2., as well as the frequency of statistically significant correlations from the Tables 4-1 to 4-6, their magnitudes, and in terms of probabilities in Tables 4-7 and 4-8, both total matric points (or APS) and matric subject scores that include Maths, English I, Accounting and Economics, in their current status, have some correlation with student success in the FMS, but the magnitudes of these correlations are not very high, ranging from 0.06 to 0.27. The frequency of statistically significant correlations is not fully supported by probabilities which are very low, ranging from 20 to 60 percent.

To elicit the whole question of whether the predictors of student performance at the university intake level are wearing off as students progress to second- and third-year accounting and economics modules in the FMS, pair-wise correlations sweep between, on the one hand, total matric points, matric Maths, and English I and II scores, and on the other the hand, student performance in second- and third-year accounting and economics modules across the same five academic years were tested.

A perusal of the results also indicates that the total matric points, matric Maths, and matric English I achieved by students who have English as their home first language, are all correlated with student performance in the second- and third-year economics modules. Only matric English I is correlated with third-year accounting module. These results indicate that correlations factorized above are not wearing off as the student progresses in the FMS. Therefore, to some extent, the total matric points, matric Maths, and matric English I are predictors of student success after the intake level.

A perusal of the tables illustrating correlations sweep between the student performance in first-year accounting and economics modules, on the one hand, and their performance in second- and third-year modules at university level across the five academic years reveals that, in absolute terms, the student performance in first-year accounting modules are correlated with ACCT200, ACCT2ISR, and ACCT300. The student performance in ACCT101 (ACC111S at the former UDW) and ACCT102 (ACC112S at the former UDW) in 2004 was correlated with their performance in ACCT2A0. Performance in ISTN101 and ISTN102 was also correlated with ACCT2ISR. The student performance in ACCT101 was correlated with ACCT102 in 2008. The student performance in first-year economics modules are correlated with their performance in second-year modules but were never correlated with the third-year module.

In absolute terms, all the pair-wise correlation coefficients between the student performance in first-year economics modules and second-year modules are statistically significant. Information systems and technology modules at the first-year level (ISTN101 and ISTN102) are good predictors of success in second-year accounting information systems (ACCT2ISR) modules and the student performance in accounting 1 modules was a good predictor of success in accounting 2 module at the former UDW. First-year performance is not correlated with the third-year module. Correlations between second-year and third-year modules were never statistically significant.

A further deduction that can emanate from the empirical results is that passing students are more likely to do extremely well when they progress to second-year modules. Alternatively, struggling students are more likely to do extremely badly. Therefore, student performance in first-year ECON101 and ECON102 modules, as well as in the quantitative method course are good predictors of whether the student will perform well in the second-year economics modules, but they are inconclusive in predicting third-year modules. An important finding is also that the correlation between undergraduate modules and matric subject scores (or their aggregate total matric points) is not wearing off as the student progresses in the FMS, except that there is a relatively weak positive correlation between the student performance in ECON202S modules and matric English II, suggesting that students whose the home first language is not English and who wrote matric English II, are more likely to perform less well even at the second-year level. These results shed some light on the issue and are in line with the findings of the few existing institutional studies commissioned within UKZN.

Table 4-9 examined the correlation between total matric points and pass rates in individual first-year modules in the FMS for the 2005 academic year (Tewari *et al.*, 2008). A perusal of this table highlights the following salient features of students' performance trends: (1) in general students are performing poorly in modules involving quantitative skills, and (2) specifically, below the total matric points (or APS) of 36 – the requirement for acceptance to the BCom (Accounting) and BCom (General) degree in the FMS - students were much less likely to be successful in the approved first-year curriculum.

Table 4-9: Total Matric Points and Pass Rate per Selected First-year Modules, FMS, CLMS, 2005.

	Total Matric Points						
Module Code	Students	Blank	Below 20	20-29	30-39	40-50	Grand Total
ACCT101	Registered	70	3	161	661	558	1453
	Passed	42	1	100	496	535	1174
	Pass Rate	**60%**	**33%**	**62%**	**75%**	**96%**	**81%**
ACCT102	Registered	45	3	131	565	548	1292
	Passed	29	1	71	387	493	981
	Pass Rate	**64%**	**33%**	**54%**	**68%**	**90%**	**76%**
ECON101	Registered	49	8	140	744	598	1539
	Passed	29	3	26	318	494	870
	Pass Rate	**59%**	**38%**	**19%**	**43%**	**83%**	**57%**
ECON102	Registered	49	4	92	547	562	1254
	Passed	36	0	18	268	442	764
	Pass Rate	**73%**	**0%**	**20%**	**49%**	**79%**	**61%**
ISTN101	Registered	67	10	135	680	606	1498
	Passed	38	6	53	464	543	1104
	Pass Rate	**57%**	**60%**	**39%**	**68%**	**90%**	**74%**
ISTN102	Registered	38	8	103	513	554	1216
	Passed	19	5	25	212	377	638
	Pass Rate	**50%**	**63%**	**24%**	**41%**	**68%**	**52%**
MGNT102	Registered	31	1	15	161	137	345
	Passed	30	1	15	146	134	326
	Pass Rate	**97%**	**100%**	**100%**	**91%**	**98%**	**94%**
MATHS134	Registered	52	9	72	523	548	1204
	Passed	39	6	41	344	456	886
	Pass Rate	**75%**	**67%**	**57%**	**66%**	**83%**	**74%**
MATHS137	Registered	5		37	135	38	215
	Passed	3		11	52	27	93
	Pass Rate	**60%**		**30%**	**39%**	**71%**	**43%**
STAT171	Registered	41	1	45	386	477	950
	Passed	26	0	15	180	324	545
	Pass Rate	**63%**	**0%**	**33%**	**47%**	**68%**	**57%**

Source: Tewari *et al.* (2008).

Evidence to support these results is drawn from a symposium on the correlations between the NSC and first-year students' performance at UKZN (UTLO, 2010). Student success in ACCT101 was found to be correlated with matric Maths scores, and matric English I scores while student success in ACCT102 had no statistically significant correlation with all the designated matric subject scores. Student success in ACCT101 was not correlated with matric English II scores. In the same study, student success in ECON101 was found to be correlated with matric Maths scores, matric English I scores and matric English II scores, whereas student success in ECON102 had no statistically significant correlation with the designated matric subject scores.

Another study found that a higher proficiency in Maths is associated with a higher level of performance at university for students who are also competent in English. This is to say that even though a student may be

competent in Maths, his or her performance in a module such as accounting or economics can be negatively affected by poor language skills (Wong and Chia, 1996).

This study, however, cannot confirm these studies' results as they only incorporated students enrolled in a single academic year: 1996 for Wong and Chia; 2005 for Tewari *et al*.; or 2009 for the UTLO, respectively.

These results are demanding further examination. Total matric points and matric subject scores data were fitted into regression analysis (Sections 4.2. and 4.3.) to further establish and quantify, holistically, their linear relationship in predicting student success in the FMS. Only the records of active students of the cohorts of 2004 (the initial year) and 2008 (the end year that will capture any change if occurred) are fitted in the modelled educational production function in equations 3-3 and 3-6. The consolidation of the findings is discussed in more detail in Chapter 6.

4.2. ORDINARY LEAST SQUARES (OLS) REGRESSION ANALYSIS

In this section, a cross sectional snapshot of students' performance in four different first-year undergraduate accounting and economics modules in the FMS are examined. This is followed by a discussion of the findings. The descriptive statistics pertaining to the sample for the cohorts of 2004 and 2008 are given in the following Tables 4-10 to 4-15 broken down by the matric scores, students' final examination marks at university, and students' demographics such as the age, gender, home first language, and race. The statistics in these tables describe the characteristics of the sample that must be kept in mind when the results are considered.

Tables 4-10 and 4-11 indicate that in the 2004 and 2008 academic years, the majority of students took English I or II at the matric level (91 percent) (61 percent took English I and 34 percent took English II in the 2008 academic year), and a large number (62 percent in 2004 and 81 percent in 2008) took matric Maths because the FMS has designated matric Maths scores and English scores in conjunction with total matric points of 36 as part of the formal entry requirements. About 26.8 percent of students (1651 students - 1209 = 342) have missing data for total matric points in the 2004 academic year. Matric accounting, business economics, and economics are not popular matric subjects, as measured by the number of students who took them (Umalusi, 2009).

Table 4-10: Descriptive Statistics for First-year Students in Accounting and Economics Modules Breakdown by the Students' Matric Scores, FMS, CLMS, 2004

Matric Scores	Number of Students	Percent of the total number of students	Mean	Std. Dev.	Min	Max
Mathematics	1061	62.26	4.01	1.72	1	8
English I or II	1502	91.00	5.42	1.12	1	8
Accounting	525	32.00	5.00	1.60	1	8
Economics	143	9.00	5.13	1.41	1	8
Business Economics	245	15.00	4.30	1.72	1	8
Total matric points	1209	73.20	29.00	5.90	4	50
Total number of students	1651	100.00	-	-	-	-

Source: Estimation

Table 4-11: Descriptive Statistics for First-year Students in Accounting and Economics Modules Breakdown by the Students' Matric Scores, FMS, CLMS, 2008

Matric Scores	Number of Students	Percent of the total number of students	Mean	Std. Dev.	Min	Max
Mathematics	3982	81.00	3.31	2.55	1	8
English I	3010	61.00	5.03	2.70	1	8
English II	1684	34.00	4.35	2.08	1	8
Accounting	2042	42.00	4.17	2.73	1	8
Economics	542	11.00	4.05	2.45	1	8
Business Economics	956	20.00	3.98	2.54	1	8
Total matric points	4911	100.00	20.76	17.11	0	50
Total	4911	100.00	-	-	-	-

Source: Estimation

A perusal of the following Tables 4-12 and 4-13 reveal the means of total matric points and matric subject scores, which represent typical or central tendencies. Large standard deviations from the means exhibit large dispersion in the central tendencies and variations. These salient features of distribution, central tendency and variability of data suggest that in first-year accounting and economics modules, the students' final examination marks are more at the extremes with either smart students passing well, or poor and underprepared students failing badly.

Table 4-12: Descriptive Statistics for First-year Students in Accounting and Economics Modules Breakdown by the Students' Final Examination Marks, FMS, CLMS, 2004

Module Code	Number of Students	% of students	Mean	Std. Dev.	Min	Max
ACCT 101	949	57.48	68.70	15.43	10	97
ACCT 102	891	54.00	62.84	14.76	14	99
ECON 101	1436	87.00	55.14	15.01	10	97
ECON 102	1336	81.00	56.00	14.00	10	91
Total	1651	100	-	-	-	-

Source: Estimation

Table 4-13: Descriptive Statistics for First-year Students in Accounting and Economics Modules Breakdown by the Students' Final Examination Marks, FMS, CLMS, 2008

Module Code	Number of Students	% of students	Mean	Std. Dev.	Min	Max
ACCT 101	1493	71.00	65.54	14.59	12	97
ACCT 102	1097	52.00	62.04	11.86	24	95
ECON 101	2104	100.00	52.46	15.40	9	98
ECON 102	2044	97.00	52.98	14.39	5	97
Total	2104	100.00	-	-	-	-

Source: Estimation

A perusal of Table 4-14 and 4-15 reveals that majority of intake students (60 percent in 2004 and 52 percent in 2008) in the FMS had languages other than English as their home first language. The difference in the figures from Tables 4-10 to 4-15 reflect the number of inactive students who had missing data (referred to in the data section as "ghost students"), duplicate student numbers who were dropped from the sample, or some educational variables which were not included because they were found to be sources of endogeneity, heteroscedasticity, or expected to be of a qualitative nature. This is analyzed in Chapter 5.

Table 4-14: Descriptive Statistics for First-year Students in Accounting and Economics Modules Breakdown by the Students' Age, Race, Home first language, and Gender, FMS, CLMS, 2004

Students Demographics	Number of Students	% of Number of students	Mean	Std. Dev.	Min	Max
Age	1651	100	32	8.39	21	76
Race						
White	25	1.50				
Coloured	11	0.63	-	-	-	-
Indian	691	41.00				
Black	924	55.97				
Home First Language						
English	666	40.34	-	-	-	-
Others	985	59.66				
Gender						
Female	863	52.27	-	-	-	-
Male	788	47.73				
Total	1651	100	-	-	-	-

Source: Estimation

Table 4-15: Descriptive Statistics for First-year Students in Accounting and Economics Modules Breakdown by the Students' Age, Race, Home first language, and Gender, FMS, CLMS, 2008

Students Demographics	Number of Students	% of Number of students	Mean	Std. Dev.	Min	Max
Age	4911	100.00	31.38	9.21	20	65
Race						
White	584	12.00				
Coloured	113	2.30	-	-	-	-
Indian	1646	34.00				
Black	2562	52.00				
Home First Language						
English	2338	48.00	-	-	-	-
Others	2572	52.00				
Gender						
Female	2611	53.00	-	-	-	-
Male	2299	47.00				
Total	4911	100.00	-	-	-	-

Source: Estimation

The parameter estimates of the independent or predictor variables included in the linear model as discussed in sub-section 3.1.5.1 are presented in Tables 4-16 to 4-23. F-statistics (the Chi-square values) and the P-values associated with them, the relevant R-squares (R^2), and the sample sizes (N) are presented at the bottom of each table corresponding to the equations regressed.

The F-statistic indicates the overall fitness of the data and is computed as a ratio of the mean square associated with the sources of variance which can be explained by the independent or predictor variables – thus, by the regression; divided by the mean square associated with the sources of variance which can be explained by the residual (thus, explained by the error term and not by the independent or predictor variables). The P-values are compared to some alpha level in testing the null hypothesis that all of the model coefficients are zero (0). The confidence intervals for the coefficients, conventionally 95 percent, are related to the P-values such that the coefficients will not be statistically significant if the confidence intervals include zero (0). This study extended the confidence intervals by using alpha levels of 0.01 and 0.10 in addition to the 0.05 alpha level. These expanded confidence intervals can help this study to put the estimates from the coefficients into perspective to see how much their values could vary.

R-squares (R^2) indicate the proportion of variance in the student success (the students' final examination marks in a typical module as defined in this study), which can be explained by the independent or predictor

variables. A word of caution: R-squares (R^2) reflect the overall measure of the strength of association and do not indicate the extent to which any particular independent or predictor variable is associated with the student success – the dependent variable.

The column of coefficients provides the values for $\beta_0, \ldots, \beta_n$ for the specific module's regression equation discussed in Chapter 3. These are the values for the regression equation for predicting the student success in a typical module from the corresponding independent variable, *ceteris paribus*. The columns of t-statistics and standard deviations (using Stata software) or standard error (using SPSS) are also reported. They are used with their associated 2-tailed p-values to test whether a given coefficient is significantly different from zero (0) using the range of alphas as defined in this study.

Overall, the F-statistics and the corresponding P-values found are implying that models used fit the data adequately. Although many independent or predictor variables were examined, only a few showed statistically significant impacts on the student success in the first-year undergraduate accounting and economics modules in the FMS (See Appendix B). The results are discussed below.

Results for ACCT101 in Tables 4-16 and 4-17 indicate that in the 2004 academic year, the coefficient for the race of the student is -0.26[14], which is statistically significant. So for every unit increase in the number of non-white students, a 0.26 unit decrease in final examination marks in the ACCT101 module is predicted, holding all other variables in the model constant.

The coefficient for English as home first language is 0.26 and is statistically significant. So for every unit increase in the number of students who have English as their home first language, a 0.26 unit increase in final examination marks in the ACCT101 module is predicted, holding all other variables in the model constant. The coefficient for the matric Accounting is 0.12 and is statistically significant. For every unit increase in the matric Accounting scores, a 0.12 unit increase in final examination marks in the ACCT101 module is predicted, holding all other variables in the model constant. The coefficient of the constant[15] is 2.62 and is statistically highly significant. Explained differently, 2.62 is the predicted value of the students'

[14] For the interpretation of the SPSS annotated output visit http://www.ats.ucla.edu/stat/spss/output/reg_spss.htm
[15] The coefficient of the constant when significant represents the height of the regression line when it crosses the Y-axis.

final examination marks in ACCT101 when all other variables are 0. Although some of the other variables had coefficients with the expected signs, none proved to be significant at the 1, 5, or 10 percent levels.

Table 4-16: Student Performance in Accounting 101 (OLS Regression), FMS, CLMS, 2004.
(Dependent Variable is Student's Final Examination Marks in Accounting 101)

Predictor variables	Coefficients	Stand. Dev.	t –value
Matric English I scores	0.09	0.14	0.70
Matric Maths scores	0.05	0.04	1.10
Matric accounting scores	0.12*	0.06	1.81
Total matric points	0.05	0.09	0.56
Age	0.11	0.14	0.77
Race	-0.26***	0.10	-2.50
Gender	-0.02	0.04	-0.52
English as home first language	0.26***	0.10	2.54
ECON101	0.10	0.07	1.49
ISTN101	0.03	0.14	0.21
MATHS134	0.08	0.20	0.43
Constant	2.62***	1.05	2.51
Number of obs = 153 Prob > F = 0.0589 R^2 =12 % F = 1.80			

Source: Estimation

*Significant at 10 percent alpha level, two-tailed;
** Significant at 5 percent alpha level, two-tailed;
*** Significant at 1 percent alpha level, two-tailed.

For the 2008 academic year, the coefficient for the age of student is -0.02 and is statistically significant. For every unit increase in the age of student, a 0.02 unit decrease in final examination marks in the ACCT101 module is predicted, holding all other variables in the model constant.

Table 4-17: Student Performance in Accounting 101 (OLS Regression), FMS, CLMS, 2008.

(Dependent Variable is Student's Final Examination Marks in Accounting 101)

Predictor variables	Coefficients	Stand. Error	t -value
Age	-0.020	0.053	-0.377
English as home first language	0.344	0.762	0.451
Gender	0.717	0.683	1.050
Matric Maths scores	-0.248*	0.135	-1.836
Total matric points	0.077***	0.027	2.875
Race	1.314	1.057	1.243
ECON101	0.579***	0.022	26.107
Constant	35.144***	2.444	14.381
Number of obs = 1006 Prob > F = 0.000 R^2 = 41.7% F = 102.042			

Source: Estimation

*Significant at 10 percent alpha level, two-tailed;
** Significant at 5 percent alpha level, two-tailed;
*** Significant at 1 percent alpha level, two-tailed.

The coefficient for the matric Maths scores is -0.25 and is statistically significant. For every unit increase in achievement in matric Maths, a 0.25 unit decrease in final examination marks in the ACCT101 module is predicted, holding all other variables in the model constant. The coefficient for the total matric points (or APS) is 0.08 and is statistically significant. For every unit increase in the total matric points (or APS), a marginal 0.08 unit increase in final examination marks in the ACCT101 module is predicted, holding all other variables in the model constant. The coefficient for the ECON101 module is 0.58 and is statistically significant. For every unit increase in the achievement in the ECON101 module, a 0.58 unit increase in final examination marks in the ACCT101 module is predicted, holding all other variables in the model constant. The coefficient of the constant is 35.1 and is statistically highly significant. Explained differently, 35.1 is the predicted value of the students' final examination marks in ACCT101 when all other variables are 0.

The linear model predicting the students' final examination marks in ACCT102 is estimated in Tables 4-18 and 4-19 and the results indicate that in the 2004 academic year, the coefficient for the matric Maths scores is -0.16 and is statistically significant. So for every unit increase in the achievement in the matric Maths scores, a 0.16 unit decrease in final examination marks in the ACCT102 module is predicted, holding all other variables in the model constant. The coefficient for the total matric points (or APS) is 0.43 and is statistically significant. So for every unit increase in the total matric points (or APS) in the FMS, a 0.43 unit

increase in final examination marks in the ACCT102 module is predicted, holding all other variables in the model constant.

Table 4-18: Student Performance in Accounting 102 (OLS Regression), FMS, CLMS, 2004.
(Dependent Variable is Student's Final Examination Marks in Accounting 102)

Predictor variables	Coefficients	Stand. Dev.	t -value
Matric English I scores	-0.35	0.38	-0.91
Matric Maths scores	-0.16**	0.08	-2.07
Matric accounting scores	0.25*	0.13	1.84
Total matric points	0.43*	0.26	1.67
Age	-0.89	0.56	-1.58
Race	-0.03	0.16	-0.24
Gender	0.05	0.09	0.53
English as home first language	0.10	0.11	0.96
ISTN110	0.33	0.29	1.13
STAT181	-0.46**	0.19	-2.32
MATHS134	0.23*	0.12	1.87
Constant	5.82*	3.11	1.87
Number of obs = 37 Prob > F = 0.0309 R^2 = 52 % F = 2.45			

Source: Estimation

*Significant at 10 percent alpha level, two-tailed;
** Significant at 5 percent alpha level, two-tailed;
*** Significant at 1 percent alpha level, two-tailed.

The coefficient for the matric Accounting is 0.25 and is statistically significant. For every unit increase in the matric Accounting scores, a 0.25 unit increase in final examination marks in the ACCT102 module is predicted, holding all other variables in the model constant. The coefficient for the STAT181 module is -0.46 and is statistically significant. For every unit increase in the achievement in STAT181, a 0.46 unit

decrease in final examination marks in the ACCT102 module is predicted, holding all other variables in the model constant. The coefficient for the MATHS134 module is 0.23 and is statistically significant. For every unit increase in the achievement in MATHS134 module, a 0.23 unit increase in final examination marks in the ACCT102 module is predicted, holding all other variables in the model constant. The coefficient of the constant is 5.8 and is statistically significant. Explained differently, 5.8 is the predicted value of the students' final examination marks in ACCT102 when all other variables are 0.

Table 4-19: Student Performance in Accounting 102 (OLS Regression), FMS, CLMS, 2008.

(Dependent Variable is Student's Final Examination Marks in Accounting 102)

Predictor variables	Coefficients	Stand. Error	t -value
Age	-0.074*	0.043	-1.943
ACCT101	0.782***	0.026	29.596
English as home first language	-0.379	0.618	-0.614
Gender	-0.514	0.555	-0.925
Matric Maths scores	-0.093	0.111	-0.836
Race	0.559	0.838	0.667
Total matric points	-0.044**	0.023	-1.943
Constant	10.553***	2.609	4.045
Number of obs = 814 Prob > F = 0.000 R^2 = 52.5% F = 127.465	-	-	-

Source: Estimation

*Significant at 10 percent alpha level, two-tailed;
** Significant at 5 percent alpha level, two-tailed;
*** Significant at 1 percent alpha level, two-tailed.

For the 2008 academic year, the coefficient for the age of student is -0.07 and is statistically significant. For every unit increase in the age of student, a 0.07 unit decrease in final examination marks in the ACCT102 module is predicted, holding all other variables in the model constant. The coefficient for the ACCT101 module is 0.78 and is statistically significant. For every unit increase in the achievement in the ACCT101 module, a 0.78 unit increase in final examination marks in the ACCT102 module is predicted, holding all other variables in the model constant. The coefficient for the total matric points (or APS) is -0.04 and is statistically significant. For every unit increase in the achievement in the total matric points (or APS), a 0.04 unit decrease in final examination marks in the ACCT102 module is predicted, holding all other variables in the model constant. The coefficient of the constant is 10.6 and is statistically highly significant. Explained

differently, 10.6 is the predicted value of the students' final examination marks in ACCT102 when all other variables are 0.

The linear model predicting the students' final examination marks in ECON101 is estimated in Tables 4-20 and 4-21 and the results indicate that in the 2004 academic year, the coefficient for the matric Maths scores is -0.30 and is statistically significant. For every unit increase in the matric Maths scores, a 0.30 unit decrease in final examination marks in the ECON101 module is predicted, holding all other variables in the model constant.

Table 4-20: Student Performance in Economics 101 (OLS regression), FMS, CLMS, 2004
(Dependent Variable is Student's Final Examination Marks in Economics 101)

Predictor variables	Coefficients	Stand. Dev.	t -value
Matric English I scores	-0.01	0.24	-0.05
Matric Maths scores	-0.30***	0.09	-3.47
Matric Economics scores	0.15	0.21	0.73
Total matric points	-0.15	0.17	-0.91
HG D in matric Economics	0.08	0.16	0.51
Age	-0.33	0.31	-1.06
Race	-0.25	0.15	-1.62
Gender	-0.09	0.08	-1.11
English as home first language	-0.01	0.25	-0.06
ISTN101	0.29**	0.12	2.37
English as home first language by matric Maths scores	0.32*	0.18	1.83
English as home first language by matric Economics scores	0.15	0.22	0.71
Constant	5.34	1.53	3.49
Number of obs = 56 Prob > F = 0.0136 R^2 =41 % F = 2.51			

Source: Estimation

*Significant at 10 percent alpha level, two-tailed;

** Significant at 5 percent alpha level, two-tailed;

*** Significant at 1 percent alpha level, two-tailed.

For the other first-year modules taught concurrently with ECON101, the coefficient for the ISTN101 is 0.29 and is statistically significant. For every unit increase in the achievement in the ISTN101 module, a 0.29 unit increase in final examination marks in the ECON101 module is predicted, holding all other variables in the model constant. The coefficient for the interaction variable capturing students who coincidently have English as home first language but sorted by matric Maths scores is 0.32 and is statistically significant. For every unit increase in the number of students who have English as home first language sorted by matric Maths scores, a 0.32 unit increase in final examination marks in the ECON101 module is predicted, holding all other variables in the model constant. Although some of the other variables had coefficients with the expected signs, none proved to be statistically significant.

Table 4-21: Student Performance in Economics 101 (OLS Regression), FMS, CLMS, 2008.
(Dependent Variable is Student's Final Examination Marks in Economics 101)

Predictor variables	Coefficients	Stand. Error	t -value
Race	-1.406	1.159	-1.214
ACCT101	0.700***	0.027	26.120
English as home first language	-0.056	0.835	-0.067
Gender	-0.463	0.749	-0.618
Matric Maths scores	0.206	0.149	1.386
Total matric points	-0.046**	0.023	-1.986
Constant	7.580***	1.938	3.910
Number of obs = 1006 Prob > F = 0.000 R^2 = 40.6% F = 114.024			

Source: Estimation

*Significant at 10 percent alpha level, two-tailed;
** Significant at 5 percent alpha level, two-tailed;
*** Significant at 1 percent alpha level, two-tailed.

For the 2008 academic year, the coefficient for the ACCT101 module is 0.70 and is statistically significant. For every unit increase in achievement in the ACCT101 module, a 0.70 unit increase in final examination marks in the ECON101 module is predicted, holding all other variables in the model constant. The coefficient for the total matric points (or APS) is -0.05 and is statistically significant. For every unit increase in achievement in the total matric points (or APS), a marginal 0.05 unit decrease in final examination marks in the ECON101 module is predicted, holding all other variables in the model constant. The coefficient of

the constant is 7.6 and is statistically highly significant. Explained differently, 7.6 is the predicted value of the students' final examination marks in ECON101 when all other variables are 0.

Table 4-22: Student Performance in Economics 102 (OLS Regression), FMS, CLMS, 2004

(Dependent Variable is Student's Final Examination Marks in Economics 102)

Predictor variables	Coefficients	Stand. Dev.	t -value
Matric English I scores	0.08	0.08	1.03
Matric Maths scores	0.04	0.03	1.52
Total matric points	0.01	0.08	0.14
HG D in matric Economics	-0.23	0.15	-1.54
Age	-0.20*	0.12	-1.75
Race	0.63	0.06	0.97
Gender	0.01	0.03	0.39
English as home first language	-0.07	0.06	-1.16
ECON101	0.13***	0.05	2.42
ISTN101	0.17**	0.08	2.09
ACCT102	-0.04	0.07	-0.60
MATHS134	-0.06	0.05	-1.29
Constant	3.93***	0.79	4.96
Number of obs = 198 Prob > F = 0.0257 R^2 =12 % F = 2.01			

Source: Estimation

*Significant at 10 percent alpha level;
** Significant at 5 percent alpha level;
*** Significant at 1 percent alpha level.

The linear model predicting final examination marks of students in ECON102 is estimated in Tables 4-22 and 4-23 and the results indicate that in the 2004 academic year, the coefficient for the age of student is -0.20 and is statistically significant. For every unit increase in the age of student, a 0.20 unit decrease in final examination marks in the ECON102 module is predicted, holding all other variables in the model constant. The coefficient for the ECON101 module is 0.13 and is statistically highly significant. For every unit increase in the achievement in ECON101 module, a 0.13 unit increase in final examination marks in the ECON102 module is predicted, holding all other variables in the model constant. The coefficient for the ISTN101 is 0.17 and is statistically significant. For every unit increase in the achievement in the ISTN101 module, a 0.17 unit increase in final examination marks in the ECON102 module is predicted, holding all other variables in the model constant. Some of the other variables in the estimation had coefficients with the expected signs, but none proved to be statistically significant.

Table 4-23: Student Performance in Economics 102 (OLS Regression), FMS, CLMS, 2008.
(Dependent Variable is Student's Final Examination Marks in Economics 102)

Predictor variables	Coefficients	Stand. Error	t -value
Age	-0.001	0.034	-0.017
ECON101	0.778***	0.016	49.612
English as home first language	-1.160**	0.527	-2.203
Gender	0.127	0.475	0.268
Matric Maths scores	-0.182**	0.094	-1.940
Total matric points	0.012	0.019	0.631
Constant	13.128***	1.642	7.997
Number of obs = 1342 Prob > F = 0.000 R^2 = 65.0% F = 354.579			

Source: Estimation

*Significant at 10 percent alpha level, two-tailed;
** Significant at 5 percent alpha level, two-tailed;
*** Significant at 1 percent alpha level, two-tailed.

For the 2008 academic year, the coefficient for the ECON101 module is 0.78 and is statistically significant. For every unit increase in achievement in the ECON101 module, a 0.78 unit increase in final examination marks in the ECON102 module is predicted, holding all other variables in the model constant. The coefficient for the English as home first language is -1.2 and is statistically significant. For every unit increase in the number of students who have English as home first language, a 1.2 unit decrease in final examination marks in the ECON102 module is predicted, holding all other variables in the model constant.

The coefficient for the matric Maths scores is -0.18 and is statistically significant. For every unit increase in attainment in the matric Maths scores, a 0.18 unit decrease in final examination marks in the ECON102 module is predicted, holding all other variables in the model constant. The coefficient of the constant is 13.1 and is statistically highly significant. Explained differently, 13.1 is the predicted value of the students' final examination marks in ECON102 when all other variables are 0.

4.3. LOGISTIC REGRESSION ANALYSIS

For comparison purposes, this section also estimates and maps the logistic regression output to equations pertaining to four first-year accounting and economics modules for the 2004 and 2008 academic years simply to capture the discrete nature of the students' performance. In order to conduct the econometric analysis, the same empirically tractable explanatory variables incorporated in Equation (3-4) were screened and fitted in the logistic regression model, but the dependant variable here is dichotomous. The results are reported in Tables 4-24 to 4-31. The chi-square statistics and the P-values associated with them, the relevant pseudo R-squares (R^2) which are indications of the 'goodness of fit' of the regression equation to the data for each regression are also given, and the sample sizes (N) are presented at the bottom of each table corresponding to the equations regressed. Each of the statistically significant coefficients is discussed below.

A perusal of the fitted model presented in Tables 4-24 and 4-25 indicates that in the 2004 academic year, holding all other variables at certain value, the odds of getting a final examination pass mark in ACCT101 for a one-unit increase in total matric points (or APS) equals or above 36 is exp(0.51) = 1.67. More explicitly in terms of percent change, holding all other variables at certain value, we will see a 67 percent increase in the odds of getting a final examination pass mark for a one-unit increase in total matric points equals or above 36. Holding all other variables at certain value, the odds of getting a final examination pass mark in ACCT101 for a one-unit increase in HG symbol D in matric English I is exp(0.51) = 1.67. So in terms of percent change, holding all other variables at certain value, we will see 67 percent increase in the odds of getting a final examination pass mark for a one-unit increase in HG symbol D in matric English I. Holding all other variables at certain value, the odds of getting a final examination pass mark in ACCT101 for a one-unit increase in HG symbol D in matric Maths is exp(0.47) = 1.60. In terms of percent change, holding all other variables at certain value, we will see 60 percent increase in the odds of getting a final examination pass mark for a one-unit increase in HG symbol D in matric Maths.

Table 4-24: Student Performance in Accounting 101 (Binomial Logistic Regression), FMS, CLMS, 2004

(Dependent Variable is Student's Final Examination Pass/Fail Marks in Accounting 101)

Predictor variables	Coefficients	Stand. Error	Z-value
Total matric points Equal or Above 36	0.51*	0.30	1.75
HG D in matric English I	0.51*	0.29	1.86
HG D in matric Maths	0.47*	0.26	1.75
HG D in matric Accounting	0.82**	0.40	2.05
Age	-0.03**	0.02	-1.94
English as home first language	1.12*	0.70	1.61
English as home first language by matric Accounting Scores	-1.20*	0.75	-1.61
Constant	2.57	0.64	4.03
Log likelihood = - 271.91 Number of obs = 1651 Prob > chi2 = 0.0186 LR Chi-square statistic (7) = 16.83 Pseudo R^2 = 3%			

Source: Estimation

*Significant at 10 percent alpha level;
** Significant at 5 percent alpha level;
*** Significant at 1 percent alpha level.

Holding all other variables at certain value, the odds of getting a final examination pass mark in ACCT101 for a one-unit increase in HG symbol D in matric Accounting is exp(0.82) = 2.27. So in terms of percent change, holding all other variables at certain value, we will see 127 percent increase in the odds of getting a final examination pass mark for a one-unit increase in HG symbol D in matric Accounting. Holding all other variables at certain value, the odds of getting a final examination pass mark in ACCT101 for a one-unit increase in the age of the student is exp(0.03) = 1.03. So in terms of percent change, holding all other variables at certain value, we will see 3 percent decrease in the odds of getting a final examination pass mark for a one-unit increase in the age of the student. Holding all other variables at certain value, the odds of getting a final examination pass mark in ACCT101 for a one-unit increase in English as home first language is exp(1.12) = 3.06. So in terms of percent change, holding all other variables at certain value, we will see 206 percent increase in the odds of getting a final examination pass mark for a one-unit increase in English as home first language. Holding all other variables at certain value, the odds of getting a final

examination pass mark in ACCT101 for a one-unit increase in the interaction variable English as home first language by matric Accounting scores is exp(1.20) = 3.32. So in terms of percent change, holding all other variables at certain value, a 232 percent decrease in the odds of getting a final examination pass mark will be seen for a one-unit increase in the interaction variable English as home first language by matric Accounting.

Table 4-25: Student Performance in Accounting 101 (Binomial Logistic Regression), FMS, CLMS, 2008
(Dependent Variable is Student's Final Examination Pass/Fail Marks in Accounting 101)

Predictor variables	Coefficients	Stand. Error	Z-value
Total matric points Equal or Above 36	1.85**	0.59	1.93
HG D in matric Maths	1.56	0.79	0.87
Matric Maths	0.90	0.09	-1.11
ECON101	6.19***	1.64	6.89
English as home first language	0.95	0.26	-0.18
Log likelihood = - 239.63 Number of obs = 1006 Prob > chi2 = 0.0000 LR Chi-square statistic (7) = 59.46 Pseudo R^2 = 11%			

Source: Estimation

*Significant at 10 percent alpha level;
** Significant at 5 percent alpha level;
*** Significant at 1 percent alpha level.

For the 2008 academic year, holding all other variables at certain value, the odds of getting a final examination pass mark in ACCT101 for a one-unit increase in ECON101 is exp(1.85) = 6.36. More explicitly in terms of percent change, holding all other variables at certain value, we will see a 536 percent increase in the odds of getting a final examination pass mark for a one-unit increase in ECON101. Holding all other variables at certain value, the odds of getting a final examination pass mark in ACCT101 for a one-unit increase in total matric points (or APS) equals or above 36 is exp(6.18) = 482.68. More explicitly in terms of percent change, holding all other variables at certain value, we will see a 48,168 percent increase in the odds of getting a final examination pass mark for a one-unit increase in total matric points equals or above 36.

A perusal of the results presented in Tables 4-26 and 4-27 reveals that in the 2004 academic year, the odds ratio in favour of getting a final examination pass mark in ACCT102 is exp(0.08) = 1.08 for a one-unit increase in total matric points (or APS), holding all other variables at certain value. More explicitly in terms of percent change, the coefficient for total matric points says that, holding all other variables at certain value, we will see 8 percent increase in the odds ratio of getting a final examination pass mark in ACCT102 for a one-unit increase in total matric points.

Table 4-26: Student Performance in Accounting 102 (Binomial Logistic Regression), FMS, CLMS, 2004
(Dependent Variable is Student's Final Examination Pass/Fail Marks in Accounting 102)

Predictor variables	Coefficients	Stand. Error	Z-value
Total matric points	0.08***	0.04	2.37
Matric Maths scores	-0.22**	0.11	-2.03
English as home first language	-0.84**	0.42	-2.00
Age	0.08**	0.04	2.14
Gender	-0.09	0.38	-0.25
ISTN 101	-0.00	0.02	-0.18
Constant	-0.37	2.12	-0.17
Log likelihood = - 110.80958 Number of obs = 514 Prob > chi2 = 0.0502 LR Chi-square statistic (6) = 12.58 Pseudo R^2 = 5.37%			

Source: Estimation

* Significant at 10 percent alpha level;
** Significant at 5 percent alpha level;
*** Significant at 1 percent alpha level.

To get a final examination pass mark in ACCT102, the odds ratio is exp(0.22) = 1.25 for a one-unit increase in matric Maths score, holding all other variables at certain value. More explicitly in terms of percent change, the coefficient for matric Maths scores says that, holding all other variables at certain value, we will see 25 percent decrease in the odds ratio of getting a final examination pass mark in ACCT102 for a one-unit increase in matric Maths score. To get a final examination pass mark in ACCT102, the odds ratio is exp(0.84) = 2.32 for a one-unit increase in English as home first language, holding all other variables at certain value. In terms of percent change, the coefficient for English as home first language says that,

holding all other variables at certain value, we will see 132 percent decrease in the odds ratio of getting a final examination pass mark in ACCT102 for a one-unit increase in English as home first language.

Table 4-27: Student Performance in Accounting 102 (Binomial Logistic Regression), FMS, CLMS, 2008
(Dependent Variable is Student's Final Examination Pass/Fail Marks in Accounting 102)

Predictor variables	Coefficients	Stand. Error	Z-value
ACCT101	1.16***	0.04	4.99
HG D in matric Maths	0.17***	0.16	-2.29
Matric English I	1.27***	0.13	2.24
Age	0.97	0.02	-0.94
Race	1.98	1.32	1.02
ECON 101	1.31	0.56	0.64
Log likelihood = - 86.895642 Number of obs = 513 Prob > chi2 = 0.0000 LR Chi-square statistic (6) = 54.76 Pseudo R^2 = 24%			

Source: Estimation

* Significant at 10 percent alpha level;
** Significant at 5 percent alpha level;
*** Significant at 1 percent alpha level.

To get a final examination pass mark in ACCT102, the odds ratio is exp(0.08) = 1.08 for a one-unit increase in the age of the student, holding all other variables at certain value. In terms of percent change, the coefficient for the age of the student indicates that, holding all other variables at certain value, we will see 8 percent increase in the odds ratio of getting a final examination pass mark in ACCT102 for a one-unit increase in the age of the student. None of the first-year module final examination marks was statistically significant to explain academic performance of students in ACCT101 and ACCT102.

For the 2008 academic year, holding all other variables at certain value, the odds of getting a final examination pass mark in ACCT102 for a one-unit increase in ACCT101 is exp(1.16) = 3.19. So in terms of percent change, holding all other variables at certain value, we will see 219 percent increase in the odds of getting a final examination pass mark for a one-unit increase in ACCT101. Holding all other variables at

certain value, the odds of getting a final examination pass mark in ACCT102 for a one-unit increase in Matric English I is exp(1.27) = 3.56. In terms of percent change, holding all other variables at certain value, we will see 256 percent increase in the odds of getting a final examination pass mark for a one-unit increase in Matric English I. Holding all other variables at certain value, the odds of getting a final examination pass mark in ACCT102 for a one-unit increase in the race of the student (white students = 1) is exp(1.98) = 7.24. So in terms of percent change, holding all other variables at certain value, we will see 624 percent increase in the odds of getting a final examination pass mark for a one-unit increase in the number of white students. Holding all other variables at certain value, the odds of getting a final examination pass mark in ACCT102 for a one-unit increase in the age of the student is exp(0.98) = 2.66. In terms of percent change, holding all other variables at certain value, we will see 166 percent increase in the odds of getting a final examination pass mark for a one-unit increase in the age of the student.

A perusal of results presented in Tables 4-28 and 4-29 indicate that in the 2004 academic year, holding all other variables at certain value, we will see 54 percent decrease in the odds ratio of getting a final examination pass mark in ECON101 for a one-unit increase in the HG symbol D in matric Maths score since exp(0.43) = 1.54. Holding all other variables at certain value, we will see 40 percent increase in the odds ratio of getting a final examination pass mark in ECON101 for a one-unit increase in the HG symbol D in matric Business Economics score since exp(0.34) = 1.40. Holding all other variables at certain value, we will see 3 percent increase in the odds ratio of getting a final examination pass mark in ECON101 for a one-unit increase in the age of the student since exp(0.03) = 1.03. Holding all other variables at certain value, we will see 256 percent increase in the odds ratio of getting a final examination pass mark in ECON101 for a one-unit increase in the quantitative method module MATHS134 since exp(1.27) = 3.56. Although some of the other variables had coefficients with the expected signs, none proved to be significant at the 1, 5, or 10 percent level.

Table 4-28: Student Performance in Economics 101 (Binomial Logistic Regression), FMS, CLMS, 2004

(Dependent Variable is Student's Final Examination Pass/Fail Marks in Economics 101)

Predictor variables	Coefficients	Stand. Error	Z-value
Total matric points equal or above 36	-0.11	0.13	-0.86
HG D in matric Maths	-0.43***	0.16	-2.73
HG D in matric economics	-0.04	0.41	-0.10
HG D in matric English I	-0.04	0.15	-0.28
HG D in matric business economics	0.34*	0.21	1.63
Non-black with matric Maths scores	0.22	0.33	0.68
Age	0.03***	0.01	4.09
Gender	-0.17	0.12	-1.44
English as home first language	-0.61	0.69	-0.88
English as home first language with matric Economics scores	0.34	0.68	0.50
English as home first language with matric Maths scores	0.54	0.39	0.21
ISTN 101	0.41	0.20	1.39
MATHS134	1.27*	0.79	1.61
Constant	-1.09	0.97	-1.13
Log likelihood = - 874.392 Number of obs = 1651 Prob > chi2= 0.0004 LR Chi-square statistic (13) = 37.37 Pseudo R^2 = 2.1%			

Source: Estimation

*Significant at 10 percent alpha level;
** Significant at 5 percent alpha level;
*** Significant at 1 percent alpha level.

For the 2008 academic year, holding all other variables at certain value, we will see 95 percent increase in the odds ratio of getting a final examination pass mark in ECON101 for a one-unit increase in the race of the student (White students = 1) since exp(0.67) = 1.95. Holding all other variables at certain value, we will see 5412 percent increase in the odds ratio of getting a final examination pass mark in ECON101 for a one-unit increase in ACCT101 since exp(4.01) = 55.12.

Table 4-29: Student Performance in Economics 101 (Binomial Logistic Regression), FMS, CLMS, 2008
(Dependent Variable is Student's Final Examination Pass/Fail Marks in Economics 101)

Predictor variables	Coefficients	Stand. Error	Z-value
Total matric points	0.99	0.01	-0.34
ACCT101	4.02***	1.19	4.70
Matric English I	1.02	0.03	0.65
English as home first language	1.16	0.22	0.81
Race	0.67*	0.16	-1.74
Log likelihood = - 438.5311 Number of obs = 716 Prob > chi2= 0.0001 LR Chi-square statistic (13) = 26.37 Pseudo R^2 = 3%			

Source: Estimation

*Significant at 10 percent alpha level;
** Significant at 5 percent alpha level;
*** Significant at 1 percent alpha level.

A perusal of results presented in Tables 4-30 and 4-31 indicate that in the 2004 academic year, holding the age and race of the student, non-black by matric Maths scores, and English as home first language at certain value, we will see a marginal one percent increase in the odds ratio of getting a final examination pass mark in ECON102 for a one-unit increase in ECON101 since exp(0.01) = 1.01. Holding ECON101, age of the student, non-black by matric Maths scores, and English as home first language at certain value, we will see 200 percent increase in the odds ratio of getting a final examination pass mark in ECON102 for a one-unit increase in the race of the student (white=1) since exp(1.10) = 3.00. Holding all other variables at certain value, we will see 2 percent increase in the odds ratio of getting a final examination pass mark in ECON102 for a one-unit increase in the age of the student since exp(0.02) = 1.02.

Table 4-30: Student Performance in Economics 102 (Binomial Logistic Regression), FMS, CLMS, 2004

(Dependent Variable is Student's Final Examination Pass/Fail Marks in Economics 102)

Predictor variables	Coefficients	Stand. Error	Z-value
ECON101	0.01*	0.01	1.92
Race	1.10***	0.37	2.95
Age	0.02**	0.01	2.18
Non-black by matric Maths scores	-0.44**	0.23	-1.93
English as home first language	-0.97***	0.34	-2.87
Constant	0.43	0.37	1.14
Log likelihood = - 673.43 Number of obs = 1436 Prob > chi2= 0.0003 LR Chi-square statistic (5) = 23.58 Pseudo R^2 = 2%			

Source: Estimation

*Significant at 10 percent alpha level;
** Significant at 5 percent alpha level;
*** Significant at 1 percent alpha level.

Holding all other variables at certain value, we will see 55 percent decrease in the odds ratio of getting a final examination pass mark in ECON102 for a one-unit increase in the interaction variable non-black students by matric Maths since exp(0.44) = 1.55. Holding ECON101, age and race of the student, and non-black by matric Maths scores at certain value, we will see 164 percent decrease in the odds ratio of getting a final examination pass mark in ECON102 for a one-unit increase in English as home first language since exp(0.97) = 2.64.

Table 4-31: Student Performance in Economics 102 (Binomial Logistic Regression), FMS, CLMS, 2008

(Dependent Variable is Student's Final Examination Pass/Fail Marks in Economics 102)

Predictor variables	Coefficients	Stand. Error	Z-value
ECON101	1.15***	0.01	11.66
ACCT102	1.06***	0.01	4.96
HG D in matric English I	0.69*	0.15	-1.64
Race	1.38	0.41	1.10
English as home first language	0.63**	0.14	-2.96
Log likelihood = - 319.2593 Number of obs = 905 Prob > chi2= 0.0000 LR Chi-square statistic (5) = 432.07 Pseudo R^2 = 40.36%			

Source: Estimation

*Significant at 10 percent alpha level;
** Significant at 5 percent alpha level;
*** Significant at 1 percent alpha level.

For the 2008 academic year, holding all other variables at certain value, we will see 216 percent increase in the odds ratio of getting a final examination pass mark in ECON102 for a one-unit increase in ECON101 since exp(1.15) = 3.16. Holding all other variables at certain value, we will see 101 percent increase in the odds ratio of getting a final examination pass mark in ECON102 for a one-unit increase in the HG in Matric English since exp(0.70) = 2.01. Holding all other variables at certain value, we will see 90 percent increase in the odds ratio of getting a final examination pass mark in ECON102 for a one-unit increase in English as home first language since exp(0.64) = 1.90. Holding all other variables at certain value, we will see 189 percent increase in the odds ratio of getting a final examination pass mark in ECON102 for a one-unit increase in ACCT102 since exp(1.06) = 2.89.

4.4. DISCUSSION OF EMPIRICAL FINDINGS AND HYPOTHESES

This sub-section examines the statistical significance of the OLS and Logistic regression analyses above. It also presents a brief overview of the responses to the research questions set in the introductory Chapter 1 and compares these responses to the existing literature and relevant theoretical expectations.

Friedman (1953) warns that a theory or hypothesis that is not verifiable by appeal to empirical evidence may not be admissible as a part of scientific enquiry. Eisenhauer (2009) advocates that if discovering the (probable) existence of a relationship is sufficient, as occurs in this study, then significant results with little explanatory power are tolerable, but the relationship between significant and meaningful results is crucial and should be emphasized.

Premised upon the above views, before validating findings of this study as confirmation of educational production function theory, an enquiry as to whether the OLS and Logistic regression estimates are statistically significant must be undertaken. If the estimates are statistically significant, this suggests that this is not a chance occurrence or peculiarity of the particular data this study has used (Gujarati, 1995: 4). As has been discussed, the findings can then be used to predict students' academic performance in the FMS.

A perusal of both the OLS and Logistic regression analyses consolidated in Table 4-32 reveals that, on aggregate, each estimated equation mapped acceptable diagnostic statistics and trends across time can be discerned.

Table 4-32: Characteristics of the student Influencing University Performance in First-year Accounting and Economics Modules, FMS, CLMS.

Characteristics of the student	Ac101-O(a) 4	Ac101-O8	Ac101-L(b) 4	AC101-L8	Ac102-O4	Ac102-O8	Ac102-L4	Ac102-L8	Ec101-O4	Ec101-O8	Ec101-L4	Ec101-L8	Ec102-O4	Ec102-O8	Ec102-L4	Ec102-L8	Relative frequency in %
Total Matric Points	x	0.08*	x	x	0.4*	-0.04*	0.08*	x	x	-0.05*	x	x	x	x	x	x	31
Matric Maths Scores	x	-0.25*	x	x	-0.16*	x	-0.22*	x	-0.30*	x	x	x	x	-0.2*	x	x	31
Matric English I Scores	x	x	x	x	x	x	x	1.27*	x	x	x	x	x	x	x	x	6
Matric English II Scores	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0
Matric Accounting Scores	0.12*	x	x	x	0.25*	x	x	x	x	x	x	x	x	x	x	x	13
Matric Business Economics Scores	x	x	x	x	x	x	x	x	x	x	0.34*	x	x	x	x	x	6
Matric Economics Scores	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0
Total matric points equal or above 36	x	x	0.51**	1.85*	x	x	x	x	x	x	x	x	x	x	x	x	13
At least HG D in Matric Maths	x	x	0.47*	x	x	x	x	x	x	x	-0.43*	x	x	x	x	x	13
At least HG D in Matric English I	x	x	0.51*	x	x	x	x	x	x	x	x	x	x	x	x	x	6
At least HG D in Matric English II	x	x	0.82*	x	x	x	x	x	x	x	x	x	x	x	x	0.70*	6
At least HG D in Matric Accounting	x	x	-1.20*	x	x	x	x	x	x	x	x	x	x	x	x	x	6
At least HG D in Matric Economics	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	6
Age	x	x	-0.03*	x	x	-0.07*	0.08*	0.98*	x	x	0.03*	x	-0.20*	x	0. 02*	x	44
Gender	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0
Race	-0.26*	x	x	x	x	x	x	1.98*	x	x	x	x	x	x	1.10*	x	25
English as home first language	0.26*	x	1.12*	x	x	x	x	x	x	x	x	x	x	-1.2*	-1.0*	0.64*	38
English as home first language by Matric Maths Scores	x	x	x	x	x	x	x	x	0.32*	x	x	x	x	x	x	x	6
English as home first language by Matric Accounting Scores	-1.20*	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	6
Non-black by Matric Maths Scores	x	x	x	x	x	x	-0.84*	x	x	x	x	x	x	x	-0.4*	x	6
ACCT101	x	x	x	x	x	0.78*	x	1.16*	x	0.70*	x	4.01*	x	x	x	x	25
ACCT102	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1.06*	6
ECON101	x	0.58*	x	6.18*	x	x	x	x	x	x	x	x	0.13*	0.78*	0.01*	1.15*	38
ECON102	x	x	x	x	x	x	x	x	x	x	1.27*	x	x	x	x	x	0
ISTN101	x	x	x	x	x	x	x	x	0.29*	x	x	x	0.17*	x	x	x	13
ISTN102	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0
MATHS134	x	x	x	x	0.23*	x	x	x	x	x	x x	x	x	x	x	x	13
STAT101	x	x	x	x	-0.46*	x	x	x	x	x		x	x	x	x	x	6

(a) O: OLS regression

(b) L: Logistic regression

*Statistically significant.

x Statistically insignificant.

In many instances the estimated coefficients that attained statistical significance were found to be of the expected signs conforming with the *a priori* expectations. Explaining why other coefficients were found to be of signs not conforming with the *a priori* expectations is purely speculative and the researcher felt that it is pointless to speculate on these signs. Some of the salient variables are found from the OLS regression analysis but not in the Logistic regression analysis and *vice versa*. Although some of the other variables had coefficients with the expected signs, none proved to be statistically significant at the 0.01, 0.05, or 0.10 levels to be considered as salient determinants of student success. Salient variables are discussed together[16] since either one of the two models can be used for prediction because as has been discussed, the accuracy of prediction of both models is good and they are both fairly equally used in the existing literature. A brief discussion of salient predictors of students' performance in the FMS follows.

TOTAL MATRIC POINTS AND MATRIC SUBJECT SCORES

As hypothesized, students are admitted with total matric points (or APS) calculated on their proficiency in matric subject scores at school leaving level. With certain minima, matric Maths score and English score are designated in the minimum requirements for admission at UKZN. The key finding is that total matric points (or APS) has positive causal effects (31 percent in relative frequency) on students' performance for first-year accounting and ECON101 modules only. This trend is consistent over the years. Thus, total matric point (or APS) is, indeed, a predictor of university student success.

Evidence emanating from the empirical analysis indicates that matric Maths scores have positive causal effects (31 percent in relative frequency) on student performance for all the first-year accounting and economics modules. Matric Accounting scores have positive causal effects (13 percent in relative frequency) on student performance for all the first-year accounting modules only. This trend is consistent over the years.

In the Logistic regression analysis, total matric points equal or above 36 has causal effects (13 percent in relative frequency) on students' performance for ACCT101 only. HG symbol D in matric Maths has causal effects (13 percent in relative frequency) on students' performance for ACCT101 and ECON101 only. This trend is also consistent over the years.

[16] OLS and logistic coefficients are not directly comparable as discussed in this study, since in the OLS model, the dependent variable is a continuous student success, while in the logit model it is a discrete student success.

This is interesting as evidence emanating from the empirical analysis indicates that, total matric points and matric Maths scores were confirmed as weak predictors of university student success at undergraduate level in correlations sweep and when data were fitted in the educational production functions. Of interest to this study is that, evidence emanating from the empirical analysis reveals that good total matric points and quantitative method skills help students do well in accountancy and economics modules in the FMS. Thus, premised upon this finding, the admission process is expected to play a vital role in highlighting the differences in the pool of student populations being educated in the FMS, and this must be borne in mind when student performance is interpreted and discussed in Chapter 6.

RACE OF THE STUDENT

As shown by descriptive statistics, for the entire sample of first-year students presented earlier, black Africans and Indians constitute the majority in the FMS. The race of the student has causal effects on students' performance (25 percent in relative frequency). As hypothesized, the predicted students' final examination marks for all the first-year accounting and economics modules would be higher for white students than for non-whites holding all other variables constant. This trend is also consistent over the years.

HOME FIRST LANGUAGE

There are some positive linear relationships between English as the home first language and students' performance in first-year accounting and economics modules (38 percent in relative frequency). As hypothesized, English as the home first language has causal effects on first-year accounting and ECON102 modules but not on ECON101. This trend is consistent over the years. Of interest to this study is that, evidence emanating from the empirical analysis reveals that proficiency in English helps students do well in accountancy and economics modules in the FMS.

AGE OF THE STUDENT

As hypothesized, the age of student has negative causal effects (44 percent, the highest relative frequency in the Table 4-32) on students' performance in first-year accounting and economics modules. This is consistent across the accountancy and economics modules and over the years.

Pair-wise correlations sweep between, on the one hand, the age of the student at the point of admission into the FMS, and on the other the hand, student performance in first-year accounting and economics modules across the same five academic years were tested. A perusal of results (See Appendix B) reveals that the student performance in first-year accounting and economics modules is strongly correlated with their age at the point of admission into the FMS across the five academic years. That is, the predicted final examination marks for younger students would be higher than for older students, holding all other variables constant.

GENDER OF THE STUDENT

As hypothesized, the gender of the student is intricately related to the student's performance suggesting that a crude measure of gender of the student does not have a significant causal effect (zero percent in relative frequency) on students' performance. Premised upon the empirical results, it is not, however, possible to draw any strong conclusion regarding the effectiveness of gender of the student. Male students seem to not perform better than female students and *vice versa*. Therefore, gender of the student in the FMS is to a large extent fixed. Even without any additional information, this finding provides strong evidence that important educational inputs (i.e. characteristics of the student at the time of admission) can be influenced after the time of university entrance in the educational production function regardless of the gender of the students.

INTERACTION EFFECTS

As hypothesized, the interaction variables capturing students who coincidently have different attributes have causal effects on students' performance. For example, the predicted final examination marks in ECON101 for students who declared having English as their home first language sorted by matric Maths at the school leaving level would be higher than others who do not have these attributes. In the Logistic regression analysis, positive causal effects in ACCT101 would stem from students having English as their home first language sorted by matric Accounting at the school leaving level. The predicted final examination marks in ECON102 for white students sorted by matric Maths would be higher than those who do not have these attributes. However, this trend is not consistent over the years (6 percent in relative frequency).

It is worth mentioning that there is a relationship between the students' academic performance and other modules taught concurrently at university. In the OLS and Logistic regression analyses, the student success in the ECON101 module has been found to have causal effects (38 percent in relative frequency) on their success in the ACCT101 and ECON102 modules. The student success in the ACCT101 (25 percent in relative frequency), and MATHS134 and STAT181 modules (both have 13 percent in relative frequency) has also been found to have causal effects on the student success in the ACCT102 module. The students' final examination marks in ACCT101, ISTN101 (13 percent in relative frequency), and the quantitative method MATHS134 modules have been found to have causal effects on the student success in the ECON101 module. This possibly indicates that first-year students who pass do better in both the accountancy and economics modules.

In the Logistic regression analysis the student success in the MATHS134 module has been found to have causal effects on the odds ratio of success in the ECON101 module. The students' final examination marks in the ECON101 and ISTN101 modules have been found to have causal effects on the odds ratio of success in the ECON102 module. For the other first-year modules at the university level taught concurrently with economics, this possibly means that knowledge of Information Systems and Technology 101 helped students to understand Economics 101 and Economics 102 better. The results indicate that there is a fairly consistent relationship between students' academic performance in ECON101 and ECON102 modules.

Of interest to this study is that, evidence emanating from the empirical analysis reveals that, although the ECON101 module is not a prerequisite for ECON102, students who do better in ECON101 are more likely to also do better in the ECON102 module. Knowledge of Information Systems and Technology for business and having well-rounded quantitative MATHS134 skills helped improve final examination marks in the ECON101 and ECON102 modules. These relationships appear to be fairly consistent across the semesters measured. These findings have a variety of education policy implications that are discussed in Chapter 6.

4.5. SUMMARY

The correlations sweep indicated some pointer to settle the whole question on whether total matric points, mathematical knowledge, and prior knowledge of accounting and economics at the high school level are predictors of university student success. A perusal of correlations sweep across the five academic years

indicated that total matric points and selected matric subject scores that include Accounting, Economics, English I, and Maths have correlations with the student success in undergraduate accounting and economics modules.

A deduction from these results is that screening and admitting students with better total matric points (also referred to as APS) in the admission process should go a long way to help increase pass rates in first-year accounting and economics modules, and improve the retention of substantial numbers of students on the graduation path in the CLMS at large. These results confirm that students are generally more likely to do better in first-year accountancy and economics modules if they have been previously exposed to these subjects at high school level. It seems reasonable for the FMS to expect future student success in ACCT101 and ACCT102 modules as well as in ECON101 and ECON102 modules to have positive relationships with these listed determinants of student success.

Correlations sweep also indicated some pointer to settle the whole question on the predictors of student performance at the university intake level are wearing off as students progress to second- and third-year accounting and economics modules in the FMS. A perusal of results indicates that correlations factorized above are not wearing off as the student progresses in the FMS. Therefore, to some extent, the total matric points, matric Maths, and matric English I are predictors of student success after the intake level.

A perusal of the results illustrating correlations sweep between the student performance in first-year accounting and economics modules, on the one hand, and their performance in second- and third-year modules at university level reveals that, the student performance in first-year accounting modules are correlated with ACCT200, ACCT2ISR, and ACCT300. The student performance in ACCT101 and ACCT102 was correlated with their performance in ACCT2A0. Performance in ISTN101 and ISTN102 was also correlated with ACCT2ISR. The student performance in ACCT101 was correlated with ACCT102 in 2008. The student performance in first-year economics modules are correlated with their performance in second-year modules but were never correlated with the third-year module. All the pair-wise correlation coefficients between the student performance in first-year economics modules and second-year modules are statistically significant. Information systems and technology modules at the first-year level (ISTN101 and ISTN102) are good predictors of success in second-year accounting information systems (ACCT2ISR) modules and the student performance in first-year accountancy modules was a good predictor of success in ACCT200 module. First-year performance is not correlated with the third-year module. Correlations between second-year and third-year modules were never statistically significant.

A further deduction that can emanate from the empirical results is that passing students are more likely to do extremely well when they progress to second-year modules. Alternatively, struggling students are more likely to do extremely badly. Therefore, student performance in first-year ECON101 and ECON102 modules, as well as in the quantitative method course are good predictors of whether the student will perform well in the second-year economics modules, but they are inconclusive in predicting third-year modules. An important finding is also that the correlation between undergraduate modules and matric subject scores (or their aggregate total matric points) is not wearing off as the student progresses in the FMS, except that there is a relatively weak positive correlation between the student performance in ECON202S modules and matric English II, suggesting that students whose the home first language is not English and who wrote matric English II, are more likely to perform less well even at the second-year level. However, as these correlations have significant coefficients with low magnitude and they were sporadic and not persistent (have low probabilities), this study cannot jump to the conclusion that they are salient and straightforward predictors of student success, demanding further analysis.

The empirical results of the OLS and Logistic regression analyses and correlations sweep taken together provide a definite statistically significant support for some predictors, which have shown some evidence of linear relationships. Salient predictors of student success at university include total matric points (or APS), proficiency in English that is having English as home first language (not students who have taken English (I or II) at the school leaving level), and matric Maths performance. Student success in first-year accountancy and economics modules is also influenced by previous matric Accounting and Economics, and the student's final examination marks in ISTN101, MATHS134, and STAT181 at first-year level at university.

The logistic regression analysis also give support to a marked improvement in performance and pass rates at the upper end of total matric points (or APS)when using a typical total matric points threshold. Total matric points of 36 set as the entrance requirement for the BCom (Accouting) and BCom (General) degree was confirmed as good predictor of student success in the regression analysis. This finding suggests that total matric points (or APS) at the upper end are a relatively good predictor of university success at the intake level.

Age at the point of admission and the race of the students also play some role in predicting student success and can therefore be generalized to have an effect in boosting or impeding student success in the FMS. That is, respectively, a young age is statistically significant at the intake level, English as a first home language, and good quantitative skills help students do well in the FMS. Non-white students (black Africans,

Coloureds, and Indians) are likely to perform less well than white students. This later results on race does not imply that all black African, Indian, and Coloured students are not competent good and that it will be impossible for them to cope or do well in BCom (Accounting) and BCom (General) degree modules. There are non-whites students who are outperforming their white peers in the FMS.

A deduction that can emanate from the empirical results of the logistic regression analysis is that students who meet minimum requirements in terms of total matric points, have quantitative skills and English language proficiency, and sorted by other personal and some student demographics such as age and race of the student are more likely to perform better in first-year accounting and economics modules. More specifically, as hypothesized, the BCom (Accounting) and BCom (General) degree are the more mathematical degrees in the FMS, and the importance of mathematical skills to student success in the FMS has been supported in this study.

The results of these OLS and logistic regression analyses are robust across undergraduate accountancy and economics modules and across the two academic years. Thus, the results presented and discussed in this study can be generalized to any multiple linear regression model involving any number of explanatory (regressors) variables. These results are in line with national and international studies. Designated matric subject scores such as Maths scores and English I scores are salient predictors of student success in the College (Mitchell *et al.,* 1997). A positive correlation was found between student success and HG Maths scores, as well as the aggregate matriculation points at the Stellenbosch University (Horn *et al*., 2011). Yathavan (2008) notes that the total matric points (a student's high school aggregate) is the most influencing variable of first-year performance at the University of the Witwatersrand. Matric Maths and English scores are all related to first-year performance (Eeden, Beer and Coetzee, 2001; Yathavan, 2008). Duff (2004) is of the opinion that student performance in school examinations is a strongest predictor of first-year academic performance and progression at university. Mc Nabb *et al*. (2002) and Smith and Naylor (2001) found that final examination marks in first-year Maths at university is a good predictor of subsequent academic performance in economics. Horn *et al.* (2011) reported that academic performance in the first-year is an important determinant of success in the second-year and most matric subjects become statistically insignificant as contributors to academic success for second-year students.

This study, however, cautions that all the predictors identified in the regression analyses though important, play only a minor role since they predict only a proportion of the entire variance in the students' performance during the two academic years' cohort of students. This is evident from some of the pseudo R^2

and R^2 which ranged from as low as 2 to as large as 65 percent pointing out large variations in the explanatory power

Thus, this suggests that results from the regression analyses alone are not enough to explain entire variances in the performance of students in the College. Matric scores are only a small part of the overall picture in the characteristics of students (low coefficients not supported by the probabilities). Premised upon the evidence that emanated from the empirical results in the correlations sweep and in the regression analyses, the determinants of student performance are far from being predicted at the time of university entrance. This study suggests the implementation of additional mechanisms to be used in conjunction with the total matric points to select candidates in the College.

Indeed, international studies point out exogenous factors including *inter alia* hard work and discipline, previous schooling, parents' education, family income and self-motivation as factors that can explain differences in university student success. Siegfried and Fels (1979), for example, concluded that the student's aptitude is the most important determinant of his/her university success. Beron (1990) found that there is a link between the perceived usefulness of an additional course in economics and the performance of the students in a current economics course who want to take another economics course. These results have implications for selection and admission policy, curriculum development, module contents, module prerequisites, student support systems, and strategic planning to enhance the characteristics of students that help them become successful in the FMS. Thus, additional mechanisms are needed and should be considered in the selection and admission of candidates and their placement into appropriate curricular routes where they are more likely to be successful in the FMS. This study offers hypotheses, suggestions, and policy implications in the following Chapters 5 and 6.

CHAPTER 5

RESULTS AND DISCUSSION OF QUALITATIVE ANALYSIS

As quantitative analysis based results were discussed in Chapter 4, this chapter is devoted to discuss all the qualitative analysis based results. The discussion is organized under three sections. Section 1 discusses findings from focus groups. Section 2 offers some suggestions about keeping students on the graduation path. This is followed by the summary in Section 3.

5.1. FINDINGS FROM THE FOCUS GROUPS

To understand the processes of student attrition, poor graduation, and low throughput rates in South African universities at large and at UKZN in particular, the focus groups consisted of two kinds: (1) academic and non-academic staff, and community members, and (2) students themselves. These findings can, therefore, be generalized to the total target population of undergraduate students in the FMS but not beyond this parameter. These are examined in the following sub-sections.

5.1.1. PERCEPTIONS OF ACADEMIC AND NON-ACADEMIC STAFF, AND COMMUNITY MEMBERS

At a collective level, a few perceptions captured the majority of standpoints. These perceptions identified reasons for and how to curb student attrition, poor graduation, or low throughput rates faced by South African universities including UKZN. These included:

- Budget constraints in educational institutions (not commensurate to needs),
- Poorly prepared learners from high schools,
- Insufficient infrastructure and support systems *versus* the flood of students (also referred to as the "student boom"),
- Student-Lecturer ratios which are affecting the quality of delivery and engagement with students,
- Calls in the public arena for the accountability of HEIs,

- High cost factors with a lagged DoHET funding system and slow progression of students on their graduation path, and
- DoHET's requirement that participation and throughput rates in higher education be increased.

Budget constraints: for most of the participants in the above categories, student attrition, and poor graduation, or low throughput rates were perceived as the outcome of both dysfunctional educational institutions prior to entering higher education triggered by a fundamental mismatch between the resources available, and the educational challenges faced by HEIs grappling with greater diversity in the student body. Participants explained that the feeder high schools and the HEIs at large and UKZN in particular are under-resourced but over-challenged in terms of the purpose of schooling, meeting the national agenda of transforming higher education, organizational effectiveness (academic year planning, staffing, and class rosters/timetables), with budget constraints making matters worse (the budget was perceived as not commensurate with the needs). High cost factors result from the DoHET's lagged funding system and the slow progression of students on their graduation path.

Poorly prepared learners: academics expressed several criticisms with regards to students presently enrolled at UKZN and other South African universities. They perceived declining academic standards over the years at the universities, which are grappling to sort out the problems of poor quality students emanating from high schools. They explained that the bulk of first-year students are ill-prepared by high schools for higher education. This is coupled with the fact that some HEIs admit students with lower scores in matric because of their disadvantaged backgrounds in order to comply with DoHET recommendations. Collectively perceptions were that poorly prepared students from high schools educated in a context of budget constraints cannot improve educational outcomes in South Africa.

Insufficient infrastructure and support systems *versus* flood of students: participants perceived that the present dismal trends in higher education represent a misallocation of state resources (uneven geographical distribution of infrastructure and provision of public goods) that are becoming even scarcer in this era of global economic meltdown and financial crisis. Community members acknowledged that student support systems are crucial. Social disadvantages and the low educational background of parents were also alluded to. They stressed that a majority of students admitted to HEIs are first-generation students with a lack of parental involvement and appropriate financial support, lack of study materials, who cannot afford prescribed textbooks, equipment, and who have inadequate transport. These students tend to suffer from weaker family involvement, and face discrimination from their peers in the HEIs and in the communities.

Communities lack adults role models committed to contribute from the level of early childhood development to the transition to higher education. Generally, communities attempt to meet educational challenges with inadequate responses. There was also some hiatus around of the time of the merging of HEIs in South Africa and this contributed to poor student performance.

Calls in the public arena for the accountability of HEIs: some academics and administrators were puzzled by the growing calls for institutional efficiency and accountability targeted at HEIs by parents, members of parliament, or government policies. Their contention was that concerns about underachieving students should be directed to pre-university education, which affects the cognitive ability of students prior to gaining access to tertiary education. Contogiannis (2005) points out that the main reason for high failure and dropout rates, slow progression, poor graduation, or low throughput rates in BCom degrees is that the students are weak and do not put enough effort into economics courses that are demanding. Examinations are not usually difficult, students have the workbook, a lot of the questions were repeated from the tests, there was a mix of lecturers (so one cannot blame the lecturers), the marking has been fair, etc. HEIs are expected to find solutions not only to these educational challenges, but also to sundry others which are societal. It is wrong to assume that these issues do not influence Student persistence or retention in higher education. South Africa needs to close inefficient schools and create more centralised super schools, staffed by truly committed educators and allocate subsidies to bus pupils in. Both academics and administrators acknowledged being accustomed to low expectations: low pass rates, high dropout and failure rates, high student attrition, and poor graduation, or low throughput rates. Participants perceived that as the education system stands, with a keen sense of history inherited from apartheid, all South Africa needs are competent educators to effectively man the schools, not a wholesale rehashing or building of more schools.

Student-Lecturer ratios: academics argued that there is a disjuncture between efficiency in HEIs to government's transformatory educational policy goals. Academics feel that high student-lecturer ratios will drag the whole higher education system down (the higher student-lecturer ratio is about 56:1 in the School of Accounting above the national average of 46:1, where none of the participants knew the figures specific to Faculties or Schools at UKZN).

DoHET's requirement to increase participation and throughput rates in higher education: some academic and administrative staff members felt that to let in more educationally under-prepared students just to increase participations rate in higher education is a waste of the scarce resources devoted to higher education. A recurrent contention in the focus groups was that holding on to underperforming students

because of the DoHET's requirement to increase throughput rates is inefficient use of academic time and resources.

Individual perceptions are reported verbatim below to highlight the disparate reasons that are perceived to be responsible for high student attrition, and poor graduation, or low throughput rates.

1. *Students drop out not because they do not have the required I.Q. but because of the hardship of their socioeconomic background and family responsibility. Somebody needs to acknowledge that time must be spent on these non-HEIs related reasons* (male administrator at UKZN).

2. *Student attrition, poor graduation, or low throughput rate in South Africa is impervious to any effort and reform inputs because the school system is the one failing Matric pupils in term of the quality of learning provided. The school system is under-resourced, has an insufficient number of appropriately skilled educators, poor facilities and neighborhoods* (academic at UKZN).

3. We (*Academics and administrators) have acknowledged spending gratuitous time on tasks that are not traditionally our responsibility as well as solving problems that are beyond the remit of the HEIs. We have tried to help students by making teaching material available online and availing counselors, tutors and academic development officers but students do not meet us half way - it is just waste of resources* (Academic at UKZN).

4. *The blame lies with us – education stakeholders - not valuing education. Students have no manners but more rights than us. They do not do their homework and do not take discipline. If I knew what I know now I would have chosen a different career* (Academic at UKZN).

5.1.2. PERCEPTIONS OF STUDENTS

At a collective level, a few perceptions captured the majority of the Student standpoints. Among the amalgam issues are:

- Academic problems and timetable logistics and clashes (lack of English language proficiency, poor lecture attendance, lack of time management skills, inaction and lack of motivation),
- Life skills deficits or underdeveloped (time allocation and family responsibility),

- Financial (NSFAS) and accommodation issues,
- Personal issues (attitudinal, emotional, food insecurity, motivational, and psychological), Academic integration, and
- Housing, health and health care issues, security and transport.

Academic problems and timetable logistics and clashes: several students expressed a degree of resentment about career choice issues or at being "forced" to enroll in specific disciplines such Accountancy, Economics, and Finance (*my parent virtually forced me to major in this…*). A majority of students perceived their lack of proficiency in English (*they suggest that the university has to allow the dictionary in the exam venues for students to grasp the meaning of difficult concepts*), absenteeism and poor lecture attendance, especially if the HEI offers programmes taking place between Friday afternoon and Monday before noon as this impacts on their social lives. Academic skills deficits, lack of time management skills, lack of motivation, lecturers' lack of will, skills, and communication, and inaction were also seen as standing in the way of success.

Life skills deficits or underdeveloped: the majority of the students felt that their lack of understanding of the course content was the reason for poor success. Regardless of how good the lecturers are, or how many times lecturers might explain the lesson, they do not understand the content. This is setting them up for failure or for dropping out. Students are feeling bad about themselves (or their peers who are) performing poorly or dropping out and want desperately to persist on the path to graduation.

Financial and accommodation issues: the majority of students felt that they are entitled to state funding. They feel that as they are prioritizing studying, they do not have time to pursue alternative funding options such as a job. Government has to secure the provision of the NSFAS, which should cover books, notes (syllabus) and residence fees, and food or meal allowances. Students suggested that education stakeholders have to push for the education sector to be the largest of all government spending to deal with the backlogs in the education sector. Not only do they require that given educational objectives have to be achieved with the optimal use of scarce state resources, but also for greater accountability as measured by performance indicators.

Personal issues: a recurrent perspective in the focus groups was students acknowledging that they were committed, eager, and motivated to perform well, be successful and graduate. Students perceived that many of their peers lost motivation and thus, are failing to meet their needs and educational expectations because

they suffer from severe poverty and dismal environments, and other factors such as lack of parental involvement, insufficient personal effort or inability to adjust to the university environment, time allocation and preference problems (competing work, study, family responsibility, and leisure times) and family problems such as ill relatives.

In the focus groups, students stressed that they do not have educational aspirations and were organized perfunctorily just to get through the academic year. They felt that they should just pass the modules and graduate. They suggested that government use indicators such as exam grades, pass or failure rates, student attrition or retention rates, graduation or throughput rates, and educational credentials including the number of conferred certificates, diplomas or degrees; or years of schooling to assess the HEIs receiving state subsidies.

Academic integration: with regards to academic integration as measured by indices such as faculty interaction, campus life, employment activity within the HEIs, and financial aid availability many participants could not list three services available to students on campus. A majority of students perceived that communication with them is vital, yet nobody has informed them about the services available.

Students were informed during focus group discussions that the executive management of the UKZN acknowledges that creating a conducive learning and social environments for students is one of UKZN's strategic goals. UKZN has commissioned a 6 000 square metres student services centre at its Westville campus. This will house banks, cashiers, the fees office, the financial aid office, journal meeting rooms, recording rooms, student academic administration, student governance, student leadership development, the student learning centre, the SRC, the Deputy Dean of students, UKZN radio, and selected outlets including coffee shops and cafeterias, and a food court, etc. In addition, a marquee will be erected in the quad, which will provide seating for students during their leisure time (UKZN Corporate Relations, 23 August 2010).

Housing, health and health care issues, security and transport: issues of students' clinics, medical aid and insurance, irregularity of public transport to or from the university, filthy privately leased buildings for students' residences, harassment by security guards and other tenants, as well as cleanliness or lack of it in the University residences were raised. In the focus groups, students felt that there was poor provision of these services (*some participants perceived that they were public goods*). Students argued that UKZN, through specific departments such as students' housing, contracts these services providers, yet they are settling for far from the best.

At an individual level, six salient perceptions are reported verbatim below to highlight the disparate reasons for high student attrition, and poor graduation, or low throughput rates.

1. *I have withdrawn from another HEI to register here in the FMS because being intelligent in that university is a sin, other students were obstinately stalking and harassing me for assignments, tests and exams. I was distracted by other students making noise and kissing during the lectures. I also got robbed in daylight. I felt that I was not protected enough. Students are paying fees for their education and deserve customer service from the HEIs which must be encouraged to reinforce sanctions against these wrong doers* (honours male students at UKZN).

2. *I dropped out because I was bored and overwhelmed. Lecturers did not have content knowledge, reading from the prescribed textbooks and learning at the same time with the students during the lecture, and there was no added value in attending such too predictable lectures (*a female former student at UKZN*).*

3. *Studying is just a waste of money. I always pay fees and do not have time to attend or write the examination. My job is keeping me busy 24/7* (female student at Unisa).

4. *I failed because I was forced to vacate the residence and could not settle down and catch up along the semester as my books and study notes were kept in a different place from my dwelling* (first-year female student at UKZN).

5. *I did not write the supplementary examination (supps) just because I was on the farm and did not have the "bus fare" to come back for the supps. The university must have empathy in their endeavour to supply education run in parallel to an all encompassing effective support to students by helping them find ways to overcome hurdles. If I was given more support, I would be able to adjust to the demands of university life, and even out-perform other allegedly high quality students* (first-year male student at UKZN).

6. The NSFAS is the only option that I have. If I apply and I am turned away allegedly because it runs out of funds, I will protest until I get it. Otherwise, it will be impossible for me to pay the fees or buy even one single prescribed textbook.

5.1.3. SUMMARY OF FOCUS GROUPS FINDINGS

Based on a survey of the literature on education literature and consolidation of perceptions of education stakeholders through focus group discussions, this study has developed tables of all possible quantitative and qualitative factors of interest. These are provided in the following sub-sections.

The focus group participants did not feel that high schools nurture would-be students' cognitive skills as these students did not progress appropriately learning the widely applied Bloom's taxonomy of learning domains commonly referred to as KSA (Knowledge, Skills, and Attitude) directed to brainstorm the (1) knowledge (cognitive: mental skills); (2) the attitude (affective: growth in feelings or emotional areas); and (3) the skills (psychomotor: manual or physical skills) (Bloom, 1956).

Students from high schools find the HEIs learning environment quite different and struggle to make adjustments, they have misperceptions about the necessary effort levels at the point of enrollment, or their high school education is not good enough, setting them up to fail courses. Tewari *et al.* (2008) explain that the level of difficulty in the courses at the higher education level is higher and demands more time and organizational skills from students compared to high schools.

Research within the higher education sector in South Africa confirms the poor reading levels of students. A study conducted jointly by the Human Sciences Research Council (HSRC) and the Council on Higher Education (CHE) confirmed that about 77 percent of students who dropped out of seven South African universities indicated that the reason for their withdrawing was the difficulty with English as the language of instruction at their institutions (Ngcobo, 2009). Nel and Nel (2009) concurred that about 83 percent of faculty stated that the lack of analytical reading skills contributes to students' lack of success in a course. Many of students who were tested at the University of Pretoria had reading levels of Grades 7 and 8 pupils (Webb, 1999).

Numerous laudable education models of support to remedy the under-preparedness of students such as better-prepared educators, small tutorials, tougher standards, greater choice, academic development, and accountability have been recommended to unlock academic success for South African students, with no discernable success.

Foundation programmes and extended curricula funded by government grants are mainly adopted to improve access to higher education for previously disadvantaged population groups. At UKZN for example, specifically designed and fully-fledged extended curricula and foundational programmes (developmental or remedial) to develop cognitively advanced competencies in language, numeracy, writing and critical thought in order to smooth the entry into mainstream disciplines for under-prepared students who do not qualify for admission to its mainstream Colleges/Faculties on the grounds of their total matric points have been implemented.

Focus groups participants mentioned the paucity of coherent educational policies and appropriately targeted educational investments and institutional climate that can ensure that the maximum numbers of a cohort of first-year students at HEIs (generally under-prepared) are channeled and kept on the path towards graduation, and eventually cater for the desperate shortage of graduates and high-level skills needs. The education sector in South Africa requires a sound methodology, good strategic planning, and clarity of thought and application. Regrettably, the sector seems to have too many challenges and is not capable of meeting these requirements. This violates students' constitutional rights.

Steyn and Villier (2005) are of the opinion that the NPHE graduation rate targets are unrealistically high in the present educational environment and that non-commensurate foundation programmes for under-prepared students do little to solve the problem of the worsening throughput rates at many HEIs in South Africa.

In summary, focus groups participants felt that the high dropout and failure rates and slow progression that are fueling student attrition, poor graduation and low throughput rates in South Africa are the outcome of mainly developmental and cognitive shortcomings exacerbated by the low levels of parental education, the needs of youth in a poverty-stricken environment, peer behaviour, and lack of community input into prevention programmes to keep students in schools/HEIs.

The profitability of investment in education calculated in metropolitan areas in KwaZulu-Natal revealed that the social rate of return for all levels of education is higher than the average for the world (Steyn and De Villier, 2005). In KwaZulu-Natal, investment in education is a profitable investment for the state and South Africa at large, establishing a valid reason for the DoHET to increase public expenditure in education

in the province, and particularly in UKZN, which is fulfilling a multidimensional role in training students for the labour market and the sustenance of economic development.

There is a vicious circle. High dropout and failure rates, slow progression, student attrition, and poor graduation and low throughput rates over the years are imposing financial and budgetary penalties on HEIs, which must generate more income themselves to decrease the deficits due to the relative decrease in public funds linked to student retention, graduation and throughput rates.

The perceived reasons for high student attrition, and poor graduation and low throughput rates provided by participants are categorized into academic/cognitive, financial/resources and other factors and presented in Table 5-1.

Table 5-1 suggests that academic and financial reasons are not wholly to blame for student attrition, poor graduation, or low throughput rates in South African universities at large and at UKZN in particular. Indeed, this table has shed light on the considerable role of a number of factors involved, including personal, social, emotional, and job-related factors. In addition there are other sundry factors such as primary and secondary education, demographic and geographic characteristics such as age, ethnicity, gender, and race; and life events including criminal enterprises, death of parents or relatives, vulnerable groups, and loss of income, among others. However, financial reasons seem to be the most prevalent reasons. The labour market and the prospect of earning income early, either to improve the economic situation of the family or to enable the student to become financially independent, can attract students out of HEIs prematurely into unskilled jobs with poor prospects. Personal circumstances such as weaker support or exclusion of students with disabilities or health problems can increase the risk of educational failure. Addressing the variable needs of mixed ability groups of students is a challenge for HEIs (European Commission, 2011). The educational facts and issues emanating from the Table 5-1 are discussed in more detail in the following Chapter 6.

Table 5-1: Possible Reasons for student attrition of students, and poor graduation and low throughput rates

Financial/Resources
• Delayed notification or obtained insufficient funding (bursary, financial aid, loan, or scholarship) • Lack of infrastructure (inappropriate, under-resourced, or poor physical facilities) • Meal programmes (free, cheaply priced, or expensive) • Under-provision of Student learning technology (or support educational materials) • Sundry costs (cost of books, commuting, fees, housing, supplies, or tuition) • Loss of income (did not have enough money to continue or could not earn enough money while attending lectures, or sundry opportunity costs) • Sponsorship (cancellation, reduction in support, or withdrawal)
Personal/Social/Emotional/Job-related/Others
• Exclusion of students or behavioural problems (failure, pushed out, DP refusal, not meeting the progression rules, tenure expired, perceived to be disruptive or detrimental to other students) • Geographical location (large cities, high poverty areas, isolated, away from social support) • Student experience (treated disrespectfully, lack of diversity in student life and residential life, few people to identify with, services, xenophobia, disaffection, psychological withdrawal) • Achieved personal goals or dislike the university (lost of interest, able but given up, stop seeing a reason for staying, disengaged, less compliant students, just fade-out, dropped out) • Cost of alternatives (child care, make ends meet), with a migrant origin, or vulnerable groups • Desire and belief (lack of motivation, self-confidence, in comfort zone, out of lecturer's sphere of attention, resentment, bitterness, negative interaction or interactive process) • Onset of youth needs (acting out, over age, aptitude, immaturity, being disruptive during lectures, awkward or embarrassing others) • Commuting distance (lost of transportation, far away or moved out of province) • Death of parents/change in personal circumstances (circumstantial facts, disenchanted with student life, ill-health (or sick relative), or hunger (lack of meals, deficit subsistence budget)) • Accepted a job (entered the military, could not work and go to university at the same time) • Settled down into marriage (children, family responsibility) or individual circumstances • Criminal enterprises (environment, household, community, neighbourhood) or self-protection • Lack of community endogenous effort input into prevention programmes to keep students at universities (students lack prospects within their chosen educational pathway or not feeling valued by the community so they leave the university)
Academic/Cognitive
• Academics/administrators lacked communication (caring attitude, consultation, or empathy) • Courses/disciplines/modules/programmes (wanted not available or not what was wanted) • Inadequate support system or bridge/remedial programmes (teaching less able/disadvantaged students, access for students with disabilities, lecturer-student difficult relationship) • Institutional management/organization (HEI's education policies, style of management, course content too hard or lengthy, lack of needed resources, cultural diversity • Lectures lacked content knowledge (teaching quality, assessment of Student achievement) • Poor learning environment (class size, lecture theatre, timetable clashes, lack of evening classes) • Transient (emigration of) outstanding academics/administrators, executives, leaders • Absenteeism (needed a break, access to residence, LAN or lab denied) • Achieved short term academic goals (Non-Degree Purpose, gained job-related skills, personal interest, explored career options or improved job prospects) • Communication problem (language proficiency, disenchanted with assessment feedback or communication with academics, more or less ignored within the lecture theatre, humiliation) • Felt overwhelmed by demands of HEIs (heavy class loads, clashes in timetabling, could not connect HEIs to own expectations) • Inadequate orientation (confused, unsure of goals, low ability, poor advice, lacked assistance in the community or neighbourhood) • Poor academic preparation (disenchanted with own academic performance: poor grades, failure or repeat courses) • Poor study habits (lack of awareness of the demands of HE (difficulty of the course, error or misperception about necessary effort levels at point of enrolment or given up), peer behaviour • Transferred to another HEI (failed to cater for the student's special need) • Under-preparation from high school (enter the HEI below requirements or cut-off line; lacked prerequisites, knowledge, readiness and skills to succeed)

Source: Based on Focus Group Participants' Perceptions.

5.2. KEEPING STUDENTS ON THE GRADUATION PATH

Students or pupils generally leave the education system without qualifications because they are excluded on academic grounds, withdraw voluntarily for other reasons, or just drop out. In the UK, individuals who leave the education system without qualifications are more likely than graduates to be unemployed or involved in menial jobs, earn less, have worse health, experience family breakdowns, are convicted of crimes, and will in the long-term attract the attention of the government or public opinion by claiming social exclusion. Wolf (2002) explains that the consequences of non-completion of education affect people throughout their lives, and reduce their chance of participating in the social, cultural and economic dimensions of society. It increases their individual risk of unemployment, as employability depends strongly on the level of qualification achieved, as well as poverty and social exclusion. Even when they are in work, they earn less, tend to be in more precarious jobs, and are more often dependent on social assistance. It affects their lifetime earnings, their wellbeing and their own health and that of their children. It reduces their children's chances of succeeding at school (European Commission, 2011). Dropouts tend to participate less in democratic processes and are less active citizens (Gordhan, 2011; Tilak, 1999). Estimates of the costs of student attrition, and poor graduation, or low throughput rates in South Africa are not made in existing studies but it can be inferred from Wolf's study in the UK and evidence emanating from Tilak's study in East Asian countries that they are significant.

A consolidation of various perceptions emanated from the focus groups reveals that there is no single vision of how to solve the challenges facing the higher education system. Fixing it is a multi-faceted task with tentacles that reach beyond the scope of any particular economic entity (DoHET, 2011). Continued success in meeting the educational challenges of reducing student attrition, and increasing the graduation and throughput rates in South African universities is contingent upon enhancing the understanding of how socioeconomic backgrounds, high schools attended, HEI resource endowments and institutional features of the education system determine the quality of education provided to students in South Africa.

From the focus group participants' viewpoints, addressing the educational challenges of student attrition, and poor graduation, or low throughput in South Africa requires a compromise between all the education stakeholders. Societies function more effectively when the state and its citizens engage openly on how policies are formulated and implemented, demanding that efforts of the various education stakeholders have to be integrated (Lederach, 1997: chapter 4). The integration of various efforts will help set the stage for a genuine commitment to working in partnership towards shared goals. This will enable various education

stakeholders to represent the interests of the people in the wider arena and give them a voice whenever policies and decisions that affect their lives are being made by government. South Africa is nowhere near achieving this.

Participants repeatedly pointed out that approaches towards addressing these education challenges tended to be piecemeal, rather than a systemic approach (Leibowitz *et al*., 2009). Laudable initiatives are not sufficiently linked to other policies addressing the socio-economic welfare of South Africans. Despite the economic growth of the past 10 years, unemployment and poverty persist (Zuma, 2011a). Yathavan (2008) maintains that proposed solutions to the current unsatisfactory throughput rates at South African universities should not be assumed to be as simple as doing more of the same or even doing the same things in slightly different ways. Lefera (2010) stressed that if government does not act soon, the low literacy rate and lack of proficiency will increase poverty and crime in South Africa, undoing much of the progress the country has made.

Certainly there is no "one size fits all" policy that will reverse the student attrition and keep them on the graduation path in a particular country or educational institution. This study therefore suggests a holistic approach to educational policy making in South Africa involving government, the HEIs, students themselves, community groups, and CSOs (or NGOs) working together towards the overall objective of identifying and strengthening the HEIs plagued with high student attrition, poor graduation, and low throughput rates; the high schools that feed them, and students at risk of failure or dropout with appropriately targeted educational investments.

The OECD (2008: 58-59) lists the challenges faced by high school educators and learners. These are outlined in Table 5-2 below. With a few dissimilarities, these are the same challenges facing academics, non-academics, and students in HEIs, as was evident from the perceptions of focus groups participants.

Table 5-2: Contrasting the Challenges Perceived by High School Educators and Learners in South Africa

Learners	**Educators**
• Lack of books • High fees • Poor facilities • Large class sizes • Lack of educators and poor teaching (educators come late to school, leave early, do not explain or provide feedback on assessment and homework, spend too much of their time on administrative tasks)	• Poor conditions of service (low salaries, poor benefits, inadequate incentives, arbitrary redeployment, unprofessional treatment, lack of development opportunities, and insufficient support) • Policy overload and consequent work overload • Disintegration of discipline • Lack of facilities • Large class sizes • Poor parental participation • Role conflicts • Favouritism and nepotism

Source: OECD (Organisation for Economic Co-operation and Development), 2008:58-59.

None of the stakeholders in the higher education sector on their own has the ability, capacity, or is in a position to address legacies inherited by the sector that include *inter alia* inadequate schooling, social disadvantage, lack of parental involvement, and lack of financial resources. The conceptual model illustrated in the following Figure 5-1 stresses the vital role of each of the education stakeholders in keeping students on the graduation path.

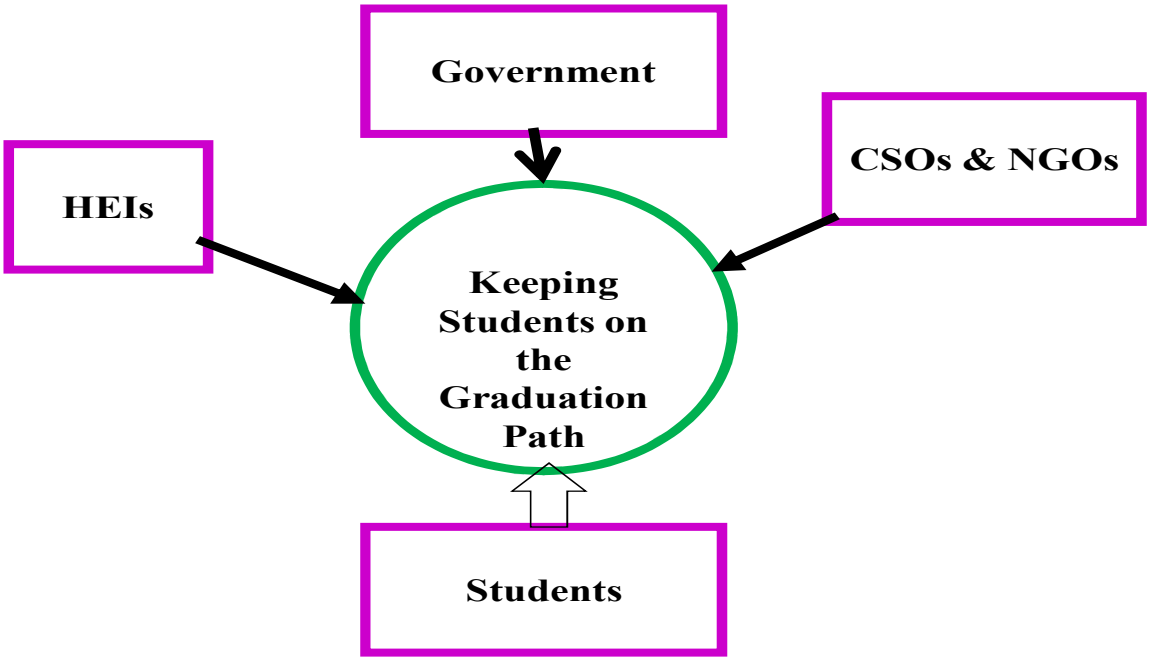


Figure 5-1: Education Stakeholders and keeping students on the graduation path.

At the outset, government is compelled to instigate an evolutionary path of national proven strategies that reverse the current trends to run parallel to a multi-stakeholder commitment to act swiftly, moving from one strategy to another. To this end, this study suggests a comprehensive model for sustained national action in Figure 5-2.

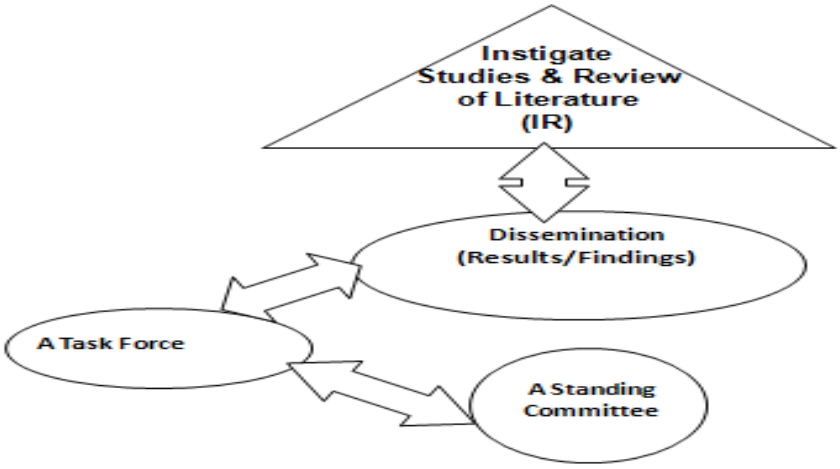


Figure 5-2: Comprehensive Model for Sustained National Action Plan on Attrition Rate

Source: Adapted from Sandel and Sydow (1997).

The model in Figure 5-2 entails: (1) instigating an institutional research and review of literature – to identify what the strategic indicators, proven strategies, best practices, and success stories are to determine how best to address student attrition, poor graduation, and low throughput rates in South Africa, (2) disseminating the results and findings – the South African government can host an education congress, a retreat or awareness campaigns to encourage the HEIs or schools to commit to the national initiative, (3) selecting a Task Force - to develop a comprehensive National Plan, and (4) a Standing Committee - to incrementally implement the comprehensive National Plan as well as cater for a well-timed assessment/evaluation.

In South Africa, local CSOs (or NGOs) and advocacy groups have been particularly effective in drawing attention to populations and communities that are often left out of public policy debates and deliberations. Their comprehensive community-based programmes of care and support are becoming a model for other organizations worldwide. They have also created awareness on government's compliance with its commitments or obligations in terms of education. Working in partnership with government, South African CSOs (or NGOs) and advocacy groups can play a central role in advocating for greater efforts and initiatives to enhance the country's education sector. Local CSOs (or NGOs) and advocacy groups can promote greater accountability by monitoring government's education activities, not foreign donors and international CSOs (or NGOs) or advocacy groups. They can monitor how government is discharging its commitments, functions, and obligations in meeting time-bound educational objectives. The role of each stakeholder is discussed in more detail in the following subsections.

5.2.1. GOVERNMENT KEEPING STUDENTS ON THE GRADUATION PATH

Government has to play the leading role in setting up a conducive framework for the achievement of the targeted education goals. There is a need to probe the possibility of innovative corrective educational model and tangible and visible educational activities and programmes in the context of South Africa's specific educational challenges. Before arriving at any conclusions about whether solutions are built from the top down (from government) or constructed from the bottom up (from the grassroots), or about how these are related, a clear picture is needed of an education and career journey, which will build career confidence; create a skill competency context that makes each course/module relevant, and help students ensure they have made the right programme choice. This study suggests the development of an analytical framework for describing the levels and magnitude of damages or areas of concerns in the education system with a view to setting up systemic lenses that will focus on addressing the identified damages or areas of concern, as suggested in Figure 5-3.

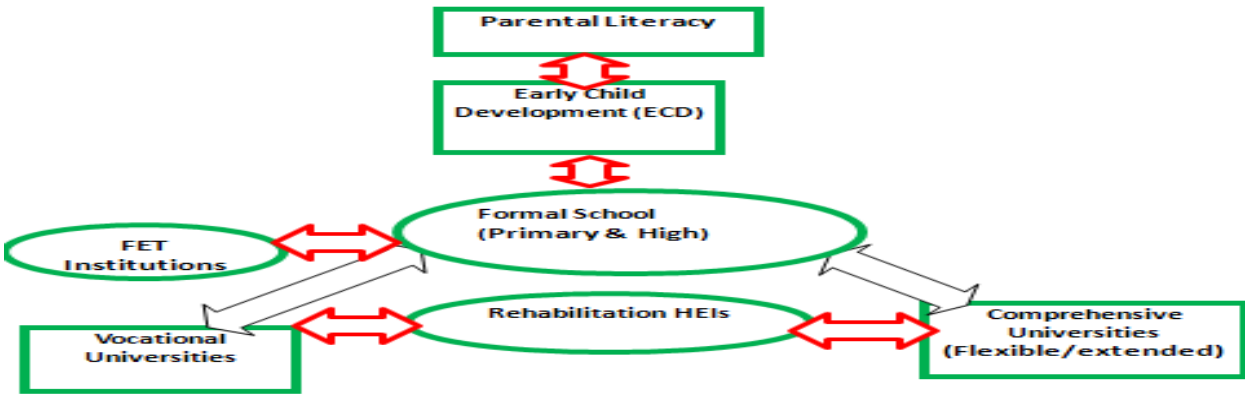


Figure 5-3: Link Between Stages of South Africa's Innovative Education System.

Figure 5-3 illustrates proposed multiple paths to graduation with traditional early child development (ECD), formal primary and secondary education, and higher education including comprehensive and vocational universities (foundation programmes and extended curricula), and Further Education and Training (FET) colleges and apprenticeship institutions. The laudable goal of unlocking student success in higher education discussed earlier hinges on effective strategies focused on both family-centered education programmes (parental literacy strategies to help them become full partners in the education of their children) and high quality educationally-oriented preschool since children benefit greatly from an early learning experience.

In addition, an array of second-chance options and alternative access to specifically developed institutions organized along rehabilitation centres or re-direction lines is suggested. The experience of failure, a lack of self-confidence in learning and increased social, emotional and educational challenges after dropping-out reduce the likelihood of achieving a qualification and completing education successfully (European Commission, 2011). These proposed alternative education and apprenticeship institutions will recruit only off-track students excluded on academic grounds to keep them on the graduation path. These centres can initiate collaboration with employers (the army, firms, care centres, the police, etc) and the HEIs to steer students into new degrees targetting higher-level skills shortages in key sectors of the South African economy. Giving financial support to HEIs, setting incentives, and helping dropouts to re-enter mainstream education through providing a so-called "second chance educational institutions" has proven to be successful in many European countries (European Commission, 2011). Lefera (2010) suggests that government subsidize more rural or black schools to assist them employ educators with much higher skills

and commitment. Suggestions to reduce student attrition, increase graduation and improve throughput rates might entail one or a combination of the steps (not in any particular order) outlined in Table 5-3.

Table 5-3: Suggestions to Government to reduce student attrition, increase graduation, and improve throughput rates

• Request the HEIs to report graduation and attrition of students annually which should run in parallel to a mechanism of control to prevent the HEIs from distorting those statistics (or face a government takeover). • Use enrollments data and documentation of HEIs as a foundation for developing an institutional action plan to prevent/minimize attrition of students. These data include *inter alia* (1) academic profile of students; (2) demographic, geographic, and family backgrounds.
• Focus intensely on the identified "troubled HEIs" that are plagued by attrition of students, poor graduation, or low throughput as the first step and provide targeted support to improve their educational offerings, provide additional support to their students, and create innovative teaching and learning environments adapted to their specific needs (European Commission, 2011). • Ensure that the educational challenges of each troubled HEI are understood by convening meetings, holding consultations, and hearings, and tackling these challenges to prevent the conditions from arising again.
• Greater government investment in appropriately targeted comprehensive, consolidated, coordinated, or integrated educational objectives such as teacher education programmes that have been shown to successfully equip teachers with clinical techniques and instruments to enable them to be more sensitive to South Africa's non-traditional students and keep them on the graduation path. • Systematic support and greater government investment in a wide range of common or specific educational programmes and initiatives focused on supporting social and economic transformation of students (including bursaries, scholarships, NSFAS and loan policies, stipend, etc).
• Probe the possibility of an innovative programme in the context of the specific challenges that will enhance student engagement, which should run in parallel to alternative access to specifically developed institutions for off-track students.

Source: Survey of the Higher Education literature.

5.2.2. HEIs KEEPING STUDENTS ON THE GRADUATION PATH

In terms of suggestions to HEIs, it appears that South Africa lacks appropriately skilled educators. The country's educational policies, such as widening access to HEIs, or government stimulating demand for students from previously disadvantaged population groups, have led to unexpected levels of diversity and many first generation students who were not adequately prepared by the school system or whose parents were not prepared to be partners in their children's education. While secondary schooling plays a major

role in enhancing a student's chances of success at university, teaching approaches at university play an equally important role. HEIs often do not provide sufficient and comprehensive targeted support for students to cope with their attitudinal, educational, emotional, and social challenges and to remain in their chosen educational pathways. High lecturer: student ratios were blamed in focus groups for undermining teaching and learning.

Smetherham (2009) is of the opinion that, while HEIs may get students who are badly prepared by the school system, if they can hold on to them long enough, work on their self-confidence, provide extensive support in development of the skills central to most HEIs' disciplines, and get them inducted into these disciplines, they will flourish and go on to graduate. Groves (2009) suggests that a flexible or long university degree that adopts a thorough and incremental approach to helping under-prepared students bridge the gap between high school and higher education could work in South Africa.

Students in South Africa are more likely to be products of poor quality schools, cognitively under-prepared, financially at risk, and may need support structures and systems to persist and graduate. At UKZN there are poor students who need more financial aid, loans, bursaries, or sponsorships. On the other hand, there are students who are poorly prepared cognitively who need extra academic support or an additional academic year to adjust and become fit to graduate. Emergent findings from focus group discussions suggested that even the most compassionate of decision-makers struggles to find ways of drawing the lines equitably between these binary divided categories and/or their mix with all that this entails - more financial resources being granted to HEIs, feeder high schools, and students; employing more academic staff; or working out a formula that would take the disciplinary statistics into account, both for scholarships and for cut-off points for NFSAS.

A recurrent perspective in the focus groups has been that to get the education system going, education stakeholders have to learn from the setbacks identified and rethink how to fine tune current support structures and systems in HEIs and feeder high schools, and to identify students at risk. Suggestions to reduce student attrition, increase graduation, and improve throughput rates might entail one or a combination of the steps (not in any particular order) in Table 5-4.

Table 5-4: Suggestions to HEIs to reduce student attrition, increase graduation, and improve throughput rates

• Keep track of student intake (progression/retention) and graduation (or attrition).
• HEIs to focus on the five benchmarks of effective educational practices, namely: (1) level of academic challenge, (2) active and collaborative learning, (3) student-staff interaction, (4) enriching educational experience, and (5) supportive campus environment (Strydom *et al.*, 2010)
• Improve accountability and analyze contributing internal and external factors that hinder student success. Consider strategies proven to promote academic diligence and ebullience among students and bring reversal in its trend (enhance academic preparation and motivation)
• Assess student satisfaction and identify endowment in terms of financial resources, physical facilities and infrastructure, and other incentives (cheaper meals and housing) that can beckon students and help them take cognizance of these support (bridge) programmes and services • Relevant here are issues surrounding the effective collaboration between Faculty, students' affairs administrators, students, tutorials in small groups, and the security or confronting inappropriate behaviours. Faculty members to adopt a duly permissive attitude in lecture theaters and give attention, time, and personal respect to all of the students (weak or able) to the same degree
• Focus on high schools that feed the HEIs by making input and valuing their input in connection with higher education standards and expectations in the early development of would-be students • A word of caution: there is no guarantee that through interaction with high schools, students will graduate. However, South African HEIs stand a good chance of retaining millions of students who would otherwise drop out if their expectations in terms of standards are known by high schools
• Implement a mandatory HE requirement that students attend academic orientation and counseling sessions. These will equip them with the necessary skills and referral options to support services and resources available to them as well as enable a reduction in the incidence of attrition
• Implement a mechanism of students' affairs and support (caring attitude, constraint or control) working collaboratively with the college, faculty, department, school, the administrator of the programme, the curriculum designer and parents; so that students are never in any doubt as to the different degree paths they can take and the choices available to them
• Be sensitive to student perceptions. Organize academic year planning, staffing, and class rosters/timetables on the assumption that large numbers of students will be absent, or drop out if it is unaccommodating. Acknowledge that teaching may need to be amended

Source: Survey of the Higher Education literature.

Participants acknowledged that for the sake of cash flow management, it is important to have a mix of programmes within one university. Generally, lecture (or tutorials) are offered in a manner that allows students to understand the relationship between different modules; for example, how does economics (laws

of demand and supply) link with accounting (capturing and proper recording of entries in bookkeeping – an economic activity). As students are engaged and involved in their own learning, they identify their strengths and weaknesses and are encouraged to consolidate their strengths and improve on their weaknesses.

It is widely recognized that small classes are better (Guney, 2009). The benefits include a holistic, interactive, and integrated approach to teaching to enable students to draw from their own experiences. The identical curriculum for both the BCom (Accounting) and BCom (General) degree means that first-year lectures are over-crowded with an average head-count of 1 500 students across the years measured (UKZN, 2004-2008). If lectures (or tutorials) in the FMS were run in small groups, students would be expected to be the main role players through discussions and debates (Zikhali and Bokana, forthcoming). This would help them improve their understanding of the material taught in the mainstream lectures, and lead to permanent learning. The FMS needs to understand how students learn in over-crowded venues. Thus, small classes are of benefit to UKZN, academic staff members, and students themselves.

A synopsis of student evaluations suggests that a mere 3 percent of students enjoy attending lectures (De Lange and Maharaj, 2010). This suggests that academic staff in the FMS, CLMS and UKZN need assistance in developing and improving their teaching approaches, methods, practices, and skills to attract students back into lectures theatres. An enabling educational environment is crucial if students from poorly-endowed schools and impoverished socio-economic backgrounds are to succeed at university.

Advances in technology have introduced a new language, a new discourse, new social networks, new engagement methods in an online environment, which together can result in the FMS, becoming a dinosaur. The Faculty needs to understand how students are learning in this new context and tailor traditional teaching and learning practices to appeal to students.

Focus group participants were of the opinion that the subsidy per student in the over-crowded first-year management studies modules is subsidizing other disciplines and stand-alone modules within UKZN. They want the funds provided from the intake of the FMS to be allocated to teaching and learning initiatives and student support structures and programmes within the CLMS to address educational issues. These include dedicated personnel – academic and support – tutorial venues and collaboration with student counseling services to monitor and encourage the development of academic staff and students so that they can reach their full academic potential in order to realize their career dreams and social potential (Author's own enquiry as a member of the FMS' Education Unit Board). This would be further strengthened by

cascading the management of different student support systems, structures and programmes down to School level. This would enable Schools to allocate adequate funds and educational resources in line with the CLMS' strategies, structures and areas of specialization.

The loss of students in some Schools within the CLMS could be seen as a gain rather than a loss, if only the proportion of the salary costs of academics engaged in teaching is taken into account. That is, the proportion of students at each level and discipline divided into the total salary cost for the Colleges, Faculties, or Schools. For instance, if in these Schools academics used to spend 40 percent of their time on research and 60 percent on teaching, small classes can reverse this time allocation to 60 percent on research and 40 percent on teaching, resulting in more publications and increased research output payouts. Small classes are beneficial since they can level the proportion of the salary cost per student of those engaged in teaching the modules and the staff: student ratios in the FMS.

5.2.3. COMMUNITIES AND CSOs/NGOs KEEPING STUDENTS ON THE GRADUATION PATH

In terms of suggestions to communities and CSOs (or NGOs), fundamentally, the decision to drop out will be a rational one, with students comparing the private returns on investment in higher education and from attendance in the HEIs to opportunity costs and returns from other activities or life events (Belfield, 2000). That is, whenever the relative earnings of educated people fall or the foregone income when attending classes increases, the education system's standard is undermined, student support is reduced, or attendance at lectures becomes less attractive compared to working or other life events – student attrition becomes a rational decision.

CSOs (or NGOs) incorporate special-interest groups such as farmers' groups, human rights groups, representatives from churchgoers, religious ministries and faith-based communities and organizations; business enterprises and shops-owners' groups, women's groups, workers' organizations and labour unions, the media, and private foundations among others. Essentially, CSOs (or NGOs) are made up of ordinary citizens: individuals, their families and communities - who organize themselves outside of government and the public sector in advocacy groups to deal with specific issues and concerns that the normal governmental process cannot address by itself.

Worldwide, it is recognized that CSOs (or NGOs) are the first to respond to any sort of crisis by organizing or taking initiatives which later become the foundations on which the country's response has to be built. Given that CSOs (or NGOs) are based in all communities, involve almost all the population and have an ethical base oriented towards demanding quality, this study's contention is that they are often an underused resource for education initiatives. Advocacy of CSOs (or NGOs) campaigns or through public protests have often drawn attention to their claims which have helped keep public issues such a dismal education system high on the political agenda. In most countries, local CSOs (or NGOs) initiatives remain at the forefront of prevention, care and support programmes, particularly in accessing and working with the most vulnerable and hard-to-reach populations as well as people whose behavior is condemned by legal and social systems. Because of government failure, local CSOs (or NGOs) provide an opportunity to raise awareness and share experiences with government and also monitor government's commitments to ensure that they are not just acts of tokenism.

To confront the disengagement of students in Naples, Italy, HEIs, in association with local CSOs (or NGOs), run a variety of open, after-hours educational institutions to encourage those who have abandoned mainstream education to re-engage.

The importance of local CSOs (or NGOs) in general, and particularly theirs role as a voice of the people is officially recognized in South Africa. CSOs (or NGOs) are expected to be tools for the achievement of set macro-economic objectives, meaning that they also play a vital role in enhancing the effectiveness of the education sector. The impact of social class and economic inequality as determinants of students' performance has been underlined by participants in focus group. They noted that access to higher education in South Africa needs considerable attention as it has the potential to influence the reproduction of the now defunct social order. Lederach (1997) emphasizes that CSOs (or NGOs) have to engage in advocacy to press for a range of necessary policy objectives and tasks, including *inter alia* campaign for better access to education which shall be free or reasonably priced, and more reasonably priced universities.

In Africa, however, there are some countries with little or no tradition of CSOs (or NGOs). In these countries tensions often exist between government and CSOs (or NGOs) that generate heated debate. In other African countries, while CSOs (or NGOs) have demanded and been granted recognition as equal partners with the same credibility as other traditionally incorporated participants to share their experiences and knowledge, their representatives often lack education, skills, confidence and/or financial resources.

Financial limitations also often result in local CSOs (or NGOs) not being able to participate effectively in coordinating mechanisms or being able to challenge power imbalances. Local CSOs (or NGOs) when funded by foreign donors and international CSOs (or NGOs) may end up being dominated by them, since they may impose conditions as a price for their financial contributions. There is a strong presumption that an education system must be locally "owned" and that its principles and aims must be widely accepted within the country if it is to be successful. Clearly, local CSOs (or NGOs) help to change official attitudes towards vulnerable populations and to spread both the concept and practice of democratic governance and grassroots political participation. Suggestions to reduce student attrition, increase graduation, and improve throughput rates might entail one or a combination of the steps (not in any particular order) in Table 5-5.

Table 5-5: Suggestion to Communities and CSOs/NGOs to Reduce Student Attrition, Increase Graduation, and Improve Throughput Rates

• Play their role as watch groups (for practices of governance, unrealized government's educational commitments).
• Provide social services for disadvantaged educational institutions and students.
• Conduct nation-wide education, campaigns, publications, and other forms of dissemination of information against wrongdoing in education (accountability, governance of educational institutions, corruption, lack of transparency, etc.
• Collection of contributions, funds, grants, membership fees and other fund-raising activities for educational institutions faced with financial difficulties.
• Government's policies to help legitimizing CSOs/NGOs and their activities.

Source: Survey of the literature on higher education.

5.2.4. STUDENTS KEEPING THEMSELVES ON THE GRADUATION PATH

Participant themselves and the higher education literature surveyed did not concur about which factors have predictive power on high dropout and failure rates, slow progression, and poor graduation, or low throughput rates. These are seen as educational outcomes, rather than characteristics that can be anticipated in order to reverse them.

The top five determinants of student underperformance in the FMS ranked by frequency out a wide range of factors were: (1) Emotional or psychological problems, (2) Family responsibility, (3) Personal illness, (4) Academic study problems and (5) Financial issues (FMS, 2009). The 2010 FMS Education Unit report back indicated that about 46.6 percent of at-risk students declared that they were self-funded and were therefore financially vulnerable at some point in time. Collectively participants alluded to social and economic imperatives that they consider part of the national agenda in South Africa as they result from the history of the now defunct apartheid system. Many sectors in the country still bear the scars of that system, including imbalances in the provision of, and access to quality education. Participants widely acknowledged the under-preparedness of Black students and socio-economic disadvantage, which impacts negatively on student success. The need for improvements in teaching and learning at many schools, as some would-be students come to university with less fundamental learning in place than do others, was also stressed in focus groups. Participants felt that students from disadvantaged population groups want to improve their life, but that at the same time they lack a competitive mentality. These students themselves do not value education as much as they should, and their levels of achievement reflect their levels of dedication.

The issue of student funding arose repeatedly in the focus groups. Student cited the lack of funding as one of their biggest stumbling blocks to accessing university education and graduating. Many students expressed a sense of entitlement, and see themselves as needy by virtue of coming from poorly-resourced families and/or schools, many of these being no-fee schools. This study did not distinguish between student participants who receive funding from NFSAS and those who do not, thus avoiding speculation on which categories of students receive funding.

A number of overseas countries, as well as international organizations such as the World Bank, the International Monetary Fund (IMF), and the World Trade Organization (WTO), argue against public subsidies in higher education, maintaining that individuals have to contribute to a greater extent towards their own higher education costs (Steyn and Villier, 2005: 9; 15). In these countries, public subsidies of higher education are plummeting.

In South Africa, there is a policy tangle in public subsidies to the higher education sector. In general, South African HEIs and students are in competition for resources that are drawn on the same public goods (bursary, financial aid, funding, grant, scholarship, sponsorship, or subsidy). Article 29 of the Constitution of South Africa has been interpreted to mean that education is a basic right. For government to educate every child, education has to be a public good that should primarily be publicly financed (Steyn and De Villier, 2005).

South Africa is targeting increased participation rates in higher education. The DoHET (2011) has indicated that this increased participation needs to come in the form of poor students who cannot afford university. This will have important compounded multiplier effects on the full breadth of South Africa's economy, addressing poverty, equity, inequality, and redress as well as transformation and the empowerment of previously disadvantaged groups (Zuma, 2011b). However, higher education is not seen as a pure public good in South Africa. South African students make a substantial contribution to the costs of their own higher education. This is true even for students who are granted funding under the NSFAS, which subsidizes only a portion of education expenditure, mainly tuition fees. Other costs such as housing and transport must be borne by the students. For education to be deemed free, the bursaries provided must cover not only tuition fees, but also both the full educational expenditure and the earnings forgone. Otherwise prospective students from poorer socio-economic backgrounds will not bother to explore what forms of financial support are available in HEIs (Melck, 1982: 125). This could counteract the targeted participation rate in higher education of 20 percent.

Collectively, participants perceived that the crux of the problem lies in the general attitude of entitlement prevalent in the student population which is contributing to expectation that higher education can be pursued without the commensurate financial resources. Some participants felt that more resources should be provided in order to retain financially needy students who are academically fit. Others felt that more resources need to be dedicated to extended and foundation programmes. Certain participants, mainly academics, insisted that if the DoHET wants the increase in the participation rate in higher education to be steady, it would be unwise to give priority to students who fail, progress slowly or struggle academically.

Some participants questioned the rationale behind students who are not from previously disadvantaged population groups having to cover the cost of their own education. Most of the participants felt that all those who apply for NSFAS funding must be accommodated, since rejecting their applications deprives them of their democratic right to education. They felt that the current system, where limited financial aid packages are granted, defeats the object of increasing participation rates in South African universities at large and at UKZN in particular. Students disagreed with the backward allocation system which requires that students provide proof of passing from UKZN's Student Academic Records before they are granted financial aid.

The participants felt that evidence to demonstrate that the South African government is committed to Article 29 of the Constitution of the Republic of South Africa, which states that everyone has the right to basic and further education is at best tenuous. The cost of higher education may hamper transformation of the higher education landscape.

Other participants were of the opinion that student attrition can be seen as a gain rather than a loss for HEIs that offer distance learning, especially if those who drop out have paid fees but do not use the services.

Answering the question of who pays the cost of higher education in South Africa is vital. Participants acknowledged that government has imprinted its mark on the education sector. The policy framework for the achievement of laudable educational goals in South Africa is in place, but the challenge lies in its successful implementation. Otherwise, government's commitments will be seen as tokenism. A recurrent perception in the focus groups was that it is time that South Africa seriously re-aligns its education system, and brings the entire education sector up to date in order to afford each and every child the future he/she deserves. To achieve this end, government has to double, treble or even quadruple its education budget. Suggestions to reduce student attrition, increase graduation, and improve throughput rates might entail one or a combination of the steps (not in any particular order) in Table 5-6.

Table 5-6: Suggestion to Students to Reduce student Attrition, Increase Graduation, and Improve Throughput Rates

• Students have to envisage their own future and be proactive towards achieving it. This implies fine-graining sundry aspects of their educational, human, and social development.
• Improvements in the quality of students' effort (students' perceived effort and required higher education effort) and endogenous effort choices of students.
• Students have to value education and their levels of achievement have to reflect their levels of dedication.
• The whole question of priority in the allocation of subsidized resources to students is vital and should be seriously considered.

Source: Survey of the literature on higher education.

5.3. SUMMARY

To improve the likelihood of keeping students on the graduation path in higher education, South Africa needs to holistically localize and focus intensely on the HEIs (Strydom *et al*., 2010) or feeder schools to tackle the crisis of student attrition, and poor graduation and throughput rates as well as provide alternative access to specifically developed-second chance institutions for off-track students.

The FMS, CLMS is using results from the former Senior Certificate's as well as the new NSC's total matric points and Maths scores to rank student applicants since performance in school-leaving has been found to be a reliable predictor of student success at university level. Schöer *et al*. (2010) pointed that predictors of university success are becoming blurred and that South African universities are becoming unsure about how well the matric Maths scores reflect the underlying numerical and quantitative competence of students which is reduced significantly. First-year students battle to stay in degree programmes for a variety of reasons (Yathavan, 2008). For example, students find it difficult to adjust to the university environment, which is quite different from school; and the level of difficulty in the courses is higher and demands more time and organizational skills from students. As more students flood into lecture theatres, academic staff members struggle to maintain and boost quality. These are the educational challenges facing the FMS, which lead to a high level of failure at first- and even second-year level in the BCom (Accounting) and BCom (General) Degree. High dropout and failure rates, slow progression, student attrition, and poor graduation and throughput rates are not peculiar to UKZN, but are in line with trends at other South African universities and with the national average as shown in recent statistics from the National Department of Education (www.Doe.gov.za). International studies have also unveiled similar trends.

At the macro-economic level, South Africa needs more tax revenue to launch a more efficient education system at all levels along with social welfare programmes that reach the poor in general, and marginalized segments of society in rural communities in particular, as it is students from these sectors that are more prone to drop out or progress more slowly than their peers. Better educators; sufficient and adequate infrastructure, facilities and support systems; improved teaching and learning processes and outcomes, more relevant curricula, improved governance of educational institutions, an improved funding and financing system; systems for monitoring and enhancing the quality of education; smaller classes; and committed educators, parents, and students; amongst others have been suggested as factors that would enhance the education landscape in South Africa. Other studies concur with these conclusions (OECD, 2008; Njuguna *et al.*, 2008).

In the light of the suggestions made in the focus groups, South African universities at large, and UKZN in particular, can reverse the alarming rates of student attrition and poor graduation and throughput by implementing a consolidated national action plan rather than each education stakeholders adopting their own approaches. This approach has to run parallel to appropriately targeted educational investments requiring that the government and universities themselves be committed to helping students find ways to overcome the socio-economic hurdles that cause failure. The European Council, for example, aims to reduce student attrition to less than 10 percent which in turn will ensure that at least 40 percent of the younger generation in Europe has a tertiary qualification or equivalent (European Commission, 2011). It is not possible to develop an absolute mechanism that lead to no dropouts, and a 100 percent graduation and throughput rate; nonetheless, a strong negative correlation exists between prevention and public expenditure on laudable educational challenges and dropout or student attrition. Rectifying the inefficiencies and shortfalls in the South African education system and sticking closely to action plan suggested above will be expensive, and will require additional investment from tax payers, but this study has provided evidence that this course of action will be effective. This is discussed further in Chapter 6.

CHAPTER 6

CONCLUSIONS AND POLICY IMPLICATIONS

This chapter brings together, in the form of a synthesis, an overview of the thesis, the results that provide answers to the research questions, and specific recommendations. The chapter also links the results that emanated from the study to the priority education issues of teaching and learning; access and equity; governance and school leadership; efficiency and effectiveness; student evaluation, involvement, retention, progression, and graduation; throughput rates; and efficient use of educational resources.

The discussion is organized under three sections. Conclusions with respect to correlations sweep, regression analysis, and focus groups are discussed in Section 1. Section 2 discusses the policy implications. The chapter concludes with a discussion of this study's limitations and further research issues in Section 3.

Conclusions with respect to correlations sweep, regression analysis, and focus groups are discussed in the sub-section below.

6.1. CONCLUSIONS

This study formulated the following four research questions:

1. What are the determinants of students' performance in undergraduate modules that can be discovered *via* student records, specifically for first-year accounting and economics modules in the FMS?
2. Amongst these determinants, which ones negatively affect (impede) or positively affect (contribute to) students' performance in undergraduate modules in the FMS?
3. Are total matric points and selected matric subject scores predictors of university student success at undergraduate level in the FMS?
4. To what extent are total matric points and matric subject scores reliable and valid predictors of university student success at the first-year undergraduate level in the FMS?

These questions were examined using a range of measures generally applied in econometric techniques that include (1) OLS regression analysis (when the dependant variable is discrete), and (2) Logistic regression

analysis (when the dependant variable is dichotomous). As discussed in the methodology section, these regression analyses are useful for identifying possible salient predictors of students' performance and their results are reliable and replicable.

Treating each academic year as a separate statistical entity, this study applies an educational production function approach to examine the FMS as a manufacturer of student achievements/outcomes. Final examination marks attained by students (surrogate of educational outcomes/outputs) are assumed to be a function of several educational inputs that are transformed in the educational production process. Analogously to how firms produce outputs, the College uses teaching and learning processes, educational resources and technologies, funds and policies amongst other inputs to educate students to achieve educational outcomes/outputs (student success). To identify the determinants of students' performance (variables that make students perform better as a surrogate of educational outcomes/outputs), this study used focus group discussions, correlations sweep, and also fit final examination marks in two different educational production functions, applying two econometric approaches, namely, OLS and logistic regression analyses.

To determine which characteristics are salient for predicting students success in the College, this study examined: (1) whether matric (total or subject) scores are good predictors of university success, (2) whether success in first-year accounting and economics modules can be predicted based on knowledge of selected characteristics of students.

In this section, conclusions on correlations sweep are presented in Sub-section 1. Conclusions on the regression analyses: OLS and Logistic regressions are presented in Sub-section 2. Conclusions on the findings of focus groups are presented in Sub-section 3.

6.1.1. CORRELATIONS SWEEP

Theoretically, a correlation analysis measures the strength or degree of linear association between two variables. Whether total matric points or matric subject scores are good predictors of university student success is best examined by mining statistically significant correlation coefficients between the students' achievement on matric subject scores and their final examination marks at the university. Stakeholders have hypothesized that the quality of matrics being admitted as students to UKZN has been deteriorating, making it difficult for them to succeed in courses/modules that are demanding. With an eye to identifying meaningful good predictors of undergraduate student academic performance in the Faculty based on their matric subject scores, correlations between selected, designated matric subject scores (or their aggregate total matric points) and student success were tested in Sub-sections 4.1.1 and 4.1.2.

The results suggest that total matric points (or APS), matric Maths, matric English I (written at the school leaving level by students whose home first language is English), matric Accounting, and matric Economics across five indicator academic years (2004 to 2008) point out some significant relationships as the statistically significant correlation coefficients mined were low and sporadic. This finding suggests the existence of correlations between achievement in matric subject scores and student success at university. Arguably, these results suggest that total matric points (or APS) as calculated traditionally have some weak correlations with student success in the undergraduate accounting and economics modules across the years measured.

Correlation between matric English I scores and student performance in first-year accounting and economics modules suggests that the writing skills of students with English as their home first language across the years measured were poor, which impeded their performance. However, as these correlations were sporadic and not straightforward or consistent across the years measured, additional mechanisms were used to test this relationship.

Correlations sweep also indicated some pointer to settle the whole question on the predictors of student performance at the university intake level are wearing off as students progress to second- and third-year accounting and economics modules in the FMS. A perusal of results indicates that correlations factorized above are not wearing off as the student progresses in the FMS. Therefore, to some extent, the total matric points, matric Maths, and matric English I are predictors of student success after the intake level confirming that the correlations are not wearing off as the student progresses to the second- and third-year of their

programmes. Of interest to this study is that, after the intake level, students are aware of their academic performance in major subjects and are more goal orientated than first-year students (Gahagan and Hunter, 2006).

In order to select students, UKZN, like many other HEIs in South Africa, requires a list of designated matric subjects in addition to the matric Maths score and matric English score and gives them equal weight in the total matric points (or APS) calculation. This comprehensive correlations sweep between the students' performance in undergraduate accounting and economics modules and matric subject scores is indicating that if students performed well in matric subjects they were more likely to perform well in the CLMS. Thus, matric Maths and English scores are shown to be indicative of student success in the CLMS. Furthermore, if the quality of the teaching of Maths and English at high school level is poor, students can be expected to perform poorly in modules involving quantitative skills. This will hinder these students' success in undergraduate accounting and economics modules. These results concur with the general statement that the school system is failing students as students' grasp of the high school Maths curriculum has been deteriorating over time in South Africa. This is in line with existing studies that highlight the deterioration in the difficulty level of Maths content in the NCS curriculum at matric level (Umalusi, 2009).

6.1.2. REGRESSION ANALYSES: OLS AND LOGISTIC

In terms of statistical inference, the study followed closely the steps of existing studies that investigated the determinants of student achievement. As discussed in the methodology section, the educational production function was to be estimated in terms of students' characteristics alone: the characteristics of education institutions (I_{ij}) and the characteristics of academic/non-academic staff members (A_{ij}) were treated as constant.

Theoretically, a regression analysis estimates or predicts the average value of the dependent variable on the basis of the fixed values of the explanatory variables. The results of regression analysis consolidated in Table 4-32 established the relationship between students' performance at the intake level and their matric scores at the school leaving level. These results confirm the correlations sweep findings that students generally do better in first-year accounting and economics modules if they have been exposed to these subjects at high school. Characteristics of students that include *inter alia* total matric points, proficiency in Maths and English I, English as home first language, and other designated individual matric subjects scores

(such as matric Accounting and Economics scores) were good predictors of student performance in first-year accounting and economics modules.

Other personal characteristics and student demographics also play a role. For example, the age of the student has negative causal effects on student performance in first-year accounting and economics modules. That is, the predicted final examination marks for younger students would be higher than for older students, holding all other variables constant. Since the national average age at which students complete their matric in South Africa is between 17 and 20, it may be assumed that an older student or returning student of above 25 years of age at the point of university entrance would more likely not perform well or achieve slower progress than their peers of between 17 and 20 who just entered the higher education. Underperformance might have been caused by the fact that the students repeated some years in primary and secondary education (delayed educational career). The student may also have taken a significant break after completing secondary education, or may not have studied for a period of time (educational career break or a gap year). It might be because the student followed an alternative or longer educational route (for example enrolled *via* an access/foundational or extended programme) before attending university. Therefore, studying at a later age can be assumed to have a negative causal effect on Student academic performance.

Empirical results also give support to a marked improved in pass rates when students are selected and admitted strictly on the basis of total matric points of 36. Total matric points (or APS) and selected designated matric subject scores including mathematical knowledge and prior knowledge of accounting, economics, and English are good predictors of student performance in undergraduate accountancy and economics modules in the College at the upper end. Students admitted through Dean's discretion or the total matric points (or APS) requirements for the BAdmin or BBus Admin, or in access programmes which require less than the total matric points of 36 when placed in the BCom (Accounting) and BCom (General) degree curricular routes are less likely to be successful. These students exhibit a lower level of academic ability as measured by their performance in the matriculation examination and are expected to have poor success rates in their university study. These students compare unfavourably with their peers. This demands the development of a new curriculum for these students or their placement into appropriate existing curricular routes different from the BCom (Accounting) and BCom (General) degree, where they can be more likely to succeed. This is a problem that the advocates of multidisciplinary curricula have to address as it is a challenge to offer the same standard of accounting and economics modules to everyone.
These findings are in line with South African and international studies.

From this econometric analysis, it emerges that weak predictors of student performance are total matric points, matric Maths score and matric English score, students who have English as home first language, and non-designated matric subjects scores that include matric Accounting score and matric Economics score. However, the estimation of the parameters of the econometric model indicated that the variables included in the regression analyses play only a limited role in predicting the variance of student performance in the CLMS. This is evident from some of the pseudo R^2 and R^2 which are as low as 2 percent pointing out low explanatory power. The empirical results from the OLS and Logistic regression analyses reinforced the findings of the pair-wise correlations sweep. Determinants of students' academic performance are ambiguous as they are not straightforward measures of student quality, making the prediction of student performance a far more complex process.

As cautioned in the methodology discussed in Chapter 3, a certain proportion of students' academic performance is determined by the one or two predictors variables in this thesis' model but as for the rest of the causation – this resides in the mystery of the other factors that either were not incorporated in the model and thus not counted (such as some of those mentioned in the findings of the focus groups) or even conceptualized in the "African belief systems" (Spirit of *Ubuntu*, cleansing or ancestors' prayers; divine and fasting prayers; superstition, guardian angels' wings or lucky charms). These African belief systems affect the attitude of the student and this in turn affects his or her academic performance. For example, it was widely hypothesized that higher failure rates in ACCT200 over the years result from the practice of giving prior learning credit for ACCT101 and ACCT102 to students transferring from other (non-accredited) HEIs. These findings add a new dimension to the existing puzzle in the CLMS.

Other variables such as the context, the characteristics of UKZN and its institutional climate, environment, policies and services to students (Cohen *et al.*, 2009), socio-economic background, student demographics, intellectual leadership, proper learning infrastructure, motivational and psychological attitudes, the characteristics of academic and non-academic staff members (administrators and support staff), amongst others are equally important in determining Student performance. The context can encompass several academic, financial, social and other non-university related explanations that can broadly be classified in four categories that include *inter alia*: (1) late registration (often after an appeal process that runs till late in the semester), and failure in the first test which knocks the students' confidence and minimize their chances of their best marks being considered for the duly performed (DP) certificate, (2) absenteeism or sporadic attendance of lectures, while trying to get their heads around managing the time table, (3) lack of prescribed textbooks, and (4) lack of financial resources. There is a long list of other possible factors such as

university choices and behavior; class attendance, laziness or over-sleeping, partying, study location and commuting distance, employment status, interaction with academic and non-academic staff members and with peers among others, that could also influence student success.

Evidence to support these findings is drawn from a variety of sources. Guney (2009) examined designated endogenous and exogenous factors to search for determinants of students' academic performance and identified lecturers, assessment, teaching material, students with better numeracy backgrounds, attendance, work experience, future career, degree course, age, and the ability to perform better in accounting amongst the endogenous factors. Exogenous factors such as learning disability, part-time work, and personal problems cause students to lose concentration and therefore underperform in accounting. McPherson (1993) recommended a system of indicators, rather than a single indicator, taking into account that value-added indicators may fail to factor in the fact that educational institutions may have a differential effect on the performance of different types of student.

These results suggest that admission eligibility consider additional mechanisms in the selection of candidates and their placement into appropriate curricular routes where they are more likely to succeed. HEIs in South Africa are becoming innovative in screening their would-be students and placing them into appropriate curricular routes. Stakeholders at UKZN have to explore and identify the characteristics that are enhancing student achievement in the College coupled with other contextual variables in a quest to improve the pass rates and throughput rates, since this study has found them to be equally or more important determinants of student success.

6.1.3. FOCUS GROUPS

The focus groups were a mind-opener to the causes of student attrition, poor graduation, or low throughput rates that characterize South African universities. The introductory chapters of this study provide a good indication of the real problems the education sector in South Africa is experiencing. Tables 1-3, 1-4, and 1-5 highlight high failure rates and student attrition in the CLMS at UKZN. Table 1-1 suggests that many HEIs across South Africa share a similar pattern. South African universities as a whole fit the 'dropout factory' description, since on an average; half of the student cohort in South Africa will not graduate. The reasons listed in Table 5-1 are warning signs to look for when attempting to predict or pre-identify potential student attrition, poor graduation, and low throughput rates in South Africa.

In South Africa there is an increasing realization that widening access to higher education, enhancing the retention of students, or improving graduation and throughput rates are equally as important as alleviating poverty and enhancing socio-economic welfare. The focus groups provided cogent examples that showed that the problems in the education sector cannot be addressed unless poverty and socio-economic problems are resolved. A popular perception was that students from wealthy families receive a superior quality education prior to university and are thus better be able to progress and graduate in the allotted time. On the other hand, participants felt that intensification of the educational process through extended curricula increases the time spent on studies and this poses a dilemma for students from poor families, rural or poorer areas, and poorly endowed schools. When they are turned down by the NSFAS, they do not have the assets to serve as collateral for student loans or credit. To meet the high tuition fees, they have to take up paid employment. Students who work part-time during the academic year are more likely to fail or be excluded. Either way, these students are prone to drop out for financial reasons. This gives rise to an inevitable process of student attrition, poor graduation, and low throughput rates.

Participants perceived that the success of education reforms is closely linked to their integration with a broader package of socio-economic welfare programmes. Thus, education policies have to take into account various social and economic relief programmes and initiatives targeting impoverished households. Participants felt that government has to assist in by profiling households and assisting the community with applications for identity documents, various grants and pensions, foster care services, counseling in respect of substance abuse, and marital problems among others.

Even in a developed country like Canada, students require academic support. For example, 30 percent of students new to university reported in a University Entry Survey that their level of proficiency is poor in various skill areas critical for academic success and they would likely require the use of institutional support services to ensure their academic success (Dietsche, 2009). While it is difficult to assess the precise percentage of students who would need to make use of support services in South Africa, that percentage is likely to be larger in this country. Yathavan (2008) notes that in the Commerce Faculty at the University of the Witwatersrand, Johannesburg, 24 percent, 32 percent and 31 percent of students dropped out in the years 2000, 2001 and 2002 respectively during the first-year; and exclusion rates for first-year students were respectively 38 percent, 40 percent, 38 percent in the same years. At Unisa, many students have failed accounting and economics modules (Parker, 2006). At the Durban University of Technology, the bachelor of Technology in Commercial Practice which requires students to major in economics was phased out as a

non-viable offering (van Der Merwe, 2006). South African students in general are abandoning economics as a major (Vachris, 1999).

Setting up an efficient students' support system will decrease student attrition. In Europe, members of states pointed out that reducing the average European student attrition by just one percentage point would provide half a million additional qualified potential young employees to the European economy every year (European Commission, 2011).

Challenges, issues, lessons and recommendations identified through the focus groups that are in line with the quantitative results based on the educational production function examined in this study are briefly discussed below.

6.1.4. CHALLENGES, ISSUES, LESSONS AND RECOMMENDATIONS

6.1.4.1. APPLICATION OF THE RULES FOR DEGREES, DIPLOMAS, AND CERTIFICATES

In general, the value of a curriculum, degree programme, or qualification depends on the difficulty in obtaining it. Employers know that graduates who have weathered a rigorous curriculum, degree programme, or qualification are more valuable.

The strict application of UKZN's admission policies needs to be addressed. Strict application of the duly performed (DP) requirements, exclusion rules, and progression rules creates the perception that failure rates and student attrition are high. For example, in 2004, struggling students were excluded and then re-admitted. This distorted the failure rates and gave a false reading of UKZN statistics. In 2005, supplementary examinations were granted to students who achieved as low as 30 percent in ECON101 and 35 percent in ECON 201. This allowed a lot of students to rewrite, though the School was not optimistic that many would pass (Contogiannis, 2005). However, in the years that followed, readmission ceased or was not recorded, or DP requirements were not extended below their thresholds. The undoubtedly higher failure and exclusion rates led to a different reading of UKZN's statistics. Blind re-admission of students who might have no prospect of eventually graduating in within the stipulated time period was a costly mistake for UKZN as far as subsidy per student is concerned. Periodically monitoring students'

performance in miscellaneous degrees programmes and qualifications offered in the CLMS and taking the necessary action to mitigate the impediments is the better option and should be considered.

The FMS took cognition of the fact that rules are rules, and applied them strictly, since bending them in many cases give a false reading of statistics. The following Figure 6-1 illustrates a flowchart of standard undergraduate academic monitoring and an exclusion policy model that the College exclusion committee is going to apply strictly to ensure consistency.

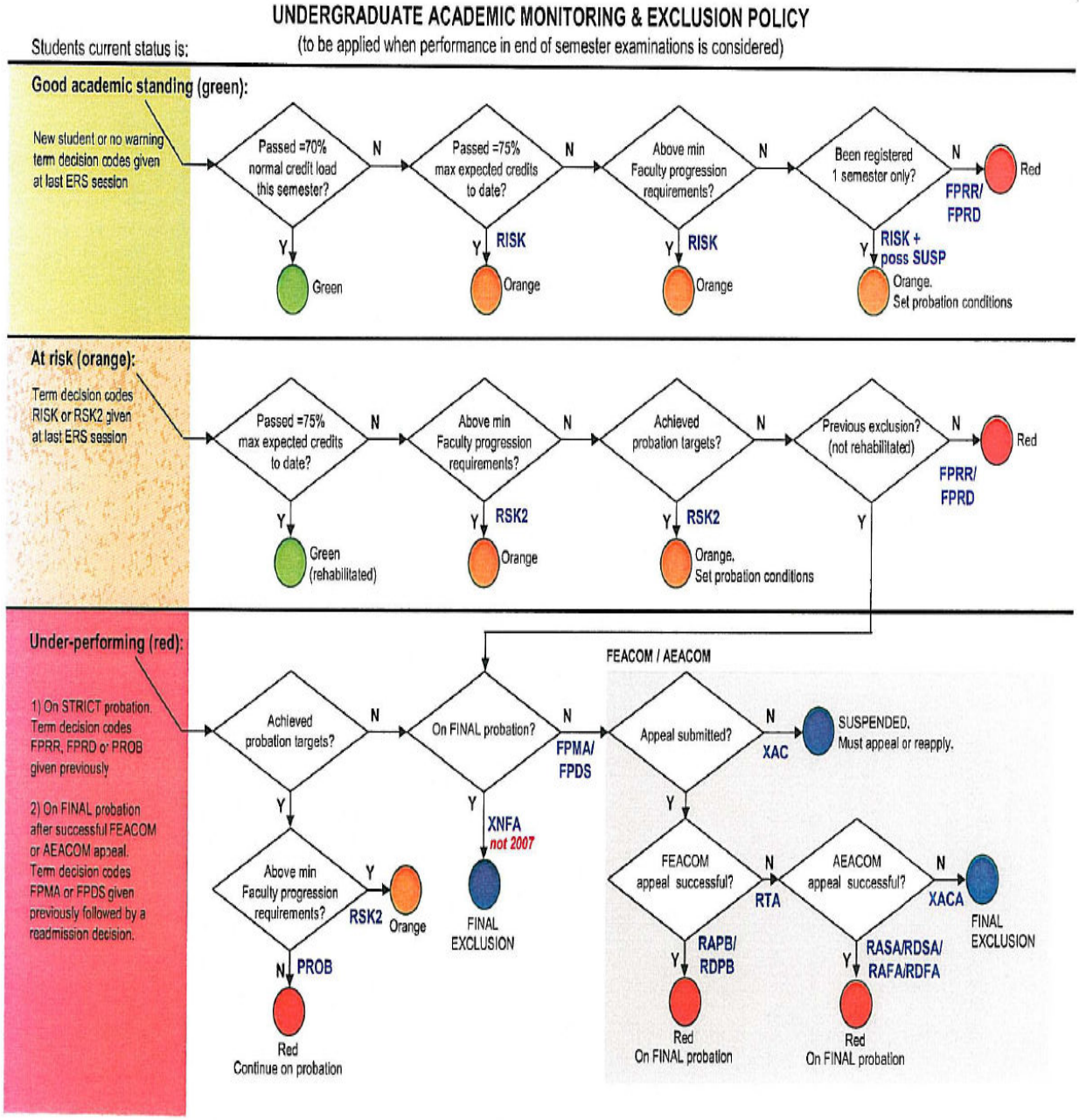


Figure 6-1: Flowchart of Undergraduate Academic Monitoring and Exclusion Policy copied from FMS (2011: 35).

6.1.4.2. STAFF DEVELOPMENT

Participants in focus groups frequently mentioned that South African students do not necessarily lack the requisite skills, but often lack the ability to mobilize these skills and effectively engage with their university studies as a consequence of the rote-learning context (Strydom *et al*., 2010; Moll and Slonimsky, 1989). Core teaching and learning processes in the College are hampered by high staff turnover rates and student-lecturer ratios. Many academic staff are on fixed term or contract employment but are expected to teach over-crowded first-year classes. The access programme (referred to as BCom 4 as it is an extended curriculum (the BCom 4- year rather than three)) poses additional challenges, as it lowers the minimum requirements for the mainstream disciplines in the BCom (Accounting) and BCom (General) degree (FMS Handbook, 2010). Academically disadvantaged students' difficulty in grasping module content generally stems from the fact that they were not taught to use their cognitive and language skills to analyze complex material in the highly abstract language and deductive nature of management studies during the high school years (Moll and Slonimsky, 1989).

Existing studies have identified techniques to overcome impediments to teaching and learning processes which, if adhered to, can go a long way to improve student success in the College (Strydom *et al*., 2010; Moll and Slonimsky, 1989; Shanahan *et al*., no date). These include improved training for lecturers and tutors, an improved understanding by staff of how students learn, better understanding of assessment techniques and their appropriate application, more flexibility in material delivery to meet students' diverse learning strategies, focusing on student engagement, and more lecturer and peer encouragement.

Staff development workshops are being run for academic staff and newly- recruited academic staff members are also encouraged to attend Centre for Higher Education Studies (CHES) modules specifically the higher education practice (HEP) module aimed at developing and improving academics' teaching skills. Non academic staff members (administrators and support staff) are granted full fee remission to further their studies at UKZN or where applicable, in other HEIs, and are also vigorously encouraged to attend University-run staff development and training programmes.

This study suggests that integrated staff development, and extended appointments for the more permanent academic staff, or academic staff with long tenure in the College, will contribute highly and go a long way towards staff continuity and stability. There is also a need for an ongoing evaluation of student support

systems in the CLMS to explore room for improvement and to take the necessary corrective action to curb the negative effects of over-crowded first-year classes. The student support system should aim to assist with acquisition of English language skills, as well as learning, writing and quantitative skills, which will enable them to cope with the more demanding modules in the College (Strydom *et al*., 2010; Edwards, 2000; Moll and Slonimsky, 1989).

6.1.4.3. CURRICULUM DEVELOPMENT

One of the major problems facing students in the College is coping with their curriculum. While the number of modules that a student is allowed to register for per semester is clearly stated in the Handbook, students effectively register for more or less than that. First-year students who are admitted into the access programme, BCom4 are not allowed to enroll for more than four modules per semester. They are also not allowed to attempt a higher level module until they have passed the lower level ones. They must take modules they have failed before registering for new modules. However, these students have augmented modules with compulsory tutorial hours which create congestion in their time table. The net result is that BCom 4 students have a higher workload than more able students in the mainstream disciplines who are studying for the same degree programmes. The curriculum for first-year students in the access programme, BCom4 should be rearranged, by merging of some of the first-year modules, or streamlining or extending modules (Zikhali and Bokana, forthcoming). Administrators involved in registration for modules should also aim to stick closely to the number of modules offered and the number of modules that a student is allowed to register for per semester.

All students in the 21st century belong to the digital generation trained in acquiring knowledge and skills, and are less accustomed to the passive forms of education such as lectures (Van den Berg and Hofman, 2005). To achieve substantial improvement in educational attainment in the present knowledge-based economics requires the adoption of a 21st century delivery model based on information and communication technology (ICT). This differs markedly from the traditional learning environment based on the 20th century industrial age model of “one size fits all”. This model ignores the diverse nature of the higher education student body (Dietsche, 2009). The current generation of the student has expectations, needs, and preferences that differ from those of previous generations. For example, in 2011, the resources for first-year economics modules were provided to all students *via* Moodle. In the first week, 1 420 students accessed the resources.

There is a need for academics in the Faculty of Management Studies to grasp, manage, model and enhance these new facets of education. This should include for instance, a reduction in the number of lectures or changes to the structure of lectures to incorporate technology. This would contribute to an improved transition to university education for this group (Leibowitz *et al.*, 2009; Van den Berg and Hofman, 2005).

Students are expected to take an active role and own their learning process requiring them to be prepared beforehand so they can maximize their understanding of the module contents and lectures. Tutorials in the Faculty of Management Studies are very different to tutorials usually encountered by students at university, which often merely involve a tutor going through a number of "tutorial questions". In the FMS, tutorials do not simply repeat the content transfer that characterizes lectures; instead they are largely based around small group discussions, activities, and interaction between students, which requires small size classes and their tutors being the facilitators. These tutorials are students-centred.

There is some validity in adopting advanced educational technology such as social networks even for economics tutorials to meet the students' technological expectations. A new paradigm requires that new ways of providing higher education to students around the world should be explored to accommodate student diversity, focus on individual students and create personalized learning opportunities and experiences (Dietsche, 2009). Keeping pace with technology-enhanced learning methods will go a long way towards greater personalization, provide a timely response to students' needs in this age of technology, multiple platforms such as social networks (Facebook, Moodle, Twitter and Skype) and mobile-based information flows, and greater productivity, which in turn will alter lecturers' and students' time allocation.

6.1.4.4. NSFAS AND STUDENT HOUSING PACKAGES

Financial difficulties were to blame for the majority of students struggling with their studies and therefore at-risk of being excluded at the end of the next semester on financial grounds. UKZN should explore innovative funding systems and housing tied to additional conditions to remove the element of free riding and low commitment. First, it is necessary to decide how to identify disadvantaged students.

For the disadvantaged schools, the DoE used deciles one to ten as ranking based on socio-economic measures of the poverty index from the 2002 Household Expenditure Survey of the school's catchment areas. Low deciles from one to eight schools are regarded as poorly endowed and producing disadvantaged

learners. This is not to say that there are not some poor students in the deciles nine and ten, but this category is difficult to systematically identify, as it is probably not yet incorporated in any of the official databases.

For this study, identification of disadvantaged students can be done using one of the following with each having its own limitations: crude measures of race; the matric authority (NSC versus IEB, or other assessment boards), discernible class-based differences, or former Model C white schools *versus* other typical schools. Based on this student screening system, a ring-fencing student funding system might be devised and innovated at UKZN at large (Zikhali and Bokana, forthcoming). This has great potential to improve participation and retention rates and eventually improve the throughput rates in the College.

6.1.4.5. COMMUNICATION WITH THE STUDENTS

UKZN in general, has a clearly defined uniform progression policy, which has built-in early warning indications to identify a *posteriori* students who may be struggling with their studies and therefore at-risk of being excluded at the end of the next semester on academic grounds. The profile of at-risk students is those who did not pass or succeed in 75 percent of their registered modules (FMS Handbook, 2011). The lists of at-risk and struggling students are sent to the FMS Student Performance Monitoring Unit, which is striving to set up effective support systems to deal with the challenges that impede academic success. The FMS Education Unit (FMS-EU) is committed to devising appropriate interventions for at-risk students and has recruited and trained Academic Development Officers (ADOs) to support these students in the various Schools. The Unit organizes student academic performance monitoring, mentoring and student development workshops, and in some cases, face-to-face tutorials with individual at-risk students to identify areas that may be of concern, and also monitors lecture and tutorial attendance. In conjunction with Schools such as the School of Economics and Finance, the Unit has also implemented a student-centred approach which encourages students who are not coping to attend study skills and time management workshops, promotes lecturer consultations and makes it compulsory for academic staff members to sign attendance registers after each lecture. Through the monitoring of students, academic and non-academic staff members in the School of Economics and Finance are able to intervene in most cases and assist students.

The Education Unit is the face of the College to students and their first port of call for queries. The remit of the Education Unit is supplemented by the Student Counseling and Wellness Centre, which has the aim to "timely identify at-risk students and to suggest retention interventions" (Author's own inquiry). The Centre

helps identify risk factors (students with risk factors of drop-out, poor academic performance, personal and life-threatening illnesses or suicidal feelings), and engages with physically challenged and troubled students especially where there are identified problems, and helps suggesting retention interventions, therefore addressing the needs of students holistically. Interventions take different forms but will invariably include counseling either by academic staff or student counselors in the Centre.

However, there still a number of challenges, including the capacity of the Education Unit and Student Counseling and Wellness Centre to address all the needs of the CLMS holistically and in terms of its structures and lack of coherence (overlap and duplication) across the constituent programmes. For example, students are confused about the role of academic support, career guidance, and counseling. Availability, accessibility, utilization, and effectiveness of these academic support programmes need to be re-assessed since in its current status it is confusing students. In many instances students who are in social crises or in doubt about their choice of major subjects are calling on the ADOs. Students with module, curriculum, tutorials, writing and reading, and Faculty-specific problems are calling on Students Counseling and Wellness Centre. Academic development becomes confused with counseling and career guidance, resulting in ADOs, Career Guidance and Counseling Officers not doing what they are intended to do, and students not received the professional academic support needed.

There is still a general level of ignorance in the student community about the key services available to them in the CLMS and the University at large. It is clear that its support systems appear to have a positive effect on student performance. The Education Unit is envisioned to become the operational arm of the strategic teaching and learning goals of the CLMS, but that can only be possible if it is appropriately and adequately supported and given commensurate resources. It is hoped, though, that with the inclusion of the CLMS Education Unit in many structures of the UKZN's Teaching and Learning, there will be increased levels of awareness (Author's own enquiry into the FMS Education Unit Strategic Plan, 2010).

6.2. POLICY IMPLICATIONS

The results of this study constitute important pointers as they elicit the relationship between the total matric points or matric subjects scores, on the one hand, and student success in the CLMS, on the other hand. The results of correlations sweep mined some positive correlations between student performance at university and their matric scores. Evidence emanating from the empirical analysis indicates that total matric point (or

APS) is, indeed, an important predictor of university success. The positive effect on students' final examination marks emerging from the empirical results suggests that exogenous factors such as the institutional environment, intellectual leadership, a proper learning infrastructure and environment, socio-economic characteristics, and psychological attitudes may have an important role in predicting the performance of students, demanding further investigation. Using focus group discussions, the results indicate that exclusion on academic grounds and financial difficulties are not wholly to blame. Other factors, including feeder high schools, life events, and the onset of youth needs are equally considerable hurdles and stumbling blocks on the graduation path.

The first policy implication of the results is that anecdotal evidences and hypotheses locating the strategic plan for recruitment, involvement, retention, progression, and graduation solely with student characteristics are challenged. Recommendations that have implications for admissions policies, teaching and learning practices, academic and curriculum development, placement of students in appropriate curricular routes, financial aid, and housing amongst others, strategic planning, and management are that the total matric points (or APS) alone cannot predict the major variance in academic performance of students at the university level. Additional mechanisms are needed to select and admit would-be students and place them on appropriate curricular routes where they are more likely to be successful.

Ways of addressing some of the educational impediments such as the development of academic staff members, curriculum development, admission policy and placement of students in appropriate curricular routes, the quality of teaching and learning, services and support systems as well as the most effective use of resources across the College were suggested earlier and should be explored.

A variety of institutional factors at UKZN combined with a host of student personal and demographic factors are impacting on students' academic performance. These include *inter alia* the institutional environment, intellectual leadership, the learning environment at the University, socio-economic characteristics, student demographics, cognitive factors such as ability, aptitude, cognitive drive and development, previous achievement at secondary school, and non-cognitive factors such as attitude, goal setting, interest, self-esteem, and study habits, learning styles, motivation, psychological and emotional backgrounds. The literature has identified these factors as possible predictors of university success.

For example, the fundamental principles of the White Paper on Higher Education adopted in 1997 have been re-affirmed at UKZN specifically in relation to access, equity and redress. There is a commitment to

transform the CLMS so that it becomes more equitable and inclusive of all of races in South Africa. Higher education is arguably the most effective and probably the direct route by which previously disadvantaged groups of population can be transformed and taken out of poverty. Increasing the participation rates of students from previously disadvantaged groups in the College improves their opportunity to enter and meaningfully participate in the mainstream economy of South Africa for a better life. The three key challenges that the College is likely to face include:

(1) Sustaining a responsive and engaged knowledge College which is fit for the purpose of transformation and development in South Africa as well as fit to respond to regional educational, social and economic needs.

(2) Increasing access to its constituent faculties (Law and Management Studies) and articulate education and training of students admitted *via* access programmes, particularly students from previously disadvantaged groups.

(3) Mitigating heterogeneity in the quality of intake and poor conditions under which many of these students learn and live. The findings of this study provide insights that can be used to guide teaching and learning in the FMS, specifically for those who are close to admissions decision-making and programme placement, curriculum design and development.

The importance of formulating strategic plans to improve student performance and also mitigate social challenges (NSFAS and housing) should be stressed. Otherwise, the CLMS will find it difficult to achieve the targeted throughput rates. The intended strategic plan to improve student achievement in the College has to be the outcome of a cooperative relationship in which the parties (UKZN's stakeholders) can obtain better education outcomes if they act together in a holistic approach (Kent, 93: 375) and requires the following, not in any particular order:

(1) The identification of potential courses of action is needed by determining what constitute the short-term and long-term actions and the specific methods in pursuit of them. If this entails increasing the throughput rates for example, then, what specific localized or shorter-term activities or steps should be taken to implement the overall College Strategic Plan to achieve increased throughput rates (i.e. identify where the current throughput rates are and where the College wants them to be in the near future).

(2) Well-timed assessments of the merits and limitations of selected courses of action so to allow the selection of the viable courses among existing options, alternatives, or the charting of completely new ones.

(3) Well-timed assessments of strengths and weaknesses of the constituent Schools or third parties such as the students, the NSFAS, or the Government which may assist or hinder the College's endeavour to achieving the laudable education goals targeted.

(4) An accurate sense of the whole context of the College and well-timed assessments of the impediments to achieving its laudable goals and the enabling factors that may facilitate the planned tasks.

This study suggests that the CLMS can be successful in averting or overcoming some of the educational constraints of its students if these findings were taken as guides for UKZN education policy-making, specifically for admission and placement of students in appropriate curricular routes. The centrality of the student-institution interaction such as institutional policies, and teaching and learning processes and practices has to promote student engagement, involvement, retention and success. In terms of retention, as soon as students are in the UKZN system, a holistic approach in the educational policy-making process and strategic planning should run in parallel to appropriately targeted educational investments – most likely from the government - which should operate like the financial crisis bailout in order to keep students on the graduation path, reverse the trend of attrition, and increase the throughput rates in the FMS, CLMS and at UKZN at large. A contention can be made in favour of increased public expenditure in education in the KwaZulu-Natal province of South Africa in which UKZN is located. This is because, the high social rates of return indicate that in KwaZulu-Natal investment in education is a profitable investment for the state and South Africa at large.

Academic administrators (Exco), UKZN's stakeholders, and education policymakers should be aware of the potential hurdles that South African students will have to clear specifically in their first semester at university in order to foster their retention in the degree programmes in the CLMS. The results of this study supported the findings in the literature surveyed that first-year experiences, specifically the student experience during the first semester at university (student success in ACCT101 and ECON101 modules), play a major role in reinforcing persistence in the HEIs. Students at the intake level coming from high school with high total matric points (or APS) into the CLMS will show consistent performance in BCom (Accounting) and BCom (General) degree only after their first semester in the College. For this study, the

academic development (AD) and support systems have to be integrated into the offered mainstream disciplines as an ongoing process to enhance students' engagement and grasp of materials.

The second policy implication of these findings is that admission criteria for different degrees offered in the CLMS based on the total matric points (or APS) systems calculated from the overall matric subject scores used in conjunction with one or combinations of specific designated matric subject scores are weak predictors of university student success. A fine grained inquiry of total matric points and designated matric subject scores by the matric authority to see if different examination boards produce different correlation results with the students' final examination marks at university should also be considered. If possible, a discriminating admissions policy with different levels of matric exemption as an entry requirement for students coming from different matric assessment bodies should be explored.

The third policy implication for those close to admission policy-making and process is that the recommendation by some UKZN's stakeholders that the admission eligibility criteria have to be revised is supported by this study. Specifically, the matric subject scores requirements and/or an entrance test should become prerequisites for selected undergraduate modules. BCom (Accounting) and BCom (General) degree programmes are some of the more mathematical degrees in the FMS. Student performance in first-year accountancy or economics modules is influenced by previous Maths performance at the high school level and the first-year Maths perfomance (for example, MATHS134 and STAT181 modules at university). It seems reasonable for students to expect future success in ACCT101 and ACCT102 modules as well as in ECON101 and ECON102 modules to be related to matric Maths scores and final examination marks in first-year Maths at university. Students' grasp and mastery of the high school Maths curriculum has been deteriorating over time and this is set to continue as the Maths content in the NCS curriculum is closer to the old NATED 550 Standard Grade than the Higher Grade, confirming the deterioration in its difficulty level.

Introducing a numeracy test for would-be students at the intake level, raising the existing Maths score entrance requirements specifically, of the BCom (Accounting) and BCom (General) degree, or increasing proficiency in Maths with a remedial module at university are expected to produce significant benefits for student achievement in the FMS. These can go a long way towards overcoming the decline in the difficulty of the Maths content curriculum at high school level and improve pass rates in undergraduate accounting and economics modules. It is cautioned that students with better high school subject records or better matric subject scores (specifically in Maths) tend to choose the natural sciences such as Physics, Biology, Chemistry, Computer Science, Geology and others (Rask and Bailey, 2002) rather than Management

Studies – a concern for the Executive of the College, which should explore ways of attracting these students. The FMS can undertake more aggressive advert to schools, for example. These points might explain why, pass rates for some disciplines in Management Studies at some competing HEIs in South Africa (having higher APS requirements) are better than the pass rates at UKZN (which has lower APS requirements) (Based on the author's inquiry into pass rates at South African HEIs).

The fourth policy implication arising from this study is that the examined matric subjects were useful for management-related studies and therefore should be given higher weight than other matric subjects (less useful for management-related studies) in the APS calculation. This study suggests that the College needs to consider revising its policy on the APS calculation specifically in terms of the designated matric subjects that are useful for management-related undergraduate studies in order to exclude those subjects which have little relevance, or give lower weight to them.

Knowingly admitting students who, for whatever reason, have no chance of academic success would be immoral (Yathavan, 2008). Specifically, the results of this study suggest that students who received below the total matric points (or APS) of 36 - requirements for acceptance to the BCom (Accounting) and BCom (General) degree in the CLMS - were much less likely to be successful in the approved first-year curriculum. These students are at risk of not coping with the approved curriculum for ACCT101 and ACCT102 modules; and ECON101 and ECON102 modules. As discussed earlier, these students encompass the BCom4 (admitted with lower total matric points of 32), BAdmin students (admitted with 30 points), and BBus Admin students (admitted with 30 matric points). These students not only need to put more effort to catch up with the more able students in mainstream accounting and economics disciplines but are also likely to be the ones who repeat the modules several times. Only 3 percent of BAdmin students who wrote the ECON101 examination passed (6 passed out of 174 -168 failed) and 3 percent of repeat students passed (17 passed out 499 – 482 failed) in the June examinations in 2005. The two categories together reflected a failure rate of 57 percent (650 failed divided by 1 143 students who wrote the paper) (Contogiannis, 2005).

There is some validity in streaming or re-directing these (weaker) students in low level accounting and economics modules, rather than leaving them to attempt, fail, and repeat the mainstream modules, extending their period of study (their years to graduation) and becoming a financial burden for UKZN. Alternatively, the problem can be partially addressed by registering students from these identified degrees to different curricula demanding the FMS to infuse the adjustment issues into the curricula. Building on these observations, the College needs to re-route these students to a different level of first-year accounting and economics modules or devise new smoothed modules in which these students will be more likely to be

successful. In addition, special attention has to be paid to developing the students' grasp of the vocabulary and discourse of Management Studies modules. Further research on this issue is needed since this is an institutional issue which does not lie within the remit of the CLMS - for example, addressed by a committee tabling multidisciplinarity at UKZN.

Going forward, the indicator academic years have provided valuable lessons and suggestions in terms of understanding the changing complexity of the student body, the extensive heterogeneity of the abilities and needs of students, the selection and placement of students into appropriate curricular routes, and the degree programmes; curricula designs and the education technologies, and logistics required to run these curricula efficiently and effectively. These should be explored and integrated into the College integrated strategic planning as a prerequisite to enhance the recruitment, involvement, retention, progression, graduation of students, and throughput. In line with existing studies surveyed, if the College heeds these suggestions, it is likely that students will be kept on the graduation path and ultimately the trends of student attrition, high dropout and failure rates, slow progression, and poor graduation, or low throughput will be reversed. Indirectly, when student success is enhanced, multiplier effects will lower costs and catalyze a stream of economic benefits to UKZN, stakeholders, and taxpayers at large.

The results as a whole illustrate the need and validity of considering multiple perspectives that go beyond the HEIs in the quest for the identification of the salient determinants of student performance, examination of the reasons for student attrition, and poor graduation, or low throughput rates in South African universities. The contention is that, instead, an integrated holistic approach in the educational policy making process and strategic planning run parallel to appropriately targeted educational investments which should operate like the financial crisis bailout is an imperative to strengthen the whole education spectrum. The shortage of graduates of critical skills at the high-end of the labour market who can drive productivity and achieve sustained economic growth continues to bedevil South Africa (Enslin-Payne, 2011). The World Bank (2006) has noted that common barriers that bedevil African countries in the realization of higher education are poor infrastructure, the cost of higher education, weak student preparation for university, poor university management, and university overcrowding. Addressing the dismal realities in the higher education system is not about blaming the past or denying South Africa's shortcomings; rather it is about recognizing that it is time to do extraordinary things (Gordhan, 2011).

Existing studies agree that education acts across many spheres of human life including *inter alia* productivity, knowledge, health, and welfare and the standard of living in general, making it one of the major variables in the human capital equation. Having a more educated and high-level skilled workforce in

South Africa will yield not only a more civic-minded population (a well-informed and thoughtful citizenry able to make informed decisions and actively engage in fostering democracy) but the country also stands to benefit from greater productivity and sustained economic growth (having a high-level skilled population), an increased tax base and revenues (increase in income earnings), decreased social welfare costs and a heightened standard of living (more health-conscious) allowing them to enjoy life more and contribute to the achievement of South Africa's macro-economic objectives. Increasing the output of graduates (raising throughput rate) *versus* reducing the output of non-graduates (reducing student attrition) will reduce the sundry costs, which in turn will lead to enormous benefits and substantial savings for South Africa. Raising a country's literacy and numeracy score by one percent leads to a raise in productivity of 2.5 percent with the flow-on increase of 1.5 percent in GDP (Cappellari, 2010:2). It is, therefore, imperative that South Africa strives to increase the number of graduates to raise the country's productivity levels and the rate of real economic growth.

In summary, although the findings are useful and in line with those of local and international studies, the main reservation concerns the fact that the analysis is done within a college of a university. However, it has been demonstrated that correlations sweep and the OLS and logistic methods can be used effectively as econometric analytic tools with UKZN's student records to examine student success in a typical university. A deeper skepticism may question not so much the accuracy of the measuring tool but the worth of what is measured in the light of the core values and activities of the discipline. Indeed, if existing policies and procedures in the CLMS are complied with, many of this study's suggestions are not a major area of concern. The limitations of the study and further issues for research are examined in the following section.

6.3. LIMITATIONS AND FURTHER ISSUES FOR RESEARCH

(1) Many variables shown in existing studies to be salient predictors of student performance such as attitude, involvement, and motivation among others, were not readily available in the student records. Other predictors of qualitative nature had to be collected from education stakeholders *via* focus groups with all their limitations. Variables such as attitude, student engagement and involvement, and motivation among others, if quantified might have improved this study's explanatory power. These variables require attention in further research.

(2) Longitudinal examination of the determinants of student performance was not part of the objectives and scope of this study. This thesis uses cross-sectional data, not longitudinal, by treating each academic year as

a separate statistical entity. If a good set of longitudinal data was available, a more preferable approach would have been to use longitudinal data rather than cross-sectional. The study would have developed a pooled regression analysis to cater for a longitudinal examination of what explains different levels of student performance in the same modules over time, using student characteristics, staff characteristics and institutional characteristics as the explanatory variables. According to the same logic, this study would have included a longitudinal examination between South African universities e.g. what explains different student performance in the same module between universities assuming that a common assessment is taking place in all of these HEIs using the student characteristics, staff characteristics and institutional characteristics as the explanatory variables. This study has however, opened the door for more and better research using sufficiently robust longitudinal data representative of the student population in South African universities.

(3) It emanated that matric score is an important factor in admitted students. Since many students do not have good matric scores, they are excluded from university. High dropout and failure rates are fueling student attrition in South African universities. Quantification of the costs of student attrition, poor graduation, or low throughput rates to families, the University, and the fiscus is relevant for a holistic understanding of their budgetary and financial penalties (Jonhson and Kuennen, 2004). Existing studies on the loss attributable to non-graduates *via* student attrition, poor graduation, or low throughput rates are controversial and highly speculative. Finding out more about how the running expenditure budgets of Schools and Faculties are worked out is an appropriate topic for further research. There are surrogates that can be used as pointers. For example, data in pension calculations about projections of life-time earnings for graduates, also taking account of forecasts of their taxes and contribution to the fiscus. Some of the economic assumptions into the cost per student prior to university can also be calculated from published materials e.g. the Household Expenditure Survey in broad quintile categories as defined by the DoE. One can also add into the equation the estimated cost across 12 years of schooling per student, the cost of taking the matriculation exams, or university application fees.

(4) This study is based on a college of a university. It is not possible to derive general conclusions since this scope limits the ability to generalize the findings beyond that entity. The merit of this study is to provide some pointers that emanated from both quantitative and qualitative analyses. The study attempted to holistically examine student success and it is replicable in a different context. Knowledge of these pointers is crucial and need to serve as building blocks on which junctures of interventions and further steps can be taken to enhance efficiency, effectiveness and the quality of teaching, learning,

and research in the setting of a college. Further research can possibly generalize across more than one university.

(5) Readers are cautioned that the limitations and further issues of research discussed above in many instances are not insurmountable. The contention is that, while definitely not trivial, they are not so serious as to invalidate the findings of this study. Education agents and stakeholders do appear to act using the fullest available, albeit uncertain, expectations sets. Therefore, the application of predominantly quantitative, model-building tools and apparatus to education research issues is of critical importance since quantification is often possible and serves as an aid for education policies and decision making. There is an array of roles for education economists to play in contributing positively to education policies and decision making as more and more issues and public debates in education are cast in economic terms. Furthermore, the net returns to applying economic principles to education research issues defray the limitations.

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APPENDICES

APPENDIX A: CORRELATIONS TABLES BETWEEN MATRIC SCORES (OR THEIR AGGREGATE) AND STUDENT SUCCESS

Table A-1: Correlation Between Economics Modules and Total Matric Points, FMS, CLMS, UKZN, 2004-2008

		ec101k8	matscore
ec101k8	Pearson Correlation	1	.057(**)
	Sig. (2-tailed)		.009
	N	2104	2104
matscore	Pearson Correlation	.057(**)	1
	Sig. (2-tailed)	.009	
	N	2104	4910

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

		matscore	ec102k8
matscore	Pearson Correlation	1	.055(*)
	Sig. (2-tailed)		.014
	N	4910	2043
ec102k8	Pearson Correlation	.055(*)	1
	Sig. (2-tailed)	.014	
	N	2043	2043

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

		matscore	ec201k7
matscore	Pearson Correlation	1	.110(**)
	Sig. (2-tailed)		.000
	N	4950	1263
ec201k7	Pearson Correlation	.110(**)	1
	Sig. (2-tailed)	.000	
	N	1263	1263

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

APPENDIX A: CONTINUED

Table A-1: Continued

		matscore	ecn12sk4
matscore	Pearson Correlation	1	-.065(*)
	Sig. (2-tailed)		.028
	N	1886	1156
ecn12sk4	Pearson Correlation	-.065(*)	1
	Sig. (2-tailed)	.028	
	N	1156	1159

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

Table A-2: Correlation Between Economics Modules and Matric Subject Scores, FMS, UKZN, 2004-2008

		ec101k6	econscor
ec101k6	Pearson Correlation	1	.128(*)
	Sig. (2-tailed)		.030
	N	2400	287
econscor	Pearson Correlation	.128(*)	1
	Sig. (2-tailed)	.030	
	N	287	411

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

		mathscor	ec101k5
mathscor	Pearson Correlation	1	.067(**)
	Sig. (2-tailed)		.002
	N	4617	2129
ec101k5	Pearson Correlation	.067(**)	1
	Sig. (2-tailed)	.002	
	N	2129	2579

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

APPENDIX A: CONTINUED

Table A-2: Continued

		ec102k5	eng1scor
ec102k5	Pearson Correlation	1	.061(*)
	Sig. (2-tailed)		.025
	N	2076	1346
eng1scor	Pearson Correlation	.061(*)	1
	Sig. (2-tailed)	.025	
	N	1346	3439

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

		eng1scor	ec101k5
eng1scor	Pearson Correlation	1	.130(**)
	Sig. (2-tailed)		.000
	N	3439	1649
ec101k5	Pearson Correlation	.130(**)	1
	Sig. (2-tailed)	.000	
	N	1649	2579

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

		econscor	ec101k5
econscor	Pearson Correlation	1	.105(*)
	Sig. (2-tailed)		.048
	N	671	357
ec101k5	Pearson Correlation	.105(*)	1
	Sig. (2-tailed)	.048	
	N	357	2579

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

APPENDIX A: CONTINUED

Table A-2: Continued

		dec1c2k4	eng1scor
dec1c2k4	Pearson Correlation	1	-.111(**)
	Sig. (2-tailed)		.004
	N	1310	660
eng1scor	Pearson Correlation	-.111(**)	1
	Sig. (2-tailed)	.004	
	N	660	988

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

		eng1scor	ec101k8
eng1scor	Pearson Correlation	1	.058(*)
	Sig. (2-tailed)		.040
	N	3009	1263
ec101k8	Pearson Correlation	.058(*)	1
	Sig. (2-tailed)	.040	
	N	1263	2104

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

APPENDIX A: CONTINUED

Table A-3: Correlation Between Accounting Modules and Total Matric Scores, FMS, UKZN, 2004-2008

		matscore	ac101k8
matscore	Pearson Correlation	1	.103(**)
	Sig. (2-tailed)		.000
	N	4910	1492
ac101k8	Pearson Correlation	.103(**)	1
	Sig. (2-tailed)	.000	
	N	1492	1492

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

		matscore	ac102k8
matscore	Pearson Correlation	1	.082(**)
	Sig. (2-tailed)		.007
	N	4910	1096
ac102k8	Pearson Correlation	.082(**)	1
	Sig. (2-tailed)	.007	
	N	1096	1096

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

		matscore	ac101k6
matscore	Pearson Correlation	1	.060(*)
	Sig. (2-tailed)		.019
	N	3484	1505
ac101k6	Pearson Correlation	.060(*)	1
	Sig. (2-tailed)	.019	
	N	1505	1505

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

APPENDIX A: CONTINUED

Table A-3: Continued

		matscore	ac101k5
matscore	Pearson Correlation	1	.057(*)
	Sig. (2-tailed)		.018
	N	5576	1704
ac101k5	Pearson Correlation	.057(*)	1
	Sig. (2-tailed)	.018	
	N	1704	1704

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

		matscore	ac111sk4
matscore	Pearson Correlation	1	.078(**)
	Sig. (2-tailed)		.007
	N	1886	1206
ac111sk4	Pearson Correlation	.078(**)	1
	Sig. (2-tailed)	.007	
	N	1206	1212

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

APPENDIX A: CONTINUED

Table A-4: Correlation Between Accounting Modules and Matric Subject Scores, FMS, UKZN, 2004-2008

		mathscor	ac111sk5
mathscor	Pearson Correlation	1	-.386(**)
	Sig. (2-tailed)		.001
	N	4617	68
ac111sk5	Pearson Correlation	-.386(**)	1
	Sig. (2-tailed)	.001	
	N	68	87

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

		mathscor	ac112sk4
mathscor	Pearson Correlation	1	-.124(**)
	Sig. (2-tailed)		.000
	N	1380	842
ac112sk4	Pearson Correlation	-.124(**)	1
	Sig. (2-tailed)	.000	
	N	842	1130

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

		mathscor	dac1c1k4
mathscor	Pearson Correlation	1	-.084(*)
	Sig. (2-tailed)		.023
	N	1380	725
dac1c1k4	Pearson Correlation	-.084(*)	1
	Sig. (2-tailed)	.023	
	N	725	946

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

APPENDIX A: CONTINUED

Table A-4: Continued

		mathscor	dac1c2k4
mathscor	Pearson Correlation	1	-.077(*)
	Sig. (2-tailed)		.047
	N	1380	661
dac1c2k4	Pearson Correlation	-.077(*)	1
	Sig. (2-tailed)	.047	
	N	661	862

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

		ac102k5	eng1scor
ac102k5	Pearson Correlation	1	.089(**)
	Sig. (2-tailed)		.007
	N	1421	904
eng1scor	Pearson Correlation	.089(**)	1
	Sig. (2-tailed)	.007	
	N	904	3439

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

		eng1scor	ac101k5
eng1scor	Pearson Correlation	1	.094(**)
	Sig. (2-tailed)		.002
	N	3439	1090
ac101k5	Pearson Correlation	.094(**)	1
	Sig. (2-tailed)	.002	
	N	1090	1704

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

APPENDIX A: CONTINUED

Table A-4: Continued

		eng2scor	ac111sk5
eng2scor	Pearson Correlation	1	-.457(*)
	Sig. (2-tailed)		.013
	N	2103	29
ac111sk5	Pearson Correlation	-.457(*)	1
	Sig. (2-tailed)	.013	
	N	29	87

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

		eng2scor	ac101k6
eng2scor	Pearson Correlation	1	.092(*)
	Sig. (2-tailed)		.032
	N	1300	549
ac101k6	Pearson Correlation	.092(*)	1
	Sig. (2-tailed)	.032	
	N	549	1505

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

		accscor	ac101k5
accscor	Pearson Correlation	1	.083(*)
	Sig. (2-tailed)		.017
	N	2524	812
ac101k5	Pearson Correlation	.083(*)	1
	Sig. (2-tailed)	.017	
	N	812	1704

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

APPENDIX A: CONTINUED

Table A-4: Continued

		accscor	ac102k5
accscor	Pearson Correlation	1	.078(*)
	Sig. (2-tailed)		.040
	N	2524	690
ac102k5	Pearson Correlation	.078(*)	1
	Sig. (2-tailed)	.040	
	N	690	1421

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

		eng1scor	ac112sk4
eng1scor	Pearson Correlation	1	-.082(*)
	Sig. (2-tailed)		.048
	N	988	579
ac112sk4	Pearson Correlation	-.082(*)	1
	Sig. (2-tailed)	.048	
	N	579	1130

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

		eng1scor	dac1c2k4
eng1scor	Pearson Correlation	1	-.138(**)
	Sig. (2-tailed)		.003
	N	988	449
dac1c2k4	Pearson Correlation	-.138(**)	1
	Sig. (2-tailed)	.003	
	N	449	862

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

APPENDIX A: CONTINUED

Table A-4: Continued

		ac112sk4	accscor
ac112sk4	Pearson Correlation	1	-.105(*)
	Sig. (2-tailed)		.028
	N	1130	443
accscor	Pearson Correlation	-.105(*)	1
	Sig. (2-tailed)	.028	
	N	443	721

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

		accscor	ac111sk4
accscor	Pearson Correlation	1	-.095(*)
	Sig. (2-tailed)		.041
	N	721	469
ac111sk4	Pearson Correlation	-.095(*)	1
	Sig. (2-tailed)	.041	
	N	469	1212

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

APPENDIX A: CONTINUED

Table A-5: Consolidation Correlation Between Student Performance in Second- and Third-year Accounting and Economics Modules and the Total Matric Points and Matric Subjects Scores, FMS, CLMS, UKZN, 2004-2008

	2004	2005	2006	2007	2008
Module			Correlation between total matric points and		
ACCT200	-0.026	0.016	(a)	0.028	0.016
ACCT300	(a)	-0.108	(a)	0.139**	0.407**
ECON201	0.032	0.004	0.046	0.110**	0.074**
ECON202	0.133**	0.040	(a)	0.029	0.072*
ECON314	(a)	0.040	0.021	-0.095	0.158**
			Correlation between matric maths scores and		
ACCT200	(a)	0.031	(a)	0.055	0.002
ACCT300	(a)	-0.231	(a)	-0.040	-0.064
ECON201	(a)	0.076**	-0.058	0.069*	0.082**
ECON202	(a)	0.106**	(a)	0.061*	0.092**
ECON314	(a)	-0.125	-0.210**	-0.053	0.099
			Correlation between matric English I scores and		
ACCT200	-0.021	-0.027	(a)	0.053	-0.022
ACCT300	(a)	-0.304*	(a)	-0.021	-0.037
ECON201	-0.022	0.089**	-0.045	0.126**	0.165**
ECON202	0.141*	0.125**	(a)	0.110**	0.164**
ECON314	(a)	-0.009	-0.151	-0.009	-0.061
			Correlation between Matric English II Scores and		
ACCT200	-0.072	-0.080	(a)	0.027	0.101
ACCT300	(a)	0.164	(a)	0.025	-0.048
ECON201	-0.016	-0.062	-0.089	-0.011	0.033
ECON202	0.083	-0.096**	(a)	-0.011	0.008
ECON314	(a)	-0.042	-0.038	0.188	-0.016

**is significant at the 0.01 level (two-tailed)

*is significant at the 0.05 level (two-tailed)

APPENDIX A: CONTINUED

Table A-6: Correlations between Undergraduate Accounting Modules, FMS, CLMS, UKZN, 2008

	Acct101	Acct102	Acct200	Acct300
Acct101	1	0.718*	0.423	1.000*
Acct102	0.718*	1	1.000*	1.000*
Acct200	0.423	1.000*	1	0.542
Acct300	1.000*	1.000*	0.542	1

- **is significant at the 0.01 level (two-tailed)
- *is significant at the 0.05 level (two-tailed)

APPENDIX A: CONTINUED

Table A-7: Correlation between Undergraduate Economics Modules, FMS, CLMS, UKZN, 2008

	Econ101	Econ102	Econ201	Econ202	Econ314
Econ101	1	0.802*	0.587*	0.576*	0.240
Econ102	0.802*	1	0.495*	0.493*	-0.495
Econ201	0.587*	0.495*	1	0.976*	(a)
Econ202	0.576*	0.493*	0.976*	1	(a)
Econ314	0.240	-0.495	(a)	(a)	1

**is significant at the 0.01 level (two-tailed)

*is significant at the 0.05 level (two-tailed)

APPENDIX B: CORRELATIONS TABLES BETWEEN STUDENTS' AGE AND STUDENT SUCCESS

Table B-1: Correlation Between Undergraduate Accounting and Economics Modules and Student Age, FMS, UKZN, 2004-2008

		ac101k8	ageac1
ac101k8	Pearson Correlation	1	-.082(**)
	Sig. (2-tailed)		.002
	N	1492	1492
ageac1	Pearson Correlation	-.082(**)	1
	Sig. (2-tailed)	.002	
	N	1492	4910

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

		ageac1	ac102k8
ageac1	Pearson Correlation	1	-.089(**)
	Sig. (2-tailed)		.003
	N	4910	1096
ac102k8	Pearson Correlation	-.089(**)	1
	Sig. (2-tailed)	.003	
	N	1096	1096

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

		ageac1	ec102k8
ageac1	Pearson Correlation	1	-.049(*)
	Sig. (2-tailed)		.027
	N	4910	2043
ec102k8	Pearson Correlation	-.049(*)	1
	Sig. (2-tailed)	.027	
	N	2043	2043

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

APPENDIX B: CONTINUED

Table B-1: Continued

		ageac1	ac101k6
ageac1	Pearson Correlation	1	-.078(**)
	Sig. (2-tailed)		.003
	N	3484	1505
ac101k6	Pearson Correlation	-.078(**)	1
	Sig. (2-tailed)	.003	
	N	1505	1505

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

		ec101k5	ageac1
ec101k5	Pearson Correlation	1	-.050(*)
	Sig. (2-tailed)		.010
	N	2579	2579
ageac1	Pearson Correlation	-.050(*)	1
	Sig. (2-tailed)	.010	
	N	2579	5576

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

		ageac1	ac101k5
ageac1	Pearson Correlation	1	-.093(**)
	Sig. (2-tailed)		.000
	N	5576	1704
ac101k5	Pearson Correlation	-.093(**)	1
	Sig. (2-tailed)	.000	
	N	1704	1704

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

APPENDIX B: CONTINUED

Table B-1: Continued

		ageac1	ac111sk5
ageac1	Pearson Correlation	1	-.270(*)
	Sig. (2-tailed)		.011
	N	5576	87
ac111sk5	Pearson Correlation	-.270(*)	1
	Sig. (2-tailed)	.011	
	N	87	87

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

		ageac1	ecn11k4
ageac1	Pearson Correlation	1	-.066(*)
	Sig. (2-tailed)		.018
	N	1886	1292
ecn11k4	Pearson Correlation	-.066(*)	1
	Sig. (2-tailed)	.018	
	N	1292	1297

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

		ageac1	dec1c1k4
ageac1	Pearson Correlation	1	.052(*)
	Sig. (2-tailed)		.048
	N	1886	1418
dec1c1k4	Pearson Correlation	.052(*)	1
	Sig. (2-tailed)	.048	
	N	1418	1425

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

APPENDIX B: CONTINUED

Table B-1: Continued

		ageac1	ac111sk4
ageac1	Pearson Correlation	1	-.231(**)
	Sig. (2-tailed)		.000
	N	1886	1206
ac111sk4	Pearson Correlation	-.231(**)	1
	Sig. (2-tailed)	.000	
	N	1206	1212

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

		ageac1	ac112sk4
ageac1	Pearson Correlation	1	-.099(**)
	Sig. (2-tailed)		.001
	N	1886	1124
ac112sk4	Pearson Correlation	-.099(**)	1
	Sig. (2-tailed)	.001	
	N	1124	1130

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

APPENDIX B: CONTINUED

Table B-2: Consolidation of Correlation Between First-year Accounting and Economics Modules and the Age of the Student, FMS, CLMS, 2004-2008

2008	
Module	Age of the Student
ACCT101	-0.082**
ACCT102	-0.089**
2006	
ACCT101	-0.078**
2005	
ACCT101	-0.093**
ACC111S	-0.270*
ECON101	-0.050*
2004	
ACC111S	-0.231**
ACC112S	-0.099**
DEC1EC1	0.052*
ECN101S	-0.066*

**is significant at the 0.01 level (two-tailed)

*is significant at the 0.05 level (two-tailed)

APPENDIX C: ORDINARY LEAST SQUARES (OLS) REGRESSIONS TABLES

Table C-1: Linear Regression of Final Examination Marks in First Year Accounting101 Module and Selected Characteristics of Students, FMS, UKZN, 2008

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	Homelang, ec101k8, Stugend, mathscor, ageac1, sturace, matscore(a)	.	Enter

a All requested variables entered.

b Dependent Variable: ac101k8

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.646(a)	.417	.413	10.76353

a Predictors: (Constant), Homelang, ec101k8, Stugend, mathscor, ageac1, sturace, matscore

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	82753.478	7	11821.925	102.042	.000(a)
	Residual	115737.676	999	115.854		
	Total	198491.154	1006			

a Predictors: (Constant), Homelang, ec101k8, Stugend, mathscor, ageac1, sturace, matscore

b Dependent Variable: ac101k8

APPENDIX C: CONTINUED

Table C-1: Continued

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	35.144	2.444		14.381	.000
	Stugend	.717	.683	.026	1.050	.294
	matscore	.077	.027	.096	2.875	.004
	ageac1	-.020	.053	-.012	-.377	.706
	mathscor	-.248	.135	-.045	-1.836	.067
	ec101k8	.579	.022	.631	26.107	.000
	sturace	1.314	1.057	.032	1.243	.214
	Homelang	.344	.762	.012	.451	.652

a Dependent Variable: ac101k8

APPENDIX C: CONTINUED

Table C-2: Linear Regression of Final Examination Marks in First Year Accounting102 Module and Selected Characteristics of Students, FMS, UKZN, 2008

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	ac101k8, mathscor, Stugend, sturace, ageac1, Homelang, matscore(a)	.	Enter

a All requested variables entered.

b Dependent Variable: ac102k8

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.725(a)	.525	.521	7.86321

a Predictors: (Constant), ac101k8, mathscor, Stugend, sturace, ageac1, Homelang, matscore

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	55168.050	7	7881.150	127.465	.000(a)
	Residual	49896.850	807	61.830		
	Total	105064.901	814			

a Predictors: (Constant), ac101k8, mathscor, Stugend, sturace, ageac1, Homelang, matscore

b Dependent Variable: ac102k8

APPENDIX C: CONTINUED

Table C-2: Continued

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	10.553	2.609		4.045	.000
	Stugend	-.514	.555	-.023	-.925	.355
	matscore	-.044	.023	-.068	-1.943	.052
	ageac1	-.074	.043	-.057	-1.694	.091
	mathscor	-.093	.111	-.020	-.836	.404
	sturace	.559	.838	.017	.667	.505
	Homelang	-.379	.618	-.017	-.614	.540
	ac101k8	.782	.026	.724	29.596	.000

a Dependent Variable: ac102k8

APPENDIX C: CONTINUED

Table C-3: Linear Regression of Final Examination Marks in First Year Economics101 Module and Selected Characteristics of Students, FMS, UKZN, 2008

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	mathscor, Stugend, ac101k8, sturace, matscore, Homelang(a)	.	Enter

a All requested variables entered.

b Dependent Variable: ec101k8

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.637(a)	.406	.403	11.82688

a Predictors: (Constant), mathscor, Stugend, ac101k8, sturace, matscore, Homelang

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	95694.840	6	15949.140	114.024	.000(a)
	Residual	139875.144	1000	139.875		
	Total	235569.984	1006			

a Predictors: (Constant), mathscor, Stugend, ac101k8, sturace, matscore, Homelang

b Dependent Variable: ec101k8

APPENDIX C: CONTINUED

Table C-3: Continued

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	7.580	1.938		3.910	.000
	Stugend	-.463	.749	-.015	-.618	.536
	ac101k8	.700	.027	.643	26.120	.000
	Homelang	-.056	.835	-.002	-.067	.946
	matscore	-.046	.023	-.052	-1.986	.047
	sturace	-1.406	1.159	-.032	-1.214	.225
	mathscor	.206	.149	.034	1.386	.166

a Dependent Variable: ec101k8

APPENDIX C: CONTINUED

Table C-4: Linear Regression of Final Examination Marks in First Year Economics102 Module and Selected Characteristics of Students, FMS, UKZN, 2008

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	sturace, mathscor, ec101k8, Stugend, ageac1, Homelang, matscore(a)	.	Enter

a All requested variables entered.

b Dependent Variable: ec102k8

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.806(a)	.650	.648	8.64556

a Predictors: (Constant), sturace, mathscor, ec101k8, Stugend, ageac1, Homelang, matscore

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	185522.404	7	26503.201	354.579	.000(a)
	Residual	99785.425	1335	74.746		
	Total	285307.829	1342			

a Predictors: (Constant), sturace, mathscor, ec101k8, Stugend, ageac1, Homelang, matscore

b Dependent Variable: ec102k8

APPENDIX C: CONTINUED

Table C-4: Continued

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	13.128	1.642		7.997	.000
	Stugend	.127	.475	.004	.268	.789
	Homelang	-1.160	.527	-.040	-2.203	.028
	matscore	.012	.019	.014	.631	.528
	ageac1	-.001	.034	.000	-.017	.987
	mathscor	-.182	.094	-.032	-1.940	.053
	ec101k8	.778	.016	.805	49.612	.000
	sturace	.819	.724	.020	1.131	.258

a Dependent Variable: ec102k8

APPENDIX D: LOGISTIC REGRESSIONS TABLES

```
. logistic ACC101 HGmath ECON101 Mathscore Mat36   HomLang

Logistic regression                               Number of obs   =       1006
                                                  LR chi2(5)      =      59.46
                                                  Prob > chi2     =     0.0000
Log likelihood = -239.63259                       Pseudo R2       =     0.1104

------------------------------------------------------------------------------
      ACC101 | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      HGmath |   1.558505   .7908334     0.87   0.382     .5764772    4.213413
     ECON101 |   6.186946   1.635354     6.89   0.000     3.685394    10.38649
   Mathscore |   .8960843   .0887385    -1.11   0.268     .7379978    1.088035
       Mat36 |   1.851727   .5907645     1.93   0.053     .9908646    3.460505
     HomLang |   .9539433   .2553383    -0.18   0.860      .564527    1.611983
------------------------------------------------------------------------------
```

APPENDIX D: CONTINUED

```
. logistic ACC102  Ac101k8 HGmath Eng1scor Sturace ECON101 Ageac1

Logistic regression                               Number of obs   =        513
                                                  LR chi2(6)      =      54.76
                                                  Prob > chi2     =     0.0000
Log likelihood = -86.895642                       Pseudo R2       =     0.2396

------------------------------------------------------------------------------
      ACC102 | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Ac101k8 |   1.163382   .0352629     4.99   0.000     1.096281     1.23459
      HGmath |   .1729824   .1148183    -2.64   0.008     .0470989    .6353207
    Eng1scor |   1.268673   .1348701     2.24   0.025     1.030054    1.562569
     Sturace |    1.97923   1.319427     1.02   0.306     .5358634    7.310352
     ECON101 |   1.314048   .5592008     0.64   0.521     .5706603    3.025834
      Ageac1 |   .9761971   .0249381    -0.94   0.346     .9285229    1.026319
------------------------------------------------------------------------------
```

APPENDIX D: CONTINUED

```
. logistic ECON101 Eng1scor Sturace HomLang ACC101 Matscore

Logistic regression                               Number of obs   =        716
                                                  LR chi2(5)      =      26.37
                                                  Prob > chi2     =     0.0001
Log likelihood =  -438.5311                       Pseudo R2       =     0.0292

------------------------------------------------------------------------------
     ECON101 | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    Eng1scor |   1.018638    .028895     0.65   0.515     .9635505    1.076875
     Sturace |   .6653018   .1560299    -1.74   0.082     .4201367     1.05353
     HomLang |   1.162194   .2163486     0.81   0.419     .8069063    1.673919
      ACC101 |   4.015623   1.187247     4.70   0.000     2.249517    7.168307
    Matscore |    .998281   .0050123    -0.34   0.732     .9885053    1.008153
------------------------------------------------------------------------------
```

APPENDIX D: CONTINUED

```
. logistic ECON102 Ec101k8   HGeng2 Sturace HomLang Ac102k8

Logistic regression                               Number of obs   =        905
                                                  LR chi2(5)      =     432.07
                                                  Prob > chi2     =     0.0000
Log likelihood =  -319.2593                       Pseudo R2       =     0.4036

------------------------------------------------------------------------------
     ECON102 | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Ec101k8 |   1.150704   .0138558    11.66   0.000     1.123865    1.178184
      HGeng2 |   .6971878    .153366    -1.64   0.101     .4530061    1.072989
     Sturace |   1.382102   .4076402     1.10   0.273     .7753273    2.463743
     HomLang |   .6364621   .1350649    -2.13   0.033     .4198918    .9647343
     Ac102k8 |   1.062563   .0129954     4.96   0.000     1.037395    1.088341
------------------------------------------------------------------------------
```

APPENDIX E: ABSTRACTS OF JOURNAL ARTICLES PUBLISHED FROM THIS THESIS

E-1. The attrition crisis in South African universities. How to keep students on the graduation path.

Bokana K. G.

Abstract: The attrition of students is a persistent and seemingly intractable problem in higher education in South Africa. Less than 15 percent of a cohort of matrics gain admission to higher education; about 50 percent of students drop out of university in their first year; and a mere 15 percent complete their degrees in the allotted time. The attrition of students from previously disadvantaged population groups may result in further racial and socio-economic disparities in future generations – a concern to both education authorities and students.

Using focus group discussions, this study attempts to understand the perceptions of randomly selected education stakeholders of reasons for student attrition, particularly at the UKZN, South Africa. Exclusion on academic grounds and financial difficulties are not wholly to blame. Other reasons, including feeder high schools, life events, and youth's sundry needs are considerable hurdles on the graduation path of students.

A holistic approach in the education policy making process run in parralel to appropriately targeted educational investments, which should operate like the financial crisis bailout is imperative to keep students on the graduation path and reverse the trend of attrition.

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APPENDIX F: ETHICAL CLEARANCE APPROVAL LETTER

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01 October 2009

Mr K G Bokana
Faculty of Management Studies
Westville Campus

Dear Mr Bokana

PROTOCOL: Performance of Students in the College of Law and Management Studies, UKZN: An Econometric Analysis
ETHICAL APPROVAL NUMBER: HSS/0524/2009

In response to your application dated 12 August 2009, Student Number: **204516728** the Humanities & Social Sciences Ethics Committee has considered the abovementioned application and the protocol has been given **FULL APPROVAL.**

PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Professor Steve Collings (Chair)
HUMANITIES & SOCIAL SCIENCES ETHICS COMMITTEE

cc: Prof. D D Tewari
cc: Mrs C Haddon

APPENDIX F: CURRICULUM VITAE

Bokana, Koye Gerry is a lecturer in the School of Accounting, Economics and Finance at the University of KwaZulu-Natal, Private Bag x 54001, Westville Campus, Durban, 4000. He has core lecturing experience and has taught introduction to economic concepts, principles of macro-economics and micro-economics, and management science courses across undergraduate programmes in the College of Law and Management Studies. He is currently the economics coordinator for both the access programme (referred to as the BCom4) and Enriched Management Studies where he coordinates tutors and develops high quality and innovative tutorial materials for the introductory and intermediate economics courses. In addition, he has enrolled in the Higher Education Practice (HEP) course which addresses educational issues of paramount relevance to higher education that include: (1) educators as reflective practitioners; (2) students and staff in higher education; (3) facilitating learning and teaching (in big/small classes); (4) mentoring; (5) curriculum development; (6) assessment; (7) materials development; (8) language; (9) diversity in higher education; (10) higher education policy; (11) quality assurance and evaluation practices; and (12) compiling a portfolio. Gerry's PhD research is in the area of the economics of education, which has given him insights and better-informed educational choices into how to address issues attached to facilitating teaching and learning in undergraduate economics courses in general. He has a good understanding of the key determinants of poor success in students and the problems faced by students, in general, and those from the disadvantaged socio-economic backgrounds, in particular. He has an extensive social network with academics, researchers, administrators, support staff, and students. He has published articles in *the Franklin Business and Law Journal*, the *Global Education Journal*, and the *Journal of Interdisciplinary Economics* and has presented papers at national and international conferences. Correspondence to: Bokanakg@ukzn.ac.za.