THE IMPACT OF PRE-UNDERGRADUATE PREPARATION COURSES ON THE ACADEMIC PERFORMANCE OF ACCOUNTING STUDENTS

by

Cornelia Maria (Corlia) Joynt

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Soli Deo Gloria

ABSTRACT

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Cornelia Maria (Corlia) Joynt

SUPERVISOR: Prof. C. de Villiers

DEPARTMENT: Department of Accounting

DEGREE: PhD (Accounting)

ABSTRACT: This study provides a thick description of an Accounting bridging course and it examines the impact of this pre-university course on the academic performance of students in a first-year introductory Accounting course at a South African university. Several control variables (such as taking Accounting at school, performance in mathematics at school, learning self-efficacy, motivation to learn and student motivation) were taken into account to determine the impact of the course on students' performance in various assessments of the first-year Accounting course. Propensity score matching and Heckman's procedure were used to compensate for selection bias. The findings show that there is a positive association between students' attendance of this pre-university course and their academic performance in Module test 1.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

DEFINITION OF KEY TERMS

Key term	Definition
Academic self-efficacy	A student's perceived ability to succeed
Adaptation factors	Factors that contribute to the inability of a student to adjust to independent study in higher education and to cope with the content in the curriculum.
Attrition rate	The number of students who dropped-out of university expressed as a percentage of all the students who enrolled initially. This is the opposite of retention rate.
Behaviourism	Teacher-centred approach; students are passive recipients of knowledge.
Bridging course	Pre-university enabling programmes; university preparatory courses and pathway courses.
Cognitive	Academic, task-related skills such as reading and numeracy.
Constructivism	Student-centred approach, students are active participants in the learning process.
Graduation	The completion of a degree programme; when the degree is awarded.
Heckman procedure	An econometric technique that incorporates an instrumental variable.
High Impact Modules	Modules that are characterised by low pass rates.
Instrumental variable	A control variable (e.g distance from campus) that would change the behaviour of a person (e.g. influencing a student's decision to enrol for PTA), but that would not have an effect on the dependent variable (e.g. academic performance).
Interventions	An additional learning opportunity usually initiated by a university to address academic deficiencies, shortfalls or underpreparedness.
Learning strategies	A strategy applied by students to master the content of a curriculum. Various skills are included in a learning strategy, e.g. rote learning and memorisation techniques.
Matriculation	Final school year, also known as Grade 12 of high school.
Metacognitive	Metacognitive knowledge entails self-awareness of the cognitive processes, in other words, being aware of how one thinks and learns
Module test 1	The first, formal, summative assessment in the form of a written test.
Non-Accounting major students	Students who are not pursuing a career as a professional Accountant.
Participation rate	The percentage of Grade 12 school leavers who enrol for tertiary education.

Propensity score matching	Matching participants according to scores obtained through the inclusion of various control variables. This strategy creates new samples that can be compared to specific variables.
Regulation time	The minimum length of time required to complete a degree programme (for most BCom programmes, this is three years).
Retention rate	The percentage of students who continue to study the following academic year. This is the opposite of the attrition rate.
Self-selection bias	This bias exists when students are invited to enrol or participate in voluntary interventions. It is expected that those who choose to enrol, are more motivated than those who choose not to participate.
Throughput rate	The percentage of students that complete their degrees within the regulation time.
Undergraduate qualification	The first qualification (degree programme) that students enrol for after they have completed high school.
Underpreparedness	Lacking skills or learning strategies for academic success at university.

LIST OF ABBREVIATIONS AND ACRONYMS

Abbreviation	Meaning
APS	Academic Performance Score
ATE	Average Treatment Effect
ATT	Average Treatment Effect on those treated
ANOVA	Analysis of variance
ANCOVA	Analysis of covariance
DHET	Department of Higher Education and Training (South Africa)
FRK 111	Financial Accounting 111 – the code for an introductory Accounting course for students who do not specialise in Accounting.
GPA	Grade Points Average
IV	Instrumental Variable
LATE	Local Average Treatment Effect
PS	Propensity Score
PSM	Propensity Score Matching
PTA	Preparation for Tertiary Accounting (the intervention)
SOLO	Structure of the Observed Learning Outcome
UP	University of Pretoria

CHAPTER 1:
INTRODUCTION

1.1 BACKGROUND

The objectives of this study are to provide a detailed description of a pre-university intervention in introductory Accounting that incorporates multiple strategies derived from cognitive and metacognitive interventions in order to mitigate domains of underpreparedness of South African school leavers. Subsequent to the primary objective is the application of three econometric techniques that comprise an evaluation model, in order to determine the association between attendance of the intervention and academic performance in an introductory Accounting course.

The contributions of this study are evident on different levels. The thick description of a bridging course in introductory Accounting is novel to Accounting education. The methodological contribution is evident in the application of the use of Propensity score matching (PSM) as well as the Heckman procedure with an instrumental variable (IV) to compensate for self-selection bias. Lastly, this study expands the current literature through its findings pertaining to the association between various previously identified control variables that have an influence on academic performance in Accounting. This includes an exploratory study on the association between constructs of motivation (namely self-efficacy, student motivation and motivation to learn) and academic performance in an introductory Accounting course.

Universities as providers of tertiary education contribute to society by preparing graduates to enter the job market as highly skilled labour, thereby assisting the country to address two broader socio-economic aims: alleviating poverty and decreasing unemployment (Fallis 2015). There is a clear association between unemployment and lack of education (CHE 2017). Of South Africans that were unemployed for the period April to June 2017, a staggering 91% did not have a tertiary qualification (CHE 2017). Universities are key role-players in empowering citizens to create better lives for themselves, their communities and South Africa at large. Therefore, universities are under pressure to increase the throughput rate and, at the same time, maintain the quality of education standards (Müller, Prinsloo & Du Plessis 2007).

In the 21st century, tertiary education has become more accessible worldwide to the wider population. Globally, higher education has undergone a transformation during the last century: from being an 'elitist' system (0 to 15 % participation), to providing higher education for the masses (massification) (16 to 50 % participation), and transforming into a universal participation system with a participation rate in excess of 50% (Fallis 2015).

South African higher education has followed suit. According to a report by the South African task team of the Council on Higher Education (CHE), the participation rate in tertiary education has increased steadily – in 2000, 15% of Grade 12 school leavers met the minimum requirements and enrolled at a university, and in 2015, 19% did so (CHE 2015). Although a steady increase in participation has been documented (CHE 2015), the various education authorities in South Africa are aiming for a 23% participation rate by 2030 as a national target. Compared to global participation rates, South African higher education institutions need innovative strategies to improve participation rates in order to contribute to socio-economic development. Especially seeing as South Africa is located in Sub-Saharan Africa – a region with the lowest participation rates in higher education in any world region (Mohamedbhai 2014).

In the light of the increasing numbers of high school leavers who qualify for and participate in higher education in South Africa, universities should be aware of the impact such increases might have on pass rates and retention rates. The South African education system fails to produce satisfactory throughput rates – measured from the start of school (grade 1) to graduation with an undergraduate qualification. A study done on the 2008 cohort of students revealed that for every 100 learners who started school in grade 1, 60 learners wrote the Grade 12 (matriculation) examination of which 37 learners passed. Twelve of these learners gained access to university of which four students managed to obtain a degree within six years after school (CHE 2017). These figures allude to one of the risks of a higher intake, namely admitting students who are not sufficiently prepared for university studies and who, consequently, are at risk of failing to complete their degree in the regulation time. Cloete (2016) contends that only 27% of students enrolled at South African universities, as part of the 2000 and 2006 cohorts, obtained their undergraduate qualification within regulation time.[1] Forty-eight per cent of students completed their undergraduate

[1] The general regulation time to complete an undergraduate qualification is normally three years, but for some degree programmes it is four years.

qualifications at contact universities within five years, but it is estimated that 45% of students in higher education will never obtain a higher education qualification (Cloete 2016).[2]

Sadly, the disparity between poor schooling systems and universities are not unique to South Africa. Many developing countries experience a similar challenge: poorly prepared school leavers enter universities as underprepared students. Results from the OECD PISA 2015 report show that the performance in reading, mathematical skills and science of school learners in Brazil is well below the OECD average (OECD 2015a). Such is also the case for Colombia (OECD 2015b) where socio-economically disadvantaged students performed worse than their advantaged peers did. Despite the challenges in the schooling system, Brazil managed to increase their tertiary participation rate from 44.9% in 2012 to 50.5% in 2016. A 12% increase for the same period was documented for Colombia (46.21% to 58.7%) (UNESCO 2018). These developing countries are part of the Latin American region and overall, this region increased tertiary enrolment from 23% to 42% in the period 2000 to 2011 (UNESCO 2018). The increase in higher education participation rates put pressure on universities to achieve better throughput rates whilst accommodating a larger number of underprepared students. [3]

Students can only graduate if they are retained by universities. Tinto (2006) argues that universities should aim to help students stay in university and succeed. Student retention is

> ...the process of *helping students to meet their needs* so that they will persist in their education towards the achievement of the educational aims they value. Retention can achieve this through the mustering of support systems that enable students to be successful, and the *lowering or elimination of those factors* that can disrupt a student's education, and that can ultimately result in their failure to achieve the educational aims they want. (Moxley, Najor-Durack & Dumbrigue 2001:37) (Emphasis added)

Student retention is important to all stakeholders, since the cost of academic failure to the student, the institution and the government increases the financial strain on all these stakeholders and postpones the student's entry into the workforce. The main threat to student retention is academic failure, which can result from various factors, including

[2] Contact universities provide face-to-face sessions as opposed to distance learning institutions, such as UNISA where the graduation rates are much lower (6% graduation rate and 78% will never graduate) (Cloete 2016).

[3] Participation rate refers to tertiary enrolment rate. This is the total enrolment in tertiary education of people between the 18 and 22 years expressed as a percentage of the population.

underpreparedness. Underpreparedness is a multi-dimensional phenomenon with cognitive, epistemological and socio-cultural dimensions (CHE 2013).

Understanding of the complex phenomenon of underpreparedness starts with recognising how it manifests. Firstly, it becomes visible in students struggling with the formal curriculum. This form of underpreparedness is usually recognised through poor performance in assessments. The inability of a student to adjust to independent study in higher education indirectly contributes to poor performance and this, together with the inability to cope with the content in the curriculum, is collectively referred to as adaptation factors (CHE 2013). Students who are not sufficiently prepared may experience university as an environment where they are continuously confronted with a sense that, whatever the attainments that got them through high school, they do not meet the expectations of the university (CHE 2013). Underpreparedness therefore, influences a students' motivation and their perceived ability to succeed (academic self-efficacy) at university. In this regard, Müller *et al.* (2007:20) state:

> If an institution has a very clear (albeit temporal) understanding of the profile of successful students in a particular field or subject, it can plan and strategise accordingly. The converse is also true; namely that an institution without a clear understanding of the characteristics of successful students will find it much harder (if not impossible) to plan and strategise for effective interventions.

Institutional awareness of the academic profile of prospective students needs to be improved in order for a university to address underpreparedness effectively. This insight will assist institutions with the allocation of resources, and it can influence the teaching model and interventions implemented by the institution for example, underprepared students cannot enjoy the full benefit of effective educational practices (Kuh 2009) and, therefore, intentionally developed interventions are needed to address this deficiency.

Secondly, underpreparedness is compounded by material factors in the form of a lack of socio-economic resources (CHE 2013). Material factors for success at university include access to sufficient basic resources to complete tertiary studies. The fact that the majority of South African black students come from low-income households with limited access to resources is a cause for concern, as it may affect their academic performance and access to tertiary institutions. Hence, many black students either do not enter higher education or drop out before completion due to a lack of financial support (CHE 2013).[4]

[4] According to Letseka and Maile (2008) almost 70% of students that drop out from university, come from poor families.

Thirdly, affective factors need to be understood, including student motivation, student perceptions and their attitudes towards their studies. Scott *et al.* (2007:38-39) explain the implications of affective factors for education in South Africa as follows:

> In South Africa, Academic Development experience has indicated that the benefits of well-designed educational interventions can be neutralised by lack of motivation, anxiety about personal or financial circumstances, or alienation from the institution. The relationship between affective factors and academic performance is likely to be iterative, however, so the other side of the coin is that students' confidence, motivation, and general wellness may be compromised by the inability to cope with the educational process they find themselves in.

Lastly, the extent to which a student can respond to the educational process forms the basis of academic success. Collectively, these factors shape the core of students' academic performance. The institutional response in terms of teacher-learner relationships, teaching approaches, student support, the curriculum framework and assessments form the essence of the educational process (CHE 2013).

Mitigating underpreparedness is not easy, given the multidimensional nature of the phenomenon. However, universities cannot be apathetic towards underprepared students. Universities can contribute towards the alleviation of underpreparedness by managing the expectations of students and working with stakeholders to source material resources. Universities can also make an effort to alleviate academic underpreparedness, which in turn may have a positive effect on affective factors that influence student perceptions.

Offering interventions is one way to address underpreparedness. Interventions aimed at retaining students are especially critical in the first academic year. Such interventions depend on the actions of the institution's academic staff (Tinto 2006). In an attempt to address inadequate schooling, some universities offer interventions before or during the degree programme to students who are at risk of poor academic performance. Students can only experience the full benefit of such an intervention if the intervention is aimed at addressing a specific domain of underpreparedness and if the intervention has specific objectives. The benefits of an academic intervention should be evident in students' academic performance and the fact that these students are retained. It is, therefore, concerning that Ogude *et al*. (2012:23) argue that "student success initiatives" to retain students implemented by the University of Pretoria (UP) from 2002 to 2012 lacked academic impact, although these interventions led to 'an increased institutional awareness'. Although the importance and significance of broader institutionalised interventions should not be

underestimated, there is a need to address discipline-specific deficiencies experienced (mostly) by first-year students.

The literature on the effectiveness of interventions aimed at addressing academic competency required for introductory Accounting is still limited. There are two main reasons for this. Firstly, only a limited number of interventions are presented as introductory Accounting interventions. Secondly, there is a lack of course evaluation models to determine the effectiveness of these interventions (Brock 2010; Lesage 2012).

1.2 PROBLEM STATEMENT AND RATIONALE FOR THE STUDY

The South African education system fails to deliver school leavers that are adequately prepared for tertiary accounting. Less than 4% of school leavers graduate with an undergraduate degree within six years after completing school (Cloete 2016). The disparity between the quality of school leavers and the throughput rate of university students allude to an articulation gap between school and university.

Therefore, a pre-university intervention – Preparation for Tertiary Accounting, hereafter referred to as PTA – was developed to address some of the domains of underpreparedness. Without an intervention that addresses inadequate preparation, students who lack the necessary skills are at a disadvantage right from the start (Leese 2010). PTA, as opposed to other interventions offered, intends to be a pro-active approach to address underpreparedness before the student experiences failure or receives negative feedback. However, the association between class attendance for the PTA and the academic performance of students in an introductory Accounting course has not yet been empirically investigated.

Moreover, thus far, few studies have been undertaken to develop a statistical model for programme evaluation (Jackson 2014). Although studies aiming to determine the association between variables and academic performance in Accounting have included all the variables that might influence academic performance, no statistical model has yet been investigated that can be used, in conjunction with the control variables, to conduct programme evaluation in Accounting education. Therefore, there is a need to develop a robust model, so that inferences can be made about the association between attending an intervention (PTA in this case) and academic performance in an introductory Accounting course.

Accounting education researchers have so far tended to investigate variables that have been shown to predict academic performance in Accounting. These variables include prior knowledge of Accounting (Doran, Bouillon & Smith 1991) and mathematics (Eskew & Faley 1988), academic aptitude (Farley & Ramsey 1988), gender (Bartlett, Peel & Pendlebury 1993), socio-economic factors (Tho 1994), mother-tongue instruction (Tan & Laswad 2008) and motivation (Byrne & Flood 2008). The findings of prior studies are contradictory.

This study provides a description of the intervention, which draws from various learning strategies, that is presented to first-year non-accounting majors. Secondly, I investigated the association between attendance of this intervention (PTA) and the students' academic performance in various assessment intervals (Module Test 1, the examination and the final mark).

1.3 AIM

The objective of this study is to provide a thick description of an intervention in introductory Accounting presented before the start of the official academic year. PTA incorporates multiple strategies (derived from cognitive and metacognitive interventions) to provide students with learning strategies, whilst also providing them with content knowledge to improve their marks in Module test 1 in an introductory accounting course.

Secondly, I aimed to determine the association between the attendance of the intervention and the academic performance in various assessments through the application of various econometric techniques.

Lastly, in order to determine the association between attendance of the intervention and academic performance, the use of regression analyses as well as other econometric techniques – novel to Accounting education – are described to develop a model for programme evaluation.

1.4 RESEARCH QUESTIONS

The research questions of this study are as follows:

- RQ1: What does a pre-university intervention that is developed based on various learning strategies and Accounting fundamentals entail?
- RQ2: What is the association between attendance of PTA and academic performance in Module test 1, the examination and the final marks of students in an introductory Accounting course?
- RQ3: How is Propensity score matching and the Heckman procedure applied in the evaluation of an intervention in Accounting?

1.5 IMPORTANCE AND BENEFITS OF THE STUDY

This study is important for several reasons. Firstly, a detailed description of a pre-university intervention, in essence a bridging course, can benefit other universities facing the challenge of admitting underprepared students. This intervention demonstrates the incorporation of various learning strategies that are applicable to introductory Accounting. Whether or not Accounting as a subject is successfully completed in the first academic year affects many first-year students, since first-year Accounting is a pre-requisite to continue with Accounting as a subject (and/or other modules for which introductory Accounting is a pre-requisite) in their second academic year.[5]

Secondly, academics will benefit from knowing more about how the chosen econometric techniques were used to conduct the programme evaluation. The use of PSM and, specifically, information on how it was documented in this study, as well as controlling for selection bias by means of the Heckman procedure, is introduced into the Accounting education literature by this study.

From an academic perspective, the findings will contribute to the literature in this field by presenting more evidence that supports or contradicts the findings of previous studies on predictors of academic performance in introductory Accounting. The findings will also be of practical importance for universities and policy-makers who need to decide on the entry

[5] These learning strategies can be applied to other disciplines as well.

requirements for prospective students who intend to study undergraduate degrees that prescribe an introductory Accounting course.

Lastly, prospective students, parents and sponsors will benefit from this study once the association between attending PTA and academic performance in an introductory Accounting course has been determined. These stakeholders invest resources and time into interventions and it would be important to them if the effectiveness of the intervention has been determined.

1.6 LIMITATIONS AND ASSUMPTIONS

1.6.1 Delimitations of the study

This study investigates the association between a pre-university intervention and academic performance in three instances, namely performance in Module test 1, the examination and the final mark. The study includes only first-year students studying for various degrees for which an introductory Accounting course is prescribed. However, students who intend to qualify as professional accountants were excluded from the study. The study was also conducted on one academic year, at the largest residential university in South Africa. No repeaters of either the intervention or the course itself were included.

1.6.2 Assumptions

This study is based on the assumption that students who enrolled for the course are either self-motivated or motivated by others, such as parents or career advisors. This assumption is addressed by controlling for observable and non-observable variables by means of econometric methods.

In instances where the prior literature provided inconclusive evidence of the significance of certain predictors, I adopted the stance of the majority of the authors in the field.

1.7 METHOD

A quasi-experimental design was chosen, following a positivist approach in the methodological section of this study. The sample consisted of first-year non-Accounting major students, some of whom attended the intervention (treated subjects) and some did not (untreated subjects). Only students who completed the questionnaire on constructs and

levels of motivation were included in the sample. This sample is referred to as the 'entire sample' in this study.

PSM was done to match each treated subject with an untreated subject. This formed the 'balanced sample', with an equal number of students in each group (treated vs untreated).

Ordinary least squares regression was used to analyse the association between the dependent variables (performance in each assessment instance) and the control variables that were identified in the prior literature as predictors of academic performance in Accounting. Two constructs for motivation, namely student motivation and motivation to learn, were also analysed, and this is novel to Accounting education.

Lastly, a Heckman procedure was carried out to mitigate self-selection bias. An Instrumental Variable (IV), 'Distance from campus' was applied in the treatment model.

1.8 STRUCTURE OF THE THESIS

The main outcomes and structure of this study are explained below.

1.8.1 Chapter 1: Introduction

This chapter provides background on the study, a problem statement, the aim and the objectives of this study. The importance and benefits of the study, as well as its limitations and assumptions are outlined. Thereafter, a brief summary of the methods applied is provided.

1.8.2 Chapter 2: Background to higher education in South Africa

This chapter contextualises the study in the South African environment. Higher education, in terms of university studies as well as high school tuition is discussed.

1.8.3 Chapter 3: Literature review: Intervention

This chapter identifies the theoretical framework that underpins this study. Thereafter, the literature review provides an overview of what has been done in prior research on Accounting education with respect to interventions and programme evaluation. This chapter also includes literature from other disciplines where the prior research on Accounting education was insufficient.

1.8.4 Chapter 4: Preparation for Tertiary Accounting

This chapter provides a detailed description of the intervention itself. It alludes to the theories that underpin it. I also discuss the learning strategies that are embedded and contextualised in this intervention.

1.8.5 Chapter 5: Literature review and research design: Control variables

Various control variables were included in the regression analyses that were conducted. This chapter provides an overview of the prior literature to explain the reasons for the inclusion of these variables.

1.8.6 Chapter 6: Research design: Empirical testing

This chapter provides a detailed description of how the research was conducted. It commences with the research orientation and the research design. It also describes the research method, referring to the sample selection, the regression models used, as well as the Heckman procedure that was applied.

1.8.7 Chapter 7: Results

This chapter commences with descriptive statistics to provide a better understanding of the sample. The results are analysed using three models: (i) ordinary least squares regression for the entire sample, (ii) ordinary least squares regression for the balanced sample, and (iii) the Heckman procedure as a treatment model. The results are presented for performance in Module test 1, the examination and the final marks.

1.8.8 Chapter 8: Discussion and conclusion

This chapter summarises the study, alluding to the background of and rationale for the study, its findings, the contributions it makes and its implications. Suggestions for future research are also made

CHAPTER 2:
BACKGROUND: HIGHER EDUCATION IN SOUTH AFRICA

Education in post-apartheid South Africa has been characterised by volatilities as well as progress in terms of transformation during the past two decades. Reddy (2004) aptly describes the expectations of two main stakeholders of universities in South Africa, namely the state and the public. On the one hand, the state demands that universities contribute to social and economic transformation. The democratically elected state wants universities to produce globally competitive graduates who will play a part in rebuilding a struggling economy. On the other hand, the public and, more specifically, previously marginalised groups, see higher education as an emancipation from poverty. These expectations have not changed much since Reddy's observation more than 10 years ago.

The National Commission on Higher Education (CHE 1996) released *A Framework for Transformation* in 1996 that aimed to provide a guideline for a transformation process built on three pillars: participation, responsiveness and governance. Of interest to this study is the envisioned strategy to increase participation rates in higher education.

Under the apartheid system, quality higher education was available to mainly white students. The 1996 *Framework for Transformation* intended to open up the higher education system, changing it from "…an elitist to a 'mass system'… a process referred to as 'massification'" (CHE 1996:35). Massification is not a new phenomenon in higher education. It is observed in developed countries (Fallis 2015) as well as in the rest of Sub-Saharan Africa (Mohamedbhai 2014). Massification of higher education in South Africa, through the implementation of the 1996 *Framework for Transformation* , intended to provide access to higher numbers of poor and black students. This intention was executed by providing a greater diversity of degree programmes, incorporating changes into curricula and providing more funding opportunities (CHE 1996).

Whether this framework has played out as intended is debatable. Although South African universities have been transformed over the past two decades to be racially inclusive, the growing impatience of masses of students who felt their expectations have gone unmet was demonstrated during the 2016 protest actions. Student protests alluded to limited access to higher education due to funding and limited capacity of universities to accommodate all

students. The frustration expressed by protesting students highlighted the desperate need for higher education as a means to escape socio-economic hardship. Students know that very few alternatives to higher education exist as the majority of school leavers are left without a recourse if they are not accepted into higher education (CHE 2017).

In South Africa, learners enrol for school at the age of six years for a preparatory or receptive year. Thereafter, a school learner's primary school career comprises grades 1 to 7. Grades 8 to 12 make up a learner's high school or secondary school years. At the end of Grade 12, a learner writes the final examination. This is referred to as the Grade 12 or matriculation examination (DoE 2018). South Africa does not apply a college system in the public school sector; therefore, school leavers apply for admission to universities with their Grade 12 results.

One of the underlying causes of underperformance in higher education is the poor schooling system in South Africa that seems to regress from bad to worse. The strong legacy of apartheid, 25 years after it was abolished, is still salient in the South African schooling system. Schools are categorised in terms of school quintiles, which is, in essence, a poverty indicator. Wealthier schools – and usually these are the schools that perform better academically – receive less financial support from government and are categorised as Quintile 5 schools. On the other end of the scale are Quintile 1 schools, where pass rates are often extremely low, evidence that, in general terms, poorer students perform worse academically (Branson, Hofmeyr & Lam 2014; Spaull 2015). Quintile 1 schools receive the biggest portion of their budgets from the government. The communities surrounding these schools are characterised by poverty and unemployment. Even though greater portions of funding is available to Quintile 1 schools, these schools are characterised by mismanagement, under-qualified teaching staff and an inability to increase academic performance (Spaull 2015). Low-quality education becomes a poverty trap to thousands of learners, because the schooling system becomes an "…intergenerational cycle of poverty where children inherit the social standing of their parents or caregivers, irrespective of their own abilities or effort" (Spaull 2015:1).

Students apply for admission to universities based on their Grade 12 marks. Prior research shows that, although there is a correlation between Grade 12 results and academic performance at university (Barnes, Dzanisi, Wilkenson & Viljoen 2009; Baard, Steenkamp, Frick & Kidd 2010; Papageorgiou 2017), some studies suggest that the marks are inflated

(Nel & Kistner 2009; Schoër, Ntuli, Rankin, Sebastiao & Hunt 2010). Although Grade 12 results determine whether or not a student is granted access to university and admission to a particular degree programme, Grade 12 results cannot be used as a predictor of success at university. The relatively poor predictive power of Grade 12 results may be indicative of an 'articulation gap' between high school and university (Van Broekhuizen, van der Berg & Hofmeyr 2017). This implies that if the schooling system is questionable, universities run the risk of allowing underprepared students to enrol for a degree programme. Underpreparedness of South African school leavers is also a result of the insufficient development of life skills, such as assertiveness, time management skills, communication and listening skills (Maphosa 2014).

Universities recognise that some students lack certain academic skills and knowledge and, therefore, offer interventions that are perceived as relevant and effective in addressing academic deficiencies (Maphosa 2014). In an attempt to mitigate the risk of allowing underprepared students, universities assess the mathematic and language proficiencies of prospective students by means of the National Benchmark Tests (NBT) that was introduced in 1995. However, since students are admitted based on their performance at school, NBT results are only indicative of academic shortcomings. Students that were identified with unsatisfactory proficiencies in mathematics and readings skills are required to complete additional course work (Van Rooy & Coetzee-Van Rooy 2015).

According to the General Household Survey of 2017 (Statistics South Africa 2017), 87.5% of learners over the age of five years attended school in 2017. However, only 4.5% of learners became university students. This means that, in an attempt to implement the *Framework for Transformation* as set out by the NCHE (1996), as many students as possible need to be admitted to higher education institutions in order to increase the participation rate. Therefore, oversubscription (admitting large numbers of students into degree programmes) seems to be a strategy employed by universities to counter the risk of the admission of underprepared students (Cloete 2016). South African universities take in large numbers of students of whom only 30% are predicted to pass within 5 years (CHE 2013; Cloete 2016). Despite the pervasive problem of underprepared students, the South African Department of Higher Education and Training (DHET), which is the primary funder of universities, expects high pass rates from universities (DHET 2015). At the same time, universities are expected to maintain high academic standards – universities are the custodians of academic standards and guardians of programme accreditation, so the

academic requirements to obtain a degree are the same for all students, regardless of a student's school background. This implies that the requirement of maintaining high pass rates may conflict with the requirement to maintain high standards. These two requirements are thus increasingly difficult to meet, especially since the DHET does not allow universities the autonomy to apply strict entrance requirements.

Programme placement in many South African universities has to consider racial demographics in order to comply with legislation such as the Higher Education Act 101 (as amended) of 1997 (RSA 1997) and to align with the government's policy of increased admission of previously disadvantaged groups to tertiary education in order to address and eradicate historical inequities. Consequently, students (many of them first-generation students) from dysfunctional schools enter university with a handicap: they have not been prepared well enough to deal with studies at university level. Thus the transition from secondary school to university is more challenging for some students due to academic underpreparedness.

In the South African academic community, underpreparedness of school-leavers entering the higher education arena is accepted as the main underlying cause of poor performance (CHE 2007). Scott, Yeld and Hendry (2007) suggest that schools are not delivering students who are prepared for tertiary education. Müller *et al*. (2007) and Ogude, Kilfoil and Du Plessis (2012) argue along similar lines. Van Broekhuizen, van der Berg and Hofmeyr (2017) contend that poor school results are barriers to university access for black students, contrary to the belief that other barriers (such as financial constraints) cause inaccessibility.

Nevertheless, local universities cannot use the country's failing school system as a convenient scapegoat – they are still expected to ensure retention and throughput of their students. However, this unintended outcome leaves universities with a predicament: on the one hand, universities need to maintain academic standards and international accreditation, whilst, on the other hand, they need to adhere to the *Framework for Transformation* through massification that might contribute to the admission of underprepared students into higher education. Unless universities explore preparatory courses or other similar interventions that can serve as bridging courses, the unsatisfactory throughput rate will remain unchanged. The poor throughput rate is exacerbated by high attrition rates at contact universities that range from 21.1% in the first year of study to 42.2% (cumulative figure) by the sixth (and final) year of study (CHE 2016).

Given that the largest disparities between pass rates and completion rates have been recorded in engineering, science and commercial degrees, courses in those degrees with low pass rates (High Impact Modules – HIMS) should be earmarked for interventions. One commercial course – offered by all the major universities in South Africa as a compulsory module for their undergraduate Baccalaureus Commercii (BCom) programmes (degrees or qualifications in commerce) – is a course in introductory Accounting. Aside from degrees that specialise in Accounting (for example, BCom Accounting Sciences), other BCom degrees also require Accounting to provide students with adequate financial knowledge for the purposes of their degree. Table 1**Error! Reference source not found.** provides a summary of the requirements of seven of the biggest universities in South Africa. It illustrates Accounting as a prescribed and, thus, compulsory module in one of the years of study.

Table 1. Selected universities in South Africa with Accounting as a prescribed module

University	Number of BCom degree programmes	Accounting as a prescribed module
Nelson Mandela Metropolitan University (NMMU 2016)	19	All first year BCom programmes
North West University (NWU 2016)	18	All first year BCom programmes
University of Pretoria (UP 2016)	18	All first year BCom programmes
University if Cape Town (UCT 2016)	23	All first year BCom programmes
University of Johannesburg (UJ 2016)	4	All first year BCom programmes
University of Stellenbosch (US 2016)	22	All first year BCom programmes
University of the Free State (UFS 2016)	9	Mostly first year, but some programmes only required in the second year of study.

Various other degree programmes also include a course in introductory Accounting as a requisite for graduating (for example, programmes in consumer science, marketing and engineering). The diversity in degree programmes involved diversifies the cohort of students on a number of levels (for example, their motivation to study Accounting), because a course

in Accounting is not necessarily related to a student's anticipated career (Hall, Pierce, Tunnell & Walther 2014). Students pursuing an undergraduate qualification other than a degree in Accounting are sometimes at risk of failing Accounting, since these students usually have a lower motivation to study (Müller *et al.* 2007:30).

In summary, Higher Education in South Africa is still developing and expanding to meet the growing demands of a developing democracy. However, there is a growing tension between maintaining high academic standards at universities and admitting large numbers of students who might not be prepared for tertiary education.

CHAPTER 3:
LITERATURE REVIEW: INTERVENTIONS AND RESEARCH QUESTIONS

3.1 INTRODUCTION

Interventions aim to bring about change. This aim is grounded in the theory of change that

> …spells out initiative or program logic. It defines long-term goals…The identified changes are mapped graphically in causal pathways of outcomes, showing each outcome in logical relationship to all the others. Interventions, which are activities and outputs of any sort, are mapped to the outcomes pathway to show what stakeholders think it will take to effect the changes, and when. Theory of change provides a working model against which to test hypotheses and assumptions about what actions will best bring about intended outcomes. A given theory of change also identifies measurable indicators of success as a roadmap to monitoring and evaluation. (Taplin, Clark, Collins & Colby 2013:2)

Interventions at higher education can broadly be classified into two categories: interventions addressing transitions and interventions addressing academic underpreparedness. , Interventions can also be classified as cognitive, metacognitive and affective interventions (Hattie, Biggs & Purdie 1996). Cognitive interventions in introductory Accounting address task-related skills such as reading, using timelines and recording transactions according to certain principles. Metacognitive interventions aim to address strategies for self-management, planning, implementing and monitoring of academic strategies. This type of intervention also relies on learning strategies and self-reflection. Affective interventions focus on non-cognitive aspects of learning such as motivation and self-efficacy.[6]

A pre-university intervention, such as PTA, should aim to incorporate academic (or cognitive), metacognitive and affective objectives. This strategy is followed in order to provide a student with a range of cognitive and metacognitive strategies that can be embedded in the context (Hattie, Biggs & Purdie 1996). Merely teaching students general all-purpose study skills will not contribute to the development of lifelong learners. Embedding it into the context of introductory Accounting demonstrates to the student the application of the relevant strategy. Therefore, students need the skill (relevant learning strategy) as well as the motivation to learn in order to succeed (Pintrich & De Groot 1990). Establishing a

[6] Interventions such as induction programmes aim to prepare students for their new environment, for example, a student support programme such as Assisted Passage to Success (APTS) (Moeketsi & Mgutshini 2014).

causal relationship between an intervention aimed at addressing academic deficiencies on the one hand, and academic improvement on the other hand, is not part of the evaluation of the effectiveness of the intervention (Brock 2010) as many other unobservable factors influence the outcome. However, this should not prohibit one from evaluating an intervention against its objectives.

In terms of pedagogical approaches, a preparatory bridging course can prepare students for the transition between behaviourist teaching practices to constructivist teaching practises. In essence, this refers to the transition from teacher-centred approaches to student-centred approaches.

Academic interventions for this discipline come in various forms, ranging from condensed interventions such as 'bootcamps' to more long-term interventions, such as weekly tutorial sessions. Little research has been conducted on programme evaluation in Accounting education, even though programme evaluation depends on the type of intervention that is offered.

In the social sciences, the effect of an intervention needs to be isolated in order to determine whether or not there is a positive association between the intervention and academic performance. This implies that various factors that might have an influence on performance in Accounting need to be taken into account. Hence, the factors (control variables in this study) that have already been identified in the literature are discussed in Chapter 5.

The remainder of this chapter is structured as follows: first the different types of interventions are discussed, thereafter the focus shifts to interventions specifically applied in Accounting. The next section contains discussions of prior literature on programme evaluation. Prior evaluation models relied on the incorporation of predictive factors for academic success. The findings of prior studies are alluded to. I conclude this chapter with the development of the research questions.

3.2 TYPES OF INTERVENTIONS

Interventions are

> …both a response and an initiative. It is a response to a situation that defines a need. It is a response to a deficit or to what is not present. At the same time, it is an initiative to influence that situation – to fill in what is not present, to transform the deficits into assets. In short, an intervention is an attempt to make a difference. (Carkhuff 1983:163)

Interventions are introduced when a problem has been identified or anticipated. Therefore, the main aim of any intervention is to prevent problems (a proactive approach) or to rectify a problem (a reactive approach). Interventions in higher education can broadly be categorised in non-academic interventions, such as interventions for generic skills (Flinchbaugh, Moore, Chang & May 2012) and motivation (Braun & Sellers 2012), and academic interventions.

Academic interventions aim to address an academic deficiency: either filling in gaps in inadequate prior knowledge or attempting to prepare students for future academic endeavours. Academic interventions vary in duration and in the timing of when the intervention is presented: before, during or as extended term interventions. Discipline-specific interventions are normally presented during the course of an academic programme; for example, results from micro-economics (Smith & Ranchhod 2012) and Accounting studies (Jones & Fields 2001) show that there was a positive association between attendance of the intervention and academic performance. This suggests that, if an intervention is effective and potentially underprepared students have been identified, offering a pre-university intervention can be a proactive solution to addressing underpreparedness. This type of pre-university intervention (short bridging programme) can be defined as an academic activity in addition to the main curriculum, aiming to prepare students "…for survival in the mainstream by providing support prior to the introduction of the mainstream curriculum" (Maphosa 2014:13).

Pre-university bridging courses or 'bootcamps' (Jackson 2014) are presented before the actual course commences. According to Lubben, Davidowitz, Buffler, Allie, and Scott (2010), bridging courses mediate gaps in knowledge or skills that should have been acquired at school. Some bridging programmes aim to assist students to be better equipped before programme selection takes place. Augmented (add-on programmes) and extended programmes are usually presented before the onset of the programme, but it usually forms part of the structure of a specific degree programme. Therefore, attendance of these

interventions are compulsory in order to comply with all the requirements of the undergraduate degree programme. [7] [8]

Interventions that are presented during the actual course can either be embedded in the course (e.g. making use of video and podcast technology) (Bongey, Cizadlo & Kalnbach 2006; Cameron & Dickfos 2013) or presented as additional assistance in the form of tutorials (Johnson, Phillips & Chase 2009; Sargent, Borthick & Lederberg 2011; Steenkamp, Baard & Frick 2012). Supplemental instruction (SI) (Congos & Schoeps 1993; Drake 2011; Harding, Engelbrecht & Verwey 2011; Jones & Fields 2001) involves additional contact sessions scheduled parallel to traditional lectures. The intellectual property rights of facilitating SI belongs to the University of Missouri (Kansas City, USA) and have been implemented since the early 1970s. SI aims to address academic deficiencies in students who are enrolled for high-risk modules and courses (such as Accounting, mathematics and engineering) as opposed to other interventions aimed at high-risk students. SI also differs from other interventions because the focus is on learning to study and master the high-risk module, and is not merely another session to transmit knowledge. Attendance of SI is mostly voluntary (Drake 2011; Harding *et al.* 2011), but can be made mandatory if necessary (Jones & Fields 2001). SI has been presented with success across disciplines: studies in the arts and sciences (Blanc, Debuhr & Martin 1983), microeconomics (Loviscek & Cloutier 1997) and engineering (Webster & Dee 1998) all report a positive association between SI attendance and improved academic performance. Although, some studies suggest that SI was not effective as measured by academic performance in a political science and calculus course (Warren & Tonsetic 1998) and a course in Sociology (Schwartz 1992).

The increase of diversity of students at South African universities resulted in the use of a combination of interventions. These interventions are grouped as academic development programmes (Maphosa 2014) and aim to "…enable students from disadvantaged academic and socio-economic backgrounds to develop their literacy, quantitative and study skills so that they are able to achieve success in a particular course, and ultimately, a higher

[7] Extended programmes are also known as Foundation Provisions. These programmes are a combination of credit-bearing and non-credit bearing modules. Extended programmes normally add one more academic year to an undergraduate programme (Bass 2007).

[8] Augmented programmes are longer in duration in order to make provision for additional interventions during the programme. Normally the first year of a programme is spread over two years (Maphosa 2014).

education qualification." (Smith 2009:109). Extended programmes and bridging courses are commonly used as interventions. PTA, the intervention that I propose in this study, can be best classified as a bridging course. The following section will be dedicated to prior literature on bridging courses.

3.2.1 Bridging courses

Bridging courses, also described in literature as pre-university enabling programmes (Lisciandro & Gibbs 2016), university preparatory courses and pathway courses (Hodges, Bedford, Hartley, Klinger, Murray, O'Rourke & Schofield 2013), are increasingly used in higher education to ensure students enter with the best possible chances of passing.

The University of Technology Sydney, an Australian university, aptly describes bridging courses as:

> …short intensive courses designed for high school students entering tertiary study. It is for students who are not confident with their preparation for university study, or they may not meet the assumed knowledge requirements. Bridging courses only teach to an introductory level and may assist in narrowing the gap between high school and university studies. Subjects taught in bridging courses do not carry any credit towards your degree. (UTS 2018)

Bridging courses can range from an intensive short-course to a full year. The use of bridging courses in mathematics (Gordon & Nicholas 2013; Nicholas, Poladian, Mack & Wilson 2015; Rolf, Lankeit & Neuhaus 2018), sciences (Fraser, Malone & Taylor 1990; Lubben *et al*. 2010), nursing and medical training (McLaughlin, Khanova, Persky, Hathaway & Cox 2017; Cruz, Felicilda-Reynaldo & Mazzotta 2017), is thoroughly documented. Prior literature is rife with empirical evidence rendering evidence in support of the effectiveness thereof. Bridging courses do not only include content knowledge, but also help students develop learning strategies for a specific discipline; it extends thinking skills and assists in the transition from school to university (Gordon & Nicholas 2013).

3.3 INTERVENTIONS IN ACCOUNTING

Many Accounting educators hold the view that Accounting as a discipline offers unique challenges to students and members of faculty. However, Rebele and St. Pierre (2015) do not believe that Accounting really differs much from other disciplines where academic challenges are concerned. Irrespective of whether the challenges are different, it is clear

that a critical evaluation of low pass rates and high rates of attrition in Accounting shows the need for Accounting-specific academic interventions. A study by Müller *et al.* (2007) reports a direct relationship between attrition at first-year level and programme attrition. For this reason, developing an intervention for first-year non-Accounting students makes a lot of sense: it is expected that if a student passes the first academic year, the student is likely to be retained and complete the degree (even if this is not in the regulation time). However, generalisations about interventions aiming to increase student retention can be misleading if the intervention is not interpreted within the context it was designed. Each student, each university and each country is different, although similarities between student cohorts, universities and countries will create opportunities for replication of interventions. South African interventions in higher education have not adequately been addressed in literature (Winfield & Luyt 2013), much less in Accounting education. [9]

Since Accounting courses are usually cumulative in design, developing an understanding of Accounting starts with understanding the basic underlying principles and theories. Dull, Schleifer and McMillan's (2015) rightly argue that it is easy for students to fall behind in Accounting, and that this may influence a student's motivation to learn. Once students have fallen behind, they are unlikely to recover to complete the course in Accounting successfully. When they are exposed to financial Accounting for the first time at tertiary level, many students do not know what to expect or which skills are required to complete the course successfully. This view is confirmed by Braun and Sellers (2012), who found that many first-year students do not understand the underlying work-ethic of continuous work throughout an Accounting course that they are supposed to cultivate. Research conducted by Debevec, Shih and Kashyap (2006) concluded that only 33% of first-year students come prepared to an introductory Accounting lecture.

In Accounting education, attendance of SI has been positively associated with an increase in academic performance (Etter, Burmeister & Elder 2000; Jones & Fields 2001), although some of the results of these studies should be interpreted with caution. These will be commented on in the discussion of the evaluation of interventions in the next section. Aside

[9] Attrition is the "non-completion of a course or failure by students of a subject, programme level or degree" (Müller *et al.* 2007:21).

from the evidence on SI, there is currently only limited evidence regarding academic interventions for Accounting (Winfield & Luyt 2013).

Deines, Bittner and Eichman (2012) report on the use of an Accounting course that was developed for high school learners. This course is aimed to replace the current Accounting subject that is offered at high school. The authors contend that a new approach to Accounting education in high school is needed and this course aims to fill that need.

A search for publications on pre-university interventions in Accounting commenced by using the combination of 'pre-university', 'bridging' and 'preparatory' with 'introductory accounting' or 'accounting'. I have searched all the databases available on Google Scholar, which includes unpublished theses and other manuscripts. The term 'pre-university accounting' is usually associated with prior knowledge acquired at school (Tho 1994; Tan & Laswad 2008; Papageorgiou 2017) and no relevant publications were found.[10]

3.4 EVALUATION OF ACADEMIC INTERVENTIONS

It is important to evaluate the effectiveness of academic interventions because interventions are resource- and time-intensive. Brock (2010) investigated interventions in general and concluded that few interventions have been evaluated to establish whether they reached the desired outcomes. Programme evaluation starts with the measurement of objectives. Interventions should be measured against the goals set at the outset of the intervention. Weiss (1972) contends that evaluation reports (reporting on the achievement or non-achievement of goals of the intervention) serve as an indicator of the feasibility and acceptability of the intervention. If this is read with arguments by Taplin *et al*. (2013), then identifying measurable indicators of success implies that one of the outputs of an academic intervention should be an increase in academic performance.

Academic objectives usually include increased academic performance, which is a product of a number of variables. Hence, robust statistical techniques are needed to determine an association between a given intervention and academic performance. Quantitative statistical methods to determine the effect of interventions vary from a simple comparison between

[10] Papageorgiou (2017) mentions the option of enrolling for a 'pre-accounting school' if students did not have Accounting as a school subject in Grade 12, however this intervention is not discussed.

groups (Etter *et al.* 2000), to more robust techniques, such as the inclusion of a number of control variables (Domina 2009; Jackson 2014; Jones & Fields 2001) or the application of an IV (Smith & Ranchhod 2012).

Programme evaluation in Accounting education often lacks statistical robustness. Only a few quantitative studies have so far been published on the evaluation of interventions in Accounting, and the few that have been published fail to present convincing statistical inferences, compared to those in other disciplines. The majority of studies in Accounting education have been conducted as quasi-experimental designs, because students as subjects cannot be randomly assigned to treatment (Hong & Yu 2008; Wyse, Keesler & Schneider 2008). Of the four models summarised by Guo and Fraser (2010), only PSM has been applied with rigour since the 1980s in course evaluation in various disciplines (Heckman, Ichimura & Todd 1998), although it received limited application in Accounting education (Jackson 2014).

Attendance of interventions is mostly voluntary; therefore, self-selection bias will always play a role where the effect of an intervention is determined. However, in most Accounting education studies, self-selection bias has either been ignored (Etter *et al.* 2000), mitigated by inferences that there is no statistically significant difference between the means of treatment and the non-treatments group (Jones & Fields 2001) or addressed unconvincingly by adding more control variables (Jones & Fields 2001). Various other disciplines[11] have addressed self-selection bias in programme evaluation effectively through the use of more advanced and robust statistical analyses such as two-stage least squares regression and/or the implementation of Heckman procedures.

Determining the effect of an intervention is more complicated in the social sciences, because causality cannot be established, since academic performance depends on the culmination of several factors. These include prior knowledge, academic and/or mathematical aptitude, all of which may contribute to academic success. In an effort to isolate the effect of an intervention, these factors must be taken into account too. Studies on factors that predict

[11]Researchers in Economics have applied multiple regression and Heckman's two-step procedure (Smith & Ranchhod 2012). Education studies used chi-square tables (Congos & Schoeps 1993) and the following fields have applied PSM: Medicine (Ye & Kaskutas 2009), the behavioural sciences (Staff, Patrick, Loken & Maggs 2008) and Public health and Criminology (Thoemmes & Kim 2011).

academic performance in Accounting have been published since the late 1960s. These studies are discussed in Chapter 5, as they merit inclusion in an evaluation model.

As research in this field developed and more variables were added to studies, later studies began to report on the (in)significance of several variables as predictive factors. For this reason, some studies are discussed under more than one theme (i.e. a predictive variable) in Chapter 5.

3.5 DEVELOPMENT OF RESEARCH QUESTIONS

3.5.1 A bridging course in introductory Accounting with embedded learning strategies

The South African schooling system does not prepare prospective students for university studies. This is especially true for underprivileged students from poorer communities. A pre-university intervention aims to prepare students for what lies ahead. Dull *et al.* (2015) rightly point out that it is easy for students to fall behind in Accounting, which would manifest in a student's performance in Module test 1. Once a student has fallen behind, he/she is unlikely to recover to complete the course in Accounting successfully. Since Accounting is cumulative in design, developing an understanding of Accounting starts with an understanding of the basic underlying principles and theories. Students who undergo an intervention are expected to complete the semester course successfully, since the intervention is meant to assist them to start well. Aside from understanding underlying Accounting principles, students need to be taught how to learn Accounting through appropriate learning strategies.

Various disciplines address the knowledge and skills gap with great success by presenting interventions in the form of pre-university, or bridging, courses. However, I could not find any previous study in introductory Accounting where a bridging course was described as an intervention that addresses underpreparedness.

Therefore, the first research question is:

RQ1: What does a pre-university intervention that is developed based on various learning strategies and Accounting fundamentals entail?

3.5.2 The association between the intervention and academic performance

Academic interventions *per se* aim to bring about positive change and are grounded in the theory of change (Taplin *et al.* 2013). Applying the theory of change implies that measurable indicators of success need to be identified. Therefore, the most significant measure of the effectiveness of an intervention would be an increase in academic performance in assessments throughout the course – in this case, students' marks in Module test 1, examination and final marks. Pre-university interventions aim to increase academic performance in the first formal test, as research has shown that students are more likely to pass a course if they do well in the first assessment. Müller *et al.* (2007) conclude that there is a direct relationship between attrition at the first-year level and programme attrition. Thus, if a student passes the first academic year, he/she is likely to be retained and complete the degree (even though this may not be in the regulation time).

Jackson (2014) reported on a pre-course intervention presented to students before their second-year in Accounting, which resulted in better academic performance. The presentation in his study of a four-day pre-university course is similar to the presentation of supplemental instruction (SI) sessions. Results of programme evaluations on these sessions have shown that there is a positive association between attending SI and academic performance in Accounting (Etter *et al.* 2000; Jones & Fields 2001).

The following research question, investigating the association between academic performance and attendance of the intervention, is:

RQ2: What is the association between attendance of PTA and academic performance in Module test 1, the examination and the final marks of students in an introductory Accounting course?

In order to answer Research Question 2, various econometric techniques are proposed. PSM and the Heckman Procedure have been applied in various disciplines, but not yet in Accounting education. A thorough description of these methods are needed in order to create opportunities for replication in future studies. Various decisions taken throughout the research design are documented as these might influence the results. Therefore, Research Question 3 reads:

RQ3: How is Propensity score matching and the Heckman procedure applied in the evaluation of an intervention in Accounting?

3.6 CONCLUSION

Interventions aim to address a deficiency which is believed to hinder academic performance. Universities in developing countries are increasingly confronted by the admission of underprepared students. In order to increase the participation, throughput and retention rates, pre-university interventions might be a way to prepare students for tertiary Accounting.

Prior literature indicates that interventions aimed at academic deficiencies are effective if clear objectives and measurement criteria are set. Academic interventions in Accounting are usually presented during the academic term when underperformance is observed. However, at the present time, nothing has been documented or published with regard to bridging courses in introductory Accounting. Aside from the lack of prior literature on bridging courses in introductory Accounting, interventions aimed at addressing underpreparedness for school leavers who are prospectively majoring in non-Accounting fields lack empirical investigation. The relative effectiveness of interventions that are mentioned in Accounting education, regardless of the aims of the intervention, needs evaluation by means of robust econometrical models.

Since interventions are time- and resource-intensive, the efficacy of interventions need to be evaluated against the objectives of the intervention. Introductory Accounting courses are often prescribed for students who do not intend to major in Accounting, resulting in a diverse student cohort in terms of prior Accounting knowledge, mathematical and academic aptitude, motivation levels and other background factors that might influence their academic performance in Accounting.

Based on the theoretical frameworks and the findings from prior studies, three research questions were developed. The first objective is to provide a description of an intervention aimed at mitigating underpreparedness through learning strategies in introductory Accounting. Secondly, to determine whether there is an association between attendance of the intervention and academic performance in an introductory Accounting course. This is done through the application of a three-step econometrical process that includes the

application of the Heckman procedure, which is novel to Accounting education and which forms the last objective of this study.

CHAPTER 4:
PREPARATION FOR TERTIARY ACCOUNTING – A DESCRIPTION OF THE INTERVENTION

4.1 INTRODUCTION

The South African schooling system does not prepare students adequately for higher education (Scott *et al.* 2007; Müller *et al.* 2007; Spaull 2015; Cloete 2016; Van Broekhuizen *et al*. 2017). Academic deficiencies affect admission to a university and completion of a qualification at university (Maphosa 2014). For this reason, universities offer interventions to address these knowledge and skills gaps (Bass 2007; Ogude *et al.* 2012; Moeketsi & Mgutshini 2014;). Offering interventions is a way of supporting students to assist them to enter and succeed in higher education. In addition, government expects universities to maintain 'acceptable' pass rates and, therefore, universities cannot just fail underprepared students (DHET 2015).

After introducing several ineffective interventions in the first year accounting semester course, I felt frustrated by the inadequate time available during the semester to introduce new ways of learning as a pro-active form of intervention. Through the twelve years of experience that I had gained as a first-year lecturer, I identified a number of academic deficiencies that could be addressed through an intervention. This led to the introduction of a bridging course (a course presented before the start of the academic year that students could voluntarily enrol in at an additional fee), in 2011, based on my own experience as a lecturer. This course has since been developed into a research-based intervention with sound educational theories underpinning its structure. The UP was, to my knowledge, the first university to present an intervention of this nature for prospective first-year accounting students in South Africa.

The bridging course (PTA) is a short course that provides learning strategies embedded in Accounting content. The theoretical frameworks that underpin this course are drawn from behaviourism as well as constructivism. The bridging course aims to assist students with the transition from school to university by exposing students to constructivist learning, or more specifically, a student-centred pedagogy. Being cognisant of the transition, PTA begins by

following a behaviourist approach (teacher-centred) and then progresses to a constructivist approach.

PTA aims to expand the 'tool box' of learning strategies with which students leave school. PTA focuses, inter alia, on self-regulated learning (SRL) strategies. Therefore, since the inclusion of different learning strategies differentiates the intervention (PTA) from the semester course, a detailed description of the teaching and learning strategies used in PTA and its underlying theories is merited. The structure of PTA includes some strategies proposed by Zimmerman (1998). The application of Zimmerman's model to Accounting was done by Becker (2013) and similar strategies were used in PTA. PTA introduces students to the university's method of teaching, learning and executing assessments, as opposed to the approach adopted at school.

PTA is a combination of cognitive and metacognitive interventions where the application of learning strategies is embedded in the specific context of an introduction to Accounting (Hattie, Biggs & Purdie 1996). Figure 1 describes the main components of PTA under each theoretical domain. These are applicable to introductory Accounting, but can also be applied to other disciplines.

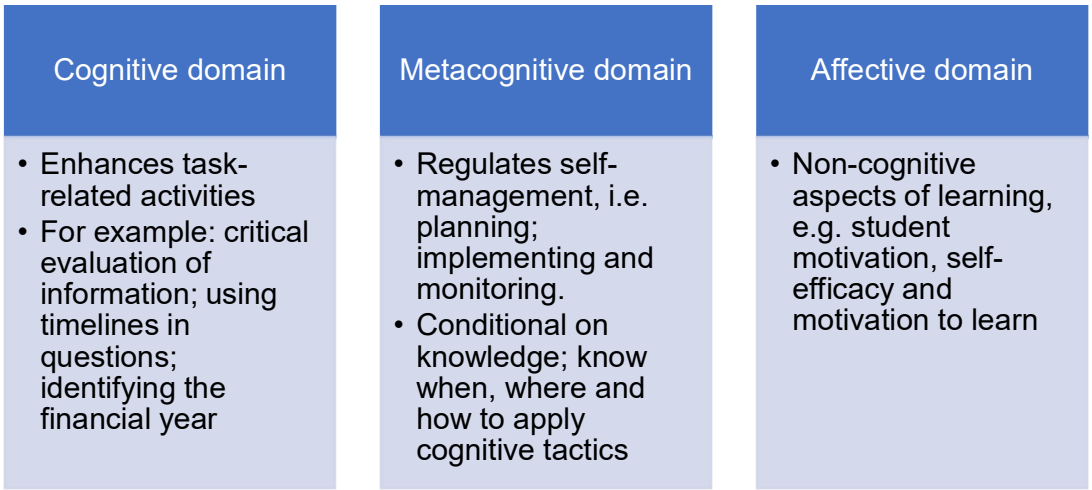

Figure 1. Schematic illustration of the supporting theories embedded in PTA (Adapted from Hattie, Biggs & Purdie 1996)

The remainder of this chapter is set out as follows: first, the need for a pre-university intervention within the South African context is explained; this is followed by a discussion of

the intervention. The discussion elaborates on the theoretical framework for PTA, namely Zimmerman's model. This entails the learning strategies that are included in PTA. Thereafter, the theoretical framework for the classification of PTA as an intervention according to the Structure of the Observed Learning Outcome (SOLO) model is described. Throughout this chapter, I aim to capture the spirit of teaching that creates the environment for learning during PTA[12].

4.2 WHY A PRE-UNIVERSITY INTERVENTION IS NEEDED IN THE SOUTH AFRICAN CONTEXT

South African universities attract a heterogeneous cohort of students that is diversified in terms of race, religion, culture, socio-economic status and previous school experience. The transition from school to university is often experienced as entering an 'alien environment' (Askham 2008); moreover, prospective introductory Accounting students might also be anxious about doing Accounting for the first time.

A pre-university intervention in introductory Accounting is needed for two reasons: to address academic deficiencies (through learning strategies applicable to introductory Accounting) and the student's lack of prior Accounting knowledge and, secondly, to ease the transition from school to university.

4.2.1 Academic deficiencies, learning strategies and Accounting

Students obtained admission based on their Grade 12 marks, however, this cannot be used as a predictor of success in university. The South African schooling system does not adequately prepare students for university. South African universities are aware of the possible risks associated with the admission of underprepared students; therefore, universities offer generic intervention programmes that address challenges associated with transition from school to university (Ogude *et al*. 2012). It is worth noting that each intervention will serve a particular student, for example, students who do not meet the minimum requirements to enrol for a degree programme might benefit from doing an extended programme or a foundational programme. Generic academic development programmes, on the other hand, are developed to address gaps in skills and knowledge in

[12] Refer to Annexure A for a detailed description of the day-to-day content.

general. Critique against the use of generic academic programmes includes the observation that students feel stigmatised (Latino & Unite 2012), generic academic development plans are expensive to deliver, and that generic academic development programmes do not meet students' changing needs (Clark-Unite 2007).

Many students meet the minimum requirements for a particular degree programme and are thus not required to enrol for an extended programme. However, since Grade 12 marks cannot be used as a predictor for success at university, these students might be underprepared. Therefore, identified skills and knowledge that are pertinent to, for example, Accounting can be delivered in the form of a voluntary bridging or pre-university course once the student has decided on a degree programme. Discipline-specific interventions have clearly outlined outcomes and focus specifically on learning strategies to master the skill and content of that discipline (Becker 2013).

A preparatory course[13] in introductory Accounting serves various purposes. Firstly, a pre-university intervention will assist students in acquiring the necessary learning strategies to not only learn and achieve academically, but to take responsibility for their own learning. Pokorny and Pokorny (2005) contend that, although students generally want to assume responsibility for their own learning, they do not always know how to do so. Some secondary school systems rely on rote learning and deep learning skills are not always applied (Müller, Prinsloo & Du Plessis 2007). A bridging course in introductory Accounting facilitates the transition from learning strategies used at school to learning strategies applicable for Accounting at university.

Students reflect on their learning strategies by judging their satisfaction with their marks. If a student is satisfied with the performance, little or no adjustment is made to the learning strategy. If a student is dissatisfied, the student might reflect on learning strategies to make adjustments where needed. One of the problems with this approach is that students run out of assessment opportunities that will ultimately prove or disprove the appropriateness of their individual learning strategy.

Students have an idea that university will be different from school, however, exactly how different and what is expected of them might not be that clear. This uncertainty of what to

[13] Also known as a bridging course.

expect results in concerns and pressure on students making the transition to university (Leese 2010). A bridging course, in the form of a preparatory course, allows more time to introduce and strengthen core competencies (such as time management[14], reading and understanding Accounting language, critical thinking skills as well as learning strategies for Accounting).

4.2.2 Easing the transition from school to university

A preparatory course allows students a unique induction into university. This induction creates opportunities to develop social cohesion (Parkinson & Forrester 2004; Rolf, Lankeit & Neuhaus 2018) which is crucial in the first few weeks of the first semester of the first year (Leese 2010). Attending class before university starts gives students an understanding of the academic environment as well as the physical environment (i.e. an orientation of campus). Students engage during PTA with fellow students from diverse degree programmes, but with introductory Accounting as the common denominator.

Entering higher education as a mostly undefined territory leads students into a period where they experiment with different learning strategies. Normally, students start out by applying learning strategies that they have applied at school and, depending on how satisfied they are with their performance in an assessment, might decide to adjust these strategies. The problem with this approach is that students often do not know how to adjust their learning strategy and which strategies are available.

4.3 A DESCRIPTION OF THE INTERVENTION

4.3.1 Self-regulated learning: Developing lifelong learners

SRL skills develop lifelong learners (Zimmerman 1998; Becker 2013). Zimmerman (1998) developed a model for stages of the learning cycle (Figure 2). These stages are cyclical and repeat throughout the life of a learner. It starts with the forethought phase, which influences the performance phase. In turn, this phase influences the self-reflection phase. Whether a student then experiences an upward cycle (for highly self-regulated learners) or a downward cycle (for poorly self-regulated learners) will depend on the reaction of the student during

[14] Two of the challenges faced by students, as found in a study done by Leese (2010), were time management and understanding academic language.

the self-reflection phase. These phases do not necessarily influence each other in a linear way; conversely, prior literature shows that an experience can influence any phase in any direction (Winne & Hadwin 1998). These phases and their application in introductory Accounting, but more specifically during PTA, are discussed.

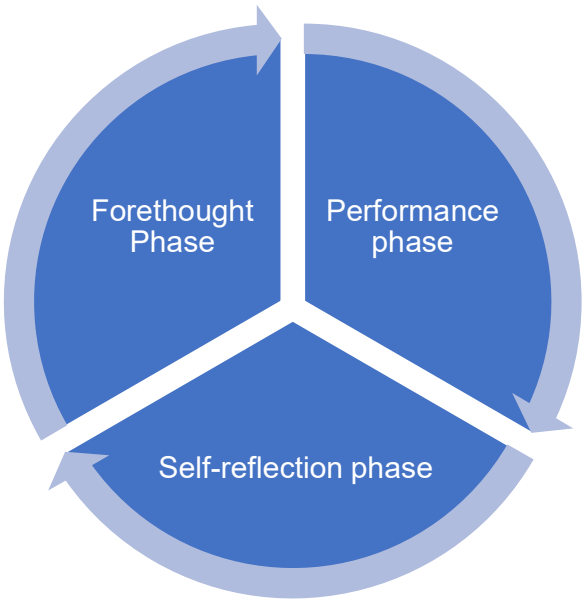

Figure 2. Zimmerman's model: An academic learning cycle (Zimmerman 1998)

Forethought phase

The forethought phase entails the motivation, beliefs and expectations that students have when entering university. These constructs are not only influenced by past experiences (Zimmerman & Bandura 1994), but also by various perceptions held by an individual. These perceptions include perceptions about learning and knowledge. In Accounting, some students may believe that 'remembering' equates 'understanding' (Moran 2005) and, therefore, students will revert to rote memorising techniques if they do not understand a concept (Gow, Kember & Cooper 1994). Perceptions of learning and knowledge are also evident when students believe that the mere 'accumulation of facts' equates to knowledge (Zellweger Moser, Hasabegovic & Metzger 2008).

Perceptions influence a student's academic performance (Schommer 1990, 1993) because it influences the learning strategy applied by a student. In introductory Accounting, the

assessments are set according to Bloom's taxonomy. The assessments are set mainly at the 'Apply' (Level 3) and 'Analyse' (Level 4) levels, with a smaller percentage of the assessment testing whether or not they 'Understand' (Level 2). However, it is evident that a student will not perform well if he/she merely tries to 'Remember' (Level 1). The learning strategy should align with the level at which a student will be assessed. Effective strategies are discussed in the performance phase of the learning cycle.

According to Paulsen and Feldman (2007), the forethought phase encompasses the lens through which the interpretation and processing of information takes place. Perceptions about learning Accounting, aside from perceptions of learning and knowledge in general, will influence how students approach introductory Accounting. Research shows that students perceive Accounting as difficult to master (Friedlan 1995, Mladenovic 2000; Goldstein, Sauer & O'Donnell 2014), leading to anxiety, low self-efficacy and even depression (Byrne, Flood & Griffin 2014). Students also know which courses are easily failed and this awareness negatively impacts self-efficacy (Sharma 1997).

An effective learning strategy intervention will assist students in moving away from 'remembering', but towards understanding (Moran 2005) by incorporating relevant learning strategies in the performance phase.

Performance phase

In the performance phase students use learning strategies to accomplish academic tasks (Becker 2013). When learning strategies are categorised (for example into elaboration and organising strategies), it might assist students in knowing when to use a specific learning strategy (Weinstein & Mayer 1983). Weinstein and Mayer (1983) categorise learning strategies into (1) rehearsal strategies (for example copying); (2) elaboration strategies (for example paraphrasing and summarising); (3) organisational strategies (for example outlining); (4) monitoring strategies (for example checking for comprehension failures) and (5) affective strategies (for example being alert and relaxed). Of these strategies, rehearsal, elaboration and organisational strategies are beneficial for learning in introductory Accounting, although the teaching of examination techniques may also include affective strategies.

Rehearsal strategies are not advocated in introductory Accounting, since the main idea of a learning strategy is to steer students away from rote memorising. However, it is important to acknowledge that some content will only be mastered through rehearsal. These include, for example, elementary formats of financial statements that are prescribed by International Financial Reporting Standards (IFRS)[15]. Teaching a learning strategy also includes teaching students which learning strategy is appropriate for the level of content knowledge required. Therefore, I recommend that certain definitions (that are required when answering a technical question) and prescribed formats of financial statements be learned through rehearsal strategies.

Conversely, students are encouraged and guided to move beyond rehearsal strategies. Compared to memorising and rehearsing techniques, elaboration and organising strategies are more effective learning strategies in Accounting (Hofer 2001, Paulsen & Feldman 2007). Elaboration strategies entail assembling information in a way that synthesises new information and prior knowledge. This strategy strengthens long-term memory and includes paraphrasing, summarising and creating analogies (Muis 2007). Elaboration leads to the integration of information and assists in deep-learning strategies (Muis 2007).

Organising strategies are effective in the Accounting context. Accounting content is conceptual and understanding the relationship between concepts are important (Becker 2013). Contrary to the belief that the communication of learning outcomes assists students in organising the content, in other words a linear approach, research shows that visual aids such as diagrams and concept maps are more effective in illustrating relationships between concepts (Leauby & Brazina 1998). In PTA, I use the Accounting cycle[16] as a basic visual concept map to explain the interrelationship between concepts and processes. It also serves as the outline for the four-day programme. This 'road map' (refer to Figure 3) of content serves a dual purpose: initially it broadly introduces students to new concepts, but more detail is added to the concept as the programme progresses. According to Leauby and

[15] One of the learning outcomes of the introductory Accounting course is the preparation of elementary financial statements for a sole proprietor.

[16] Transaction occurs, the source document is generated, recording in the journal, recording in the general ledger, preparation of the trial balance and, lastly, drafting financial statements for the period.

Brazina (1998), this strategy creates meaningful learning and an opportunity for students to reflect on the interrelationship between concepts.

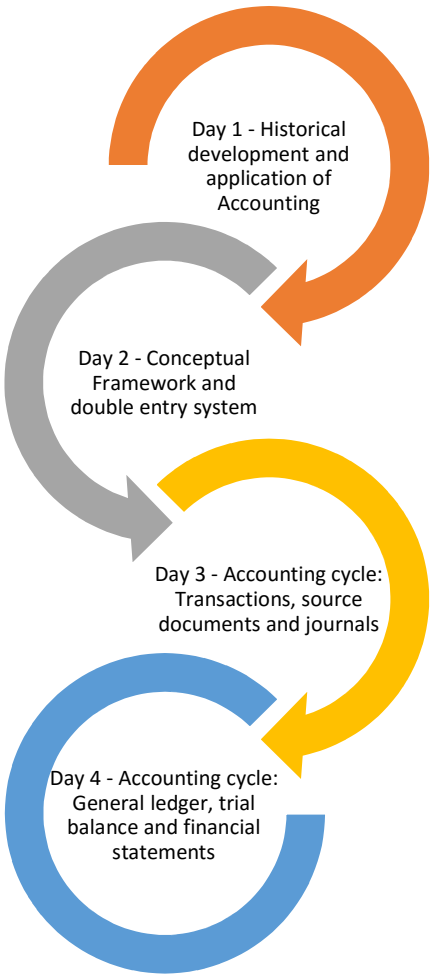

Figure 3. Schematic illustration of the daily outcomes of PTA

Since learning strategies are used to complete academic tasks in this phase, it is crucial to create opportunities for continuous self-monitoring. Students should have frequent opportunities to assess their knowledge after a concept has been explained. This is especially true in Accounting since mastering harder concepts relies on the understanding of fundamental concepts. In the event that a student does not fully understand, then the student should adopt a different strategy, change the study environment, seek help from available resources or initiate another change (Becker 2013).

The main driver of the performance phase is persistence (or lack thereof), which in turn is influenced by beliefs and perceptions held during the forethought phase (Bandura 1986).

PTA's curriculum includes a strong focus on how Accounting studies should be approached. I start this session by showing visual images of opposing pictures: athletes opposed to overweight people; victorious conquerors opposed to defeated soldiers and successful and happy people opposed to depressed and underperforming individuals. These images spark a conversation where we discuss, as a group, what the difference is between these groups of people. I steer the conversation into the direction of fostering good habits, academic persistence and the value of frequent self-reflection. Good habits include students acquiring learning strategies that are effective, firstly for Accounting, but also for other courses where a deeper understanding of conceptual knowledge is needed for higher-level thinking.

During PTA, a strong constructivist approach is followed for this phase. Throughout the four-day intervention, organising and elaboration techniques are explained and demonstrated. First, students discuss which learning strategies were followed during high school. Thereafter, we discuss, as a group, why those strategies might not be applicable for university studies. I create awareness by referring to the obvious differences between school and university: the importance of self-discipline, how to set learning goals, how to deal with academic setbacks, what resources are available at university to assist students and how to utilise those resources.

Self-reflection phase

During the self-reflection phase, students evaluate their performance based on the goal that was set. Normally this goal is a performance goal: either expressed as a score for an assessment, improvement on a prior score or as vague as 'just passing the course'. The development of lifelong learning skills require more than merely setting performance goals. Students should rather be encouraged to set learning goals (that can be achieved through deep learning strategies) as opposed to performance goals (that can be achieved through surface learning strategies) (Ballantine, Duff & Larres 2008). Highly self-regulated students will view undesired outcomes as correctable whilst maintaining a positive self-reaction. Conversely, students who are low self-regulated students will easily equate unsatisfactory performance with their inability to understand. This interpretation will adversely affect a student's self-belief and due to the cyclical nature of learning, will influence the student's forethought phase.

Students should be guided through the self-reflection phase in an introductory Accounting course. During PTA, I emphasise that the application of the right learning strategy makes all the difference. I agree with Smith (2001) that "… academic difficulty may be less a matter of ability than of the student's ability to know how to take control of the learning process" (2001:691).

Frequent assessment opportunities during PTA are used to provide students with the opportunity to do self-reflection. These assessments become a gauge or an instrument to help the student determine: 'Am I getting this?'. Timeous, relevant and constructive feedback is provided to every student during PTA. I make use of peer evaluation as well as traditional evaluation[17] techniques. I take time to discuss how feedback should be interpreted to avoid anxiety. Students should learn how to manage anxiety, since anxious students revert to rote memorising techniques (Paulsen & Feldman 2007).

4.3.2 Classification of PTA as an intervention according to the SOLO taxonomy

The SOLO taxonomy (Biggs & Collis 1982) refers to the classification of the process of learning in terms of the structural complexity of learning. However, SOLO is "readily generalizable" (Hattie, Biggs & Purdie 1996:104) and has been applied to the classification of interventions by these authors. Therefore, SOLO classifies interventions according to its structural complexity by referring to the stages of learning of a student. The purpose of an intervention is evident from the dependent variable that requires change and usually includes anticipated changes in academic performance, study skills, self-efficacy, etc. (Hattie, Biggs & Purdie 1996). However, learning outcomes, content delivery and assessment need to align to bring about effective change through constructive alignment (Biggs 2003). Therefore, it is important to be aware of a student's stage of learning. This awareness will ensure that there is a clear alignment between current and desired outcomes as well as the assessments needed to evaluate the desired outcomes. Figure 4 shows the different stages of learning according to the learning outcomes that are categorised by the SOLO taxonomy. The classification of PTA, based in the SOLO taxonomy, is indicated.

[17] Traditional assessments include writing a test or completing an assignment. I mark these assessments personally and provide individualised, constructive feedback.

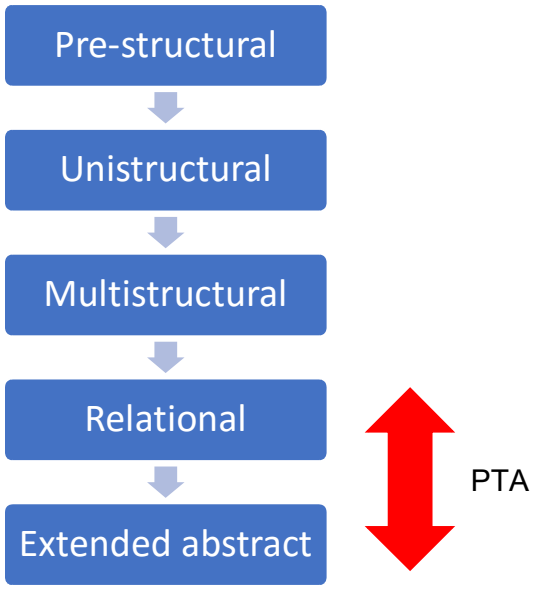

Figure 4. Schematic illustration of the classification of PTA according to the SOLO taxonomy

The outcomes of pre-structural interventions are ill defined, and tasks during this intervention are approached in an inappropriate way. Unistructural interventions focus on changing one dependent variable, for example, the outcome of an intervention might be to increase academic performance only. Multistructural interventions are executed without a metacognitive framework. These interventions apply a range of independent strategies, but these strategies are largely isolated without integration within a context.

PTA is classified as an intervention incorporating outcomes of both relational and extended abstract interventions. Relational interventions integrate components from all domains. That means that content is contextualised whilst metacognitive components such as SRL strategies are incorporated. For example, Accounting terminology is contextualised and explained through day-to-day examples to illustrate the relevance of Accounting during the presentation of PTA. A strong emphasis is placed on self-regulated learning through the application of time management, the reflection on acquired knowledge and the interpretation of feedback after assessments, which illustrate the incorporation of metacognitive strategies.

Extended abstract interventions aim for “far transfer” (Hattie, Biggs & Purdie 1996). Far transfer refers to the application of acquired skills – through the intervention – that could also be generalised to other spheres of life. PTA incorporates components of extended

transfer interventions, as students are active participants in the learning process. This part of the intervention demonstrates to students 'how' to assume responsibility for their role in constructing learning (Pokorny & Pokorny 2005). PTA excludes parts of the curriculum as only the topics assessed in Module test 1 are included in the curriculum of PTA. However, learning about how to study Accounting and thinking about how to approach an Accounting problem are the aims of PTA. These strategies are used not only in introductory Accounting, but throughout the Accounting course. Extended abstract interventions avoid strategies that can lead to being 'taught to the test'. Rather, students are encouraged to present more than one possible solution and co-create different scenarios by changing variables in Accounting problems.

4.3.3 The changing role of the lecturer: shifting between pedagogies

During the semester, I am part of a team of four lecturers that is responsible for 1 700 students in an introductory Accounting course. Approximately 200 to 300 students attend each lecture. Lecturers aim to create an environment that is conducive to learning, but due to the layout of our facilities and the large group of students in each lecture, the first priority is to reach the outcomes of the academic programme whilst maintaining good discipline. Lecturers agree that the course curriculum is full, however it is not possible to increase the number of contact sessions with students. Our student cohort consists of non-accounting majors and, therefore, most of their time is spent on their degree programme majors. This means that a teacher-centred pedagogy is applied by default and this entails that the lecturer becomes an instructor with students as passive recipients of knowledge (Bonk & Smith 1998). A teacher-centred approach might impede engagement and, ultimately, learning. Even if lecturers are aware that a change in pedagogical strategies leads to an enhanced learning experience (Bonner 1999), little time is available during a lecture to shift between instructivist and constructivist pedagogies.

Enough time is available during PTA to explain to students the change in pedagogies, although I remain cognisant of the fact that students attending PTA come from schools where the teacher-centred approach is predominant. I also appreciate the fact that it normally takes more than one session for students to recognise the shift in roles; therefore, I take time to explain what is expected from them when a student-centred approach is followed. After this explanation, I invite students to reflect on this approach. I belief this

leaves them with a sense of co-construction of the learning process and it increases their buy-in into the learning cycle.

During PTA, my role is primarily one of a constructivist, although for the purposes of content delivery, I adopt an instructivist approach. This can also be seen as shifting between a student-centred and teacher-centred pedagogy: when I teach principles pertaining to Accounting, I adopt a teacher-centred approach. This means that I explain the principle by means of text taken from the Conceptual Framework or another academic source and 'digesting' it to make it easier to understand. I normally ask a question toward the end of the session to make sure everyone understands, but I do not require critical reflection on what was learned at this point. This is normally followed by an application of the newly acquired knowledge.

During the stage where I demonstrate an application of the new knowledge, I adopt a student-centred approach. I pose a question or a problem that needs to be solved either in the form of a fictitious scenario that requires elementary solutions, or an authentic case study that requires critical thinking. The shift between student-centred and teacher-centred approaches was proposed by Bonner (1999) and it contributes to the learning experience of students on a number of levels. Firstly, when students are expected to be active participants in their own learning, they quickly observe how others can enhance their learning. Besides fostering respect and appreciation for others, this interaction between students is conducive to interdependence and social cohesion in the group. In South Africa – with so many divides between racial and socio-economic groups – this skill will be invaluable to graduates in the workplace. Secondly, Bonner's strategy provides an opportunity to reflect on what was learned and how it is understood in a non-intimidating way. Students can test their own understanding by participating in discussions that take place during class. Lastly, from the group discussion it emerges that more than one solution to the problem might be considered as applicable and correct. This enhances the principle-based teaching in Accounting.

This shift between the approaches is equally balanced because enough time is available during PTA to achieve this balance. For instance, instead of presenting a lecture on the history of Accounting (which follows the teacher-centred approach during the semester

course), students attending PTA receive an academic article[18] published in an accredited academic journal. Students are required to read the article and, using a rubric as a guide, complete a reading assignment on the history of Accounting. This strategy allows students to recognise credible sources of information (the academic journal) and creates the opportunity to compare this source of information to other less credible sources available on the internet. It, therefore, also assists students in developing a skill for critical analysis.

Utilising the history of Accounting also allows students to critically evaluate the credibility of Accounting information (Sangster 2010). This critical evaluation skill is applied again in the self-developed case study that is used as an academic activity during PTA. The case study intentionally includes ambiguous information that requires an evaluation of the relevance, credibility and appropriate Accounting treatment of the information. The use of a case study allows students to engage in a real-life scenario with unanswered questions that might be addressed with Accounting. Biggs (1989) refers to this as the 'motivational context' that provides a connection with the real world and enhances learning. Case studies provide opportunities to apply judgement as uncertainty needs to be resolved, thus relying on active participation from a student (Boyce, Williams, Kelly & Yee 2001). Further to this, the case study, given as an assignment in PTA, fosters collaboration with others. This, in turn, simulates an authentic work place where interdependence to solve a problem is a generic skill (Boyce, Williams, Kelly & Yee 2001).

4.3.4 An environment that fosters belonging

Research suggests that discourses promoting independent learning should be cognisant to foster an environment that is conducive to conversations and open communication between students and staff. These conversations should include continuous discussions on transitions and how to adapt to higher education (Leese 2010). A direct correlation between a sense of belonging and student retention has been established (Kift & Field 2009). Due to the relatively small size of the PTA cohort, early engagement is fostered and participation in group work is encouraged which also contributes to a sense of belonging (Fisher 2007).

[18] Sangster, A., Stoner, G.N. and McCarthy, P.A.2008. The market for Luca Pacioli's Summa arithmetica. Accounting Historians Journal, 35 (1):111-134.

PTA is presented before the start of the academic year. At this point students have been accepted into their various degree programmes, but they have not yet received any orientation nor have they attended any induction programmes. Students enrolled at the UP come from all over the country as well as from neighbouring countries, such as Namibia and Zimbabwe. During the transition from high school to university, students need support as they navigate the process from separation, transition and then incorporation (Tinto 1988). Tinto (1988) recommends that students should be engaged within the first six weeks of the start of their first year in order to gain the maximum benefit from support. Academic and non-academic engagement is encouraged through the attendance of PTA. Social engagement between students foster belonging, and this is one of the reasons why PTA is offered as a face-to-face intervention as opposed to an online bridging course. An online bridging course might leave students feeling isolated (Rolf, Lankeit & Neuhaus 2018).

The campus is relatively quiet as members of faculty finalise the preparations for the new academic year. On a macro level, this creates a unique opportunity for PTA attendees to find their way and become familiar with their environment in the absence of crowds of unfamiliar faces. On a micro level, this is an opportunity to engage with fellow students and to make friends in the group. On the second day of PTA, students are required to form groups of three people, ideally consisting of others that intend to study the same degree programme. These groups remain the same for the duration of PTA. Gamification forms an integral part of PTA. Groups compete against each other from the second day of PTA. Marks for assessments and points for participation contribute to determine the overall winner at the end of Day 4. Collegiality and team work form the basis of activities and this strategy creates a sense of belonging and familiarity. In essence, it forms part of the implementation of transition pedagogy[19] (Kift, Nelson & Clarke 2010), albeit on a much smaller scale.

PTA is facilitated by a lecturer who remains involved with teaching for the rest of the introductory financial accounting course[20]. This grounds students and makes them feel at ease when the academic semester starts. Very often this lecturer becomes the first person students turn to if assistance is required. The perceived familiarity with the lecturer creates

[19] A curriculum intentionally designed to optimise opportunities for students to engage and develop a strong sense of belonging (Kift, Nelson & Clarke, 2010).

[20] Referring to the module that all non-accounting business majors need to complete during their first year.

a sense of belonging and assurance in first-year students. The relatively small group of students per intake of PTA, makes it easy for me to get to know students by name. From my experience, students feel more at ease to engage and they feel acknowledged when they are addressed by name in a class environment. This strategy is echoed by Kuh (2009), Tinto (1988) and Biggs (1989) who contend that an increase of contact between academic staff and students have a positive impact on student success.

PTA sessions are presented from 8 am to 1 pm daily. This session is structured so that content is delivered for 50 minutes followed by a 10-minute break. This is done to simulate the duration of lectures during the academic semester. Toward the end of the session, students are encouraged to consult with the lecturer on a one-on-one basis, or to work on campus (either in the lecture venue or in the library) in their groups.

PTA is facilitated on campus in one of the venues that will be used by these students during the semester. To increase students' awareness of campus and to provide them with opportunities to orientate themselves, a game is incorporated into the PTA programme during which a venue or a special place of interest needs to be located. The first group to send a picture of themselves (at the location) to me, wins the 'Amazing Race' prize for the day.

4.3.5 Development of lifelong learners

Lifelong learning is a mind-set of continuous skills development, acquisition of knowledge and solving new problems (Smith 2001). First-year students need strategies to foster 'learning to learn' skills in order to become lifelong learners. The goals of an introductory accounting course should include both the 'process' of learning as well as content knowledge (Becker 2013). It would be a naïve assumption to presume that first-year students will develop these skills as they progress through higher education. According to Cornford (2002), learning skills should be developed through appropriate and deliberate intervention. Since these non-Accounting major students do not intend on becoming

professional accountants, adopting lifelong learning skills will assist them in adapting to a changing environment.[21]

During the four days at PTA, I devote specific time to discuss proven learning strategies that are recommended for the successful completion of an introductory Accounting course. However, it is important to afford students time to practically apply these strategies and thereafter, to reflect on the application of these strategies. Time constraints in the course programme during the semester is most likely the main reason for not being able to discuss learning strategies in depth with the students.

Limited contact time with students results in a strong focus on the acquisition of content knowledge (Becker 2013). Prior research has also indicated that a strong focus on procedural knowledge (knowing 'how to' do Accounting) leaves little room for the development of lifelong learning (Mayer-Sommer, 1990; Paris and Paris, 2001). Lifelong learning is promoted if the reason behind procedural knowledge is explained. In introductory Accounting, this is easily accomplished by frequent reference to the Conceptual Framework. This use of the Conceptual Framework as the explanation of 'why we do what we do' in Accounting becomes an illustration of understanding the bigger picture of Accounting. Even though the procedural ('how to's') might change over time, students will be empowered to easily adapt to this change since they understand the 'why' of Accounting. This pedagogy is also known as the principle-based teaching of Accounting, as opposed to the rule-based teaching of Accounting (Coetzee & Schmulian 2011). I have found that the inclusion of the Conceptual Framework from the very first academic session greatly increases students' understanding of otherwise abstract concepts. It also answers a number of other underlying questions such as: 'Who are the users of Accounting?' and 'How do we communicate financial information to these users?'. Answers to these questions make Accounting relevant to students' prospective careers.

[21] The changing environment is not only anticipated in South Africa. Globally, the phenomenon of the fourth industrial revolution and its impact on professionals, is receiving attention. Universities need to prepare their students to be adaptable, ethical, life-long learners.

4.3.6 Relevance of introductory Accounting to future employment

It is important to emphasise the relevance of Accounting throughout the curriculum, especially to students who are non-accounting majors. The introductory Accounting course supports students studying towards 42 different degree programmes. Since the introductory Accounting course is compulsory for these students, they often lack the motivation to study. Alluding to the relevance to various authentic cases is likely to increase the motivation of these students (Byrne & Flood 2005).

Seeing as students attending PTA are enrolled for various degree programmes, one of the activities on the first day of PTA is aimed at the relevance of Accounting to a student's degree programme. Coupled with the assignment on the historical development of Accounting, students also need to conduct their own research to write a logical and coherent essay on the application of Accounting in their prospective careers. This essay provides an opportunity for students to reflect on their choice of degree programme. After the submission of the essays (on which students receive detailed feedback), the relevance of Accounting in various careers is discussed during the first session of the next day. Specific reference is made to degrees and anticipated careers for which attendees of PTA are enrolled.

4.4 CONCLUSION

PTA addresses the void in the itinerary of academic support programmes available to prospective Accounting students, especially those with no intention to major in Accounting. The growing articulation gap between schools and universities as well as the gap between the expectation and the experience of students can be addressed by presenting courses similar to PTA in high-impact modules or "killer modules" (Maphosa 2014:16).

This intervention, in the form of a four-day bridging course, is presented before a student's first year commences. It is classified as a relational and extended abstract programme according to the SOLO taxonomy. PTA aims to deliver content using a student-centred pedagogy and draws on behaviourism as well as constructivism as theoretical frameworks. Through attendance of PTA, students receive content knowledge (cognitive domain) as well as learning strategies that might influence their metacognitive functioning.

CHAPTER 5:
LITERATURE REVIEW AND RESEARCH DESIGN: CONTROL VARIABLES

5.1 INTRODUCTION

PTA, as an intervention, is evaluated by means of various econometric techniques in this study. One of the econometric techniques I used in this study was the application of an ordinary least squares regression analysis.

Various control variables were included in the regression analysis. This chapter alludes to prior literature and explains the rationale for the inclusion of these control variables in the regression analysis.

One of the first factors that was identified in having an influence on academic performance in an introductory Accounting course at university was prior knowledge. The literature review includes a discussion of the theoretical framework regarding prior knowledge and how it connects to metacognitive knowledge. Research on prior knowledge has been conducted since the 1960s, and, thereafter, other factors that were considered to influence academic performance in Accounting were added. The findings of these studies are often contradictory, but each study contributes to a greater understanding of factors that influence undergraduate student performance in Accounting.

Studies evolved to include various other factors that might have an influence on performance in an introductory Accounting course (the dependent variable in each study). Over the years, the effect(s) of other variables (such as gender, language, type of school from which students come, and mathematical aptitude) on academic performance in an introductory Accounting course was tested, parallel to the impact of prior Accounting knowledge.

Students enter university with the sum total of their prior experiences in the years of their upbringing, external factors that shaped what the student learned, how the student learned, and what the student perceives about him-/herself as a student. As a result, the focus of some studies in Accounting education shifted to include previously excluded factors pertaining to the motivation and beliefs of students.

Studies done from 1968 to 1993 are significant, as they laid the groundwork for further research. Most of these studies aimed to establish what determined academic success in introductory Accounting courses. Thereafter, studies refined the early work, and several used multiple regressions and other robust forms of statistical analysis.

This section commences with a schematic illustration of the categorisation of themes in terms of cognitive and metacognitive domains, as summarised in Figure 5. This is followed by a summary of the reviewed articles in a table (see Table 2) for ease of reference. Thereafter, the literature – which includes major works published on learning self-efficacy, student motivation and motivation to learn, especially in Accounting education – is reviewed.

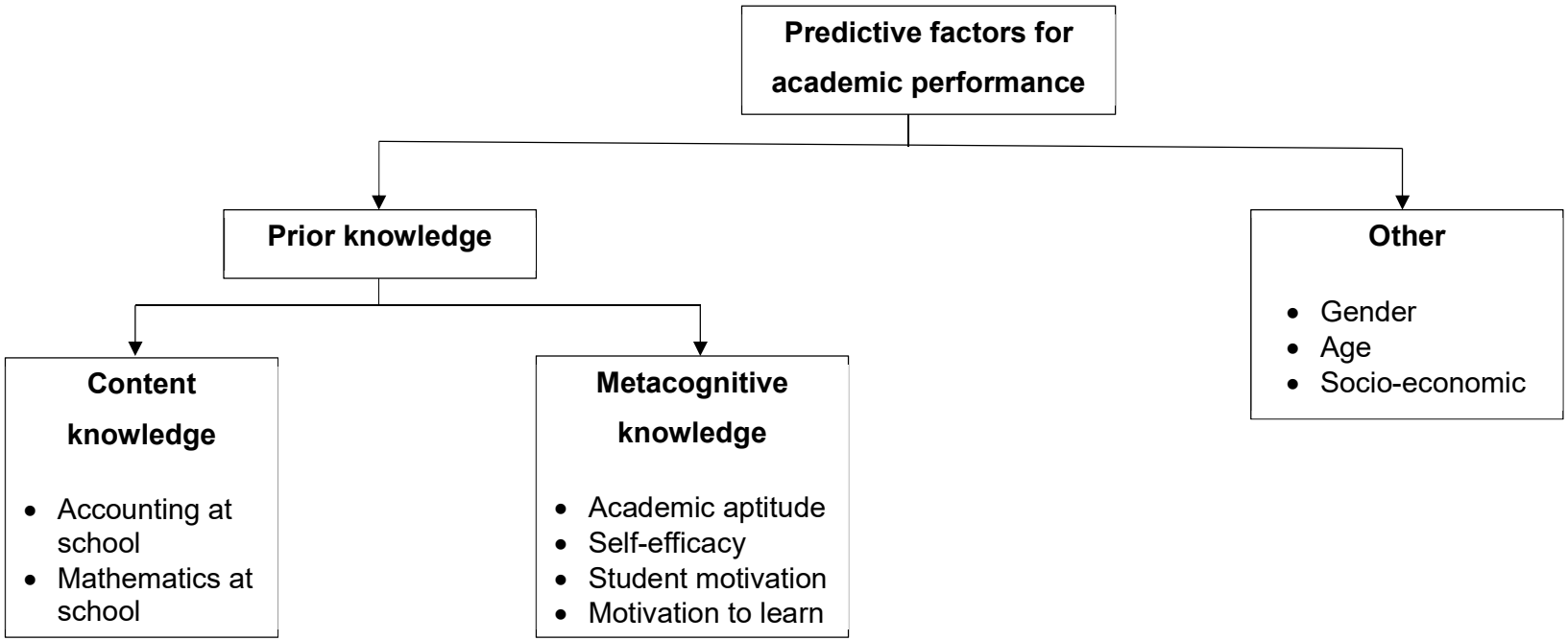

Figure 5. Structure of variables discussed based on the prior literature

Table 2. Predictors of success in Accounting as identified in the prior literature

Author(s)	High school Accounting (prior knowledge)	Academic aptitude	Mathematics at school	Gender	Motivation	Age	Socio-economic status
Smith (1968)	Significant	-	-	-	-	-	-
Jacoby (1975)	Initially significant, eroded	-	-	-	-	-	-
Baldwin & Howe (1982)	Insignificant	-	-	-	-	-	-
Mitchell (1985)	Significant	-	Inclusion recommended	-	-	-	-
Schroeder (1986)	Significant (if longer than 1 year)	Significant	-	-	Significant (Academic major)		
Eskew & Faley (1988)	Significant	Significant	Significant	Insignificant	Significant (Number of assessments)	-	-
Farley & Ramsey (1988)	Significant	Significant	Significant	-	-	-	-
Keef (1988)	Insignificant	-	Insignificant	-	-	-	-
Mitchell (1988)	Inconclusive	-	Significant	-	Inclusion recommended		
Rowlands (1988)	Significant (eroded)						
Doran *et al*. (1991)	Significant	Significant		Males outperformed	Inclusion recommended		

Author(s)	High school Accounting (prior knowledge)	Academic aptitude	Mathematics at school	Gender	Motivation	Age	Socio-economic status
Keef & Hooper (1991)	Significant	-	-	-	-	-	-
Keef (1992)	Insignificant (if > one year)	-	-	-	-	-	-
Bartlett *et al*. (1993)	Significant (quickly eroded)	Insignificant	Insignificant (used as proxy for academic aptitude)	Inconclusive	Inclusion recommended	-	Insignificant (type of school)
Gul & Fong (1993)	Significant	-	Significant	-	Significant (self-expectation of exam)	-	-
Loveday (1993)	Significant	-	-	-	-	-	-
Lynn, Shehata & White (1994)	Significant (level at school)	-	-	-	-	-	-
Tho (1994)	Significant	-	Significant	Insignificant	-	-	Insignificant (residential status)
Rohde & Kavanagh (1996)	Significant	Significant	-	-	-	-	-
Gist, Goedde, Ward (1996)	-	Significant	Significant	Insignificant	-	-	-
Evans & Farley (1998)	Significant	Significant	Significant				Inconclusive (type of school)
Van Rensburg, Penn &	Significant	Included					

Author(s)	High school Accounting (prior knowledge)	Academic aptitude	Mathematics at school	Gender	Motivation	Age	Socio-economic status
Haiden (1998)							
Koh & Koh (1999)	Insignificant	Significant		Significant (males better than females)	-	Significant	-
Lee (1999)	Significant	-	-	Insignificant	-	-	Significant (type of school)
Lane & Porch (2002a)	-	Significant	-	-	-	Significant (older)	-
Lane & Porch (2002b)	-	Insignificant	Insignificant		Significant (attitude)	Significant (older)	
Rankin, Silvester, Vallely & Wyatt (2003)	Significant	Significant	-	-	Significant (degree & number of tutorials)	-	-
Tickell & Smyrnios (2005)	Significant	Significant	-	Insignificant	Significant (interest in Accounting)	Insignificant	Significant (Type of school)
McDowall & Jackling (2006)	Insignificant	-	-	Insignificant	-	-	-
Byrne & Flood (2008)	Insignificant	Significant	-	Insignificant	Significant (Self-efficacy & Student motivation)	-	-
Tan & Laswad (2008)	Significant	-	-	Significant (females better than males)	Insignificant (intention to major in Accounting)	Insignificant	Significant (Language)

Author(s)	High school Accounting (prior knowledge)	Academic aptitude	Mathematics at school	Gender	Motivation	Age	Socio-economic status
Xiang & Gruber (2012)	Significant (eroded)	-	-	-	Inclusion recommended	-	-
Seow, Pan & Tay (2014)	Not included	Significant	Significant	Significant (males better than females)	-	-	-
Boshua & Van der Nest (2015)	Significant	-	Significant	-	-	-	-

5.2 PREDICTIVE FACTORS FOR ACADEMIC SUCCESS

5.2.1 Prior knowledge

Prior knowledge refers to “those prerequisite types of knowledge, skills, and competencies which are essential to the learning of a particular new task or set of tasks” (Bloom 1976:75). Accounting as a discipline can only be mastered by being exposed to the fundamental principles and to how the Accounting processes work. Prior knowledge of Accounting, therefore, seems beneficial to students, since it implies they have been exposed to the fundamentals and the underlying work ethics needed to master Accounting.

The development of research in Accounting education is characterised by the number of studies since 1960 which aimed to address the same research question: does Accounting at school benefit a student at university? Findings were contradictory, so studies continued and more sophisticated research methods were applied to reach some conclusion as to the benefit of prior Accounting knowledge.

The theoretical framework of prior knowledge is grounded in educational psychology. Authors such as Ausubel (1963) and Alexander, Kulikowich, and Schulze (1994) have identified a student’s prior knowledge as the most influential determinant of academic performance. Ausubel was convinced of the effect of prior knowledge, and he has often been quoted: “If I had to reduce all of educational psychology to just one principle, I would say this: The most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly” (Ausubel 1968:vi).

Prior knowledge is divided into (i) content knowledge and (ii) metacognitive knowledge (Rankin *et al.* 2003). According to Winne (1995), content knowledge (also known as conceptual knowledge) contains facts, frameworks and principles about the subject matter, all of which are very applicable to Accounting. Content knowledge consists of non-specific knowledge (Rankin *et al.* 2003) and domain-specific knowledge, which, for example, includes Accounting as a discipline. Domain-specific knowledge consists of declarative knowledge, which is “descriptive information that remains static until changed by learning” (Rankin *et al.* 2003:367), for example, knowing different Accounting terminology. Procedural knowledge “relates to condition rules where it is only activated if a particular condition is satisfied” (Rankin *et al.* 2003:367); it can be explained by knowledge used, for example, to

prepare financial statements in Accounting. The relationship between these constructs is illustrated in Figure 6.

Metacognitive knowledge entails self-awareness of the cognitive processes, in other words, being aware of how one thinks and learns (Schleifer & Dull 2009). It is grounded in SRL theories. These theories include information processing theory, social cognitive theory and constructivist theory (Schleifer & Dull 2009). Metacognition is, therefore, an important learning attribute to consider if students want to be successful in a SRL environment, such as a university. Metacognition and how certain components of it relate to Accounting, are discussed in Section 5.2.2.

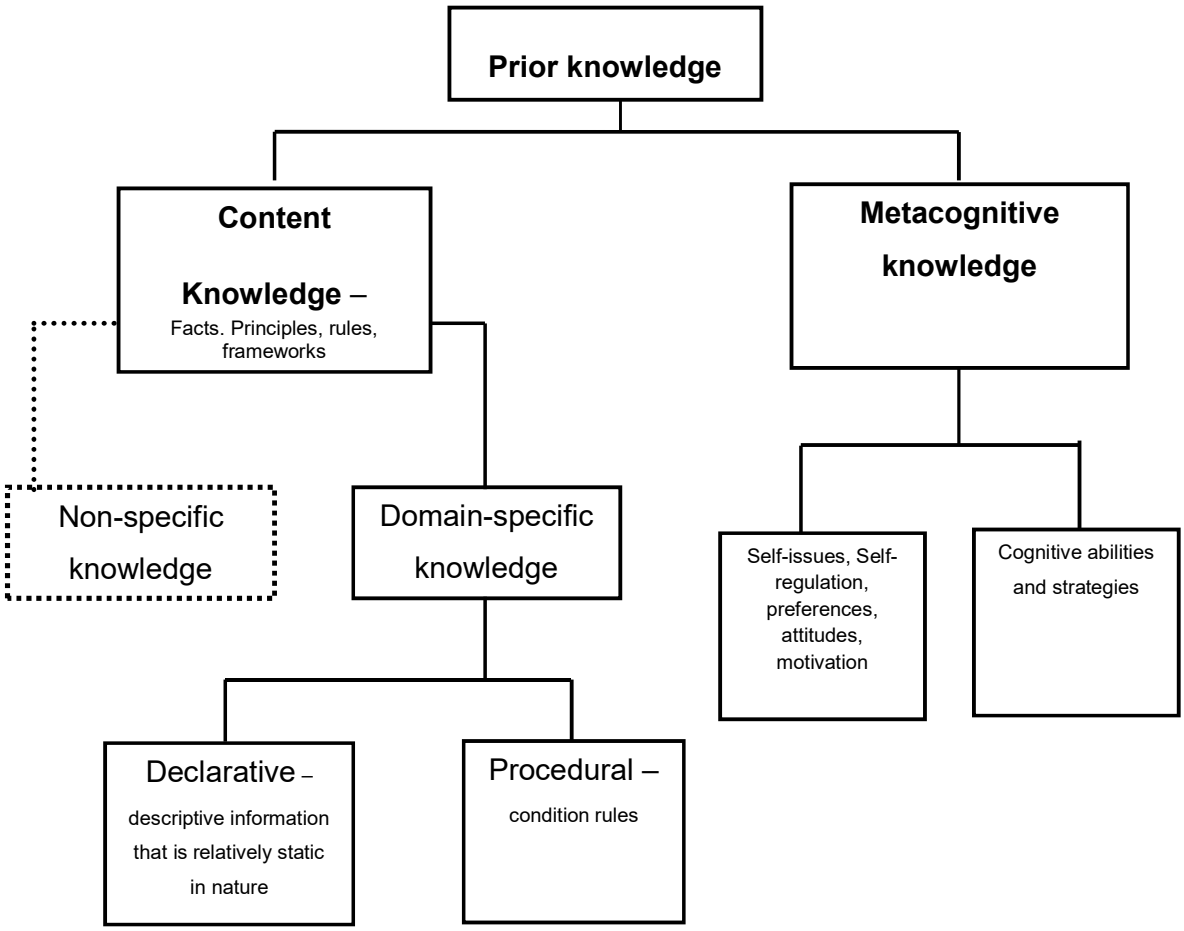

Figure 6. Theoretical framework in which prior knowledge is grounded. (Adapted from Rankin, Silvester, Vallely & Wyatt 2003)

The assumption of the benefits of prior Accounting knowledge is based on the nature of the curriculum of an introductory Accounting course, which focuses on teaching the basic principles of Accounting. Since high school curricula also include the basic principles and fundamentals of Accounting, it is expected that students with high school Accounting will perform better than students with no prior Accounting knowledge.

Research on the benefits (if any and to what extent) of prior Accounting knowledge at university level has been conducted for decades. Researchers aimed to contribute to the current understanding of these benefits, by changing the experiment or measurement or sample to confirm or contradict previous findings. Over the years, various conclusions have been reached. Below, a summary of the main contributions and the most prominent studies available is given. It is interesting to note that since research into the benefits of high school Accounting started in the late 1960s most of the studies were conducted without referring to theories that might underpin the findings. Only since 2003 have more authors attempted to explain the contradictions between the reported findings of studies conducted over the years.

5.2.1.1 Prior knowledge: Content knowledge

a. Accounting at school

The benefit of Accounting knowledge and Accounting skills is recognised by high schools in South Africa. For this reason, Financial Accounting is offered as a compulsory subject to learners in Grades 8 and 9, but as an elective for learners in Grades 10 to 12. Most learners at school choose their matriculation subjects in Grade 10, roughly based on what they would like to study after completing Grade 12. School learners are often uncertain about what they would like to study after they have completed high school. Opting not to complete Accounting in Grade 12 means that a student who then decides to pursue studies in Commerce enters tertiary Accounting without prior knowledge. Since the completion of a module in introductory Accounting is compulsory for most BCom courses, it is expected that having completed Grade 12 Accounting would be beneficial to students in an introductory Accounting course. In essence, the curriculum in a first-year introductory Accounting module is the same as the full curriculum of the secondary schools (Grades 8 to 12), but the focus of such an introductory course would be on the basic principles of Accounting – and this is supposed to have been mastered by Grade 12 Accounting learners already.

The literature review on the influence of prior knowledge in Accounting starts with an unpublished dissertation submitted in 1968. Smith (1968) refined the research of his time by aiming to answer the question: 'To which *degree* does a student benefit at university level from Accounting knowledge acquired at school level?' He accepted the claims of prior literature which reported that, because of the overlap in curricula, students do benefit from prior Accounting knowledge. He used analysis of variance (ANOVA) to analyse his findings statistically, and reported that prior Accounting knowledge led to "superior achievement" (Smith 1968:64) and that students with such prior knowledge completed their Accounting at tertiary level with a greater understanding of Accounting than students who did not do 'bookkeeping' in high school. However, he remarked that the greatest academic progress was observed in students with no prior Accounting knowledge. He concluded that courses in introductory Accounting "tend[s] to eliminate some of the differences initially prevailing between the groups" (Smith 1968:65). The fact that the initial benefit of having prior Accounting knowledge is eradicated over time raised the question of whether students should be encouraged to complete Accounting at school or not. He suggested in his study that students should be divided into groups at university level: those who did Accounting at school and those who did not, provided that a screening test of prior Accounting knowledge should be implemented, as some students who were supposed to have prior knowledge from school performed worse than some other students who did not have such prior Accounting knowledge. His findings and recommendations were catalysts for more research.

Consequent research results can be divided into three groups: (i) evidence of benefits at university attributed to taking Accounting at school (Doran *et al.* 1991; Eskew & Faley 1988; Farley & Ramsay 1988; Keef & Hooper 1991; Mitchell 1985; Schroeder 1986), (ii) evidence of the benefits of prior Accounting knowledge, although these benefits are eroded over time (Bartlett *et al.* 1993; Jacoby 1975; Rowlands 1988; Xiang & Gruber 2012) and (iii) evidence suggesting that taking Accounting at school is not beneficial to students at university level (Baldwin & Howe 1982; Keef 1988; Koh & Koh 1999; McDowall & Jackling 2006; Byrne & Flood 2008).

Research has developed since Smith's study to include more variables in an effort to isolate the effect of prior knowledge in Accounting. The literature is characterised by the replication of studies in different contexts, and including different explanatory variables. For example,

Baldwin and Howe (1982) replicated Smith's study, but included a larger sample (n=232) than Smith's (n=20). Baldwin and Howe aimed to strengthen the research design by using control variables to ensure internal validity and to compensate for selection bias, so they opted to use Analysis of Covariance (ANCOVA) with repeated measures as a statistical method of analysis. Their findings contradicted those reported by Smith (1968), and they concluded that their results "imply that such prior study of Accounting may be dysfunctional" (Baldwin & Howe 1982:625). It should be noted that the students included in their study were "business majors two years out of high school" (Baldwin & Howe 1982:620), and not first-year students.

Due to an expected difference in context (referring to the curriculum and assessment methods), Mitchell (1985) justified his replication of a study by Jacoby (1977), who reported the erosion of benefits of Accounting knowledge, and Baldwin and Howe's (1982) research by arguing that these studies were done in the United States (USA), and that there was reason to expect a different finding among students in the United Kingdom (UK). Also, in determining the effect of prior knowledge, it is important to be cognisant of the way in which students are assessed in Accounting, if academic performance is used as a dependent variable. Written examinations (where problem-solving in Accounting is required) will produce different results from Accounting assessments using multiple choice questions (Mitchell 1985). These differences in assessment types of Accounting between institutions may mean that results cannot be meaningfully compared. Nevertheless, there is ample literature on the benefits of taking Accounting at school, with no mention of the assessment types that were used to measure performance (Boshua & Van der Nest 2015; Lee 1994; Loveday 1993; Lynn *et al.* 1994).

However, the findings of these studies were contradicted by Koh and Koh (1999), who concluded that gender, previous working experience, age and academic aptitude were significant predictors, rather than prior Accounting knowledge. McDowall and Jackling (2006) and Byrne and Flood (2008) reported similar results. Byrne and Flood (2008) argue that prior, overall academic performance was the best predictor of academic success at university and that this aspect should receive attention from university admissions committees and career guidance counsellors at school.

Overlap between the Accounting curriculum at school and the Accounting curriculum at universities may explain the apparent benefit of having taken Accounting at school. This explains the benefit of taking Accounting at school for South African students (Rowland 1988; Van Rensburg *et al.* 1998), but it is also recognised internationally as a possible explanation of the benefit of taking Accounting at school. However, if no reference is made to (dis)similarities between school and university curricula, Mitchell (1988) cautions against merely generalising findings and suggests that more studies be replicated to submit evidence in support of or contradicting the supposed benefits of studying Accounting at high school. Mitchell acknowledges the fact that the mixed results reported by previous studies on the importance of high school Accounting "may indicate the effects of the significant differing educational systems in the two countries" (Mitchell 1988:290), referring to differences between the systems in the UK and USA.

The number of years a student did Accounting at school and also how well the student performed in Accounting at school may also have an influence on the benefit that a first-year student derives in first-year Accounting at university from taking high school Accounting. Schroeder (1986) found that that there was no difference between students who did Accounting in high school for one year or less and students who did not do Accounting in high school. However, students who took Accounting at high school for more than one year tended to outperform students who did not have Accounting at high school in an introductory Accounting course at university. A study by Farley and Ramsay (1988) used a refined statistical model including mathematical ability, and their results confirmed those of Schroeder (1986). In contradiction to Schroeder's (1986) findings, Keef (1988) reported in a study conducted in New Zealand that the level of prior exposure to Accounting had no significant effect on the performance in an introductory Accounting course. It remained unclear whether the mixed results from these studies could be attributed to the differences in curricula between high school and university in these countries. It might have strengthened the results if the similarities between the high school curriculum and university curriculum could be expressed as a percentage of similarity.

Irrespective of the number of years of Accounting studies at high school, Loveday (1993) reported a positive correlation between performance in Accounting at school and performance in Accounting at university. Loveday (1993) found that when students performed well in high school Accounting (measured as a final mark higher than 80%), they

would not be disadvantaged in the second semester of Accounting if they were exempted from the first semester of university Accounting. Loveday's results confirm the results of the cohort of authors who found that prior Accounting knowledge is beneficial to students in an introductory Accounting course.

Some studies suggest, however, that the benefit of prior Accounting knowledge attained at school is eroded over time. Jacoby (1975), following on from Smith's research, found that students with high school Accounting initially outperformed students without high school Accounting, but that there was no significant difference between the academic performance of these groups later in their academic programme that could be attributed to their high school Accounting knowledge. A similar finding was reported by Rowlands (1988), a South African researcher at the time, who found that students who did Accounting at high school performed better in the first assessment, but that their performance in the final examination was similar to that of students who did not do Accounting at school. In further years of study, students who did not complete high school Accounting outperformed their peers (who ostensibly had prior knowledge) in second-year Accounting (Van Rensburg *et al*. 1998).

Prior Accounting knowledge may also benefit students who will not specialise in Accounting, even though these students' motivation to study Accounting usually differs from that of students majoring in Accounting (Eskew & Faley 1988). However, a suitable proxy or measurement for motivation to be included as a control variable in multiple regressions should be carefully considered. Eskew and Faley (1988) aimed to include the number of assessments taken as an indication of students' motivation to study Accounting in an effort to expand the number of explanatory variables that were excluded from prior studies (Baldwin & Howe 1982; Jacoby 1975; Mitchell 1985). Eskew and Faley (1988) concluded, based on the inclusion of control variables, that previous Accounting knowledge acquired at school had a significant positive influence on the academic performance of students in an introductory Accounting course at university. It is arguable whether the number of assessments taken by a student is a suitable indicator of a student's motivation. Since this variable had previously been applied in another discipline (Uguroglu & Walberg 1979), it merited inclusion as a proxy for motivation. However, since motivation to study Accounting is a complex phenomenon, more sophisticated constructs to measure different types of motivation should be investigated and included. The findings of Tickell and Smyrnios (2005), suggesting that students specialising in Accounting have a higher motivation to study

Accounting, were expected. These researchers identified six predictors of the academic performance of students majoring in Accounting: (i) successful completion of Grade 12 Accounting, (ii) academic performance in the previous year; (iii) attendance of a government-funded secondary school and (iv) possessing "an intrinsic interest in Accounting" (Tickell & Smyrnios 2005:254). Results from a study by Tan and Laswad (2008) confirmed the benefit of Accounting at school, but contradicted prior studies suggesting that motivation had no significant influence on the explanation of the variance in academic performance.

Until 2003, studies investigating the effect of prior Accounting knowledge reported findings without explicitly alluding to a theoretical framework. One of the main contributions of Rankin *et al.'s* (2003) study was the theoretical framework that they provided to explain the inconsistencies in the findings reported in prior studies, as discussed above. Their study reported mainly on the effect on academic performance of diversity among students. Factors identified in their study that influenced academic performance in an introductory Accounting course were taking high school Accounting, the university entrance score (as a proxy for academic aptitude) and the level of motivation of students (as indicated by a student's major and the number of tutorials attended by a student). Proxies were used to control for motivation. However, more robust measures are available to ensure more concise measurement of levels of motivation. Also, different types of motivation that have been identified in literature were not included in the study by Rankin *et al*. (2003). This omission is discussed in greater detail elsewhere in this document.

This literature review concludes with studies conducted in the past five years. These studies replicated some of the previous studies, and it is thus no surprise that they confirmed the argument that high school Accounting knowledge is beneficial to students (Boshua & Van der Nest 2015) or is at least initially beneficial, even if it is eroded over time (Xiang & Gruber 2012). These studies also confirm that academic aptitude (Seow *et al*. 2014[22]) and

[22] Due to changes in the education policy of Singapore (Accounting at high school was dropped from pre-university entrance examinations), Accounting at high school was not included in the study conducted by Seow *et al.* (2014) as a variable with the aim of determining predictors of academic success in an Accounting programme. Although academic aptitude has been indicated as a significant contributor to the prediction of academic success, it would have strengthened the findings if prior Accounting knowledge was included to make the results comparable to those of other studies in the field.

mathematical aptitude (Boshua & Van der Nest 2015; Seow *et al*. 2014) are significant predictors.

b. Mathematical knowledge

Accounting originated from mathematics and specifically from arithmetic (Sangster, Stoner & McCarthy 2008). To study Accounting successfully, a student needs some numeric understanding (Collier & McGowan 1989). In South Africa, mathematics at school is a prerequisite for undergraduate studies in Accounting. The possible influence of mathematical ability (prior knowledge of mathematics) was already recognised by Mitchell (1985), who recommended the inclusion of a proxy for performance in mathematics in studies that aim to determine predictive factors of success in Accounting. In a later study, Mitchell (1988) concluded that students who did not complete Accounting or mathematics in high school were particularly at risk of underperforming in Accounting at university level. Mathematical aptitude (in some studies referred to as numerical aptitude) served as significant predictors or determinants in subsequent studies (Eskew & Faley 1988; Evans & Farley 1998; Farley & Ramsey 1988; Gul & Fong 1993; Tho 1994; Seow *et al.* 2014). These findings were confirmed by Gist *et al*. (1996), who investigated predictive factors in minority groups in the USA. They concluded that, among other factors, performance in calculus was a significant predictor of success in Accounting for Black students, although such inferences should be made with caution, due to certain limitations of their study.[23] Van Rensburg *et al.* (1998) conducted a South African study that included mathematics as a predictive factor for success in Accounting, but they did not report on its significance in the prediction. Boshua and Van der Nest (2015) found mathematics to be a significant predictor of academic success in Accounting in a South African context.

Although most studies confirmed the significant influence of prior mathematical knowledge, some contradictory findings were reported, rendering the findings on prior knowledge of mathematics inconclusive. Keef (1988) found the inclusion of mathematical aptitude to be an insignificant variable in the prediction of academic performance in Accounting, confirming results in a study by Burdick and Schwartz (1982) which suggested that arithmetic, algebra or calculus performance at university were not significant predictive factors of success in

[23] Their findings were based on a case study conducted at only one institution, for only one year. Consequently, the findings should not be generalised, but should rather be seen as a possible guideline for admission policies and screening assessments for that institution.

Accounting. Bartlett *et al.* (1993) argue that the insignificant effect of mathematics might be explained by the very low variation in the 'A' level scores of the sample group. It might also reflect that differences in the 'quality' of the 'A' level examinations of different examining boards are not accurately reflected in the composite variable used for the purposes of the study (Bartlett *et al.* 1993).

Most studies which included mathematics as a variable reported that mathematics was a significant predictor of success in Accounting, and although contradictions from other studies render findings on the predictive power of mathematics at school inconclusive, it is also expected that mathematics will serve as a predictive factor for academic performance in Accounting in South Africa.

5.2.1.2 Prior knowledge: Metacognitive knowledge

Metacognitive knowledge includes learning strategies, self-regulation in learning, preferences, attitudes and motivation (Winne 1995).

Figure 7 illustrates the relationship between metacognitive knowledge and the motivation constructs under discussion.

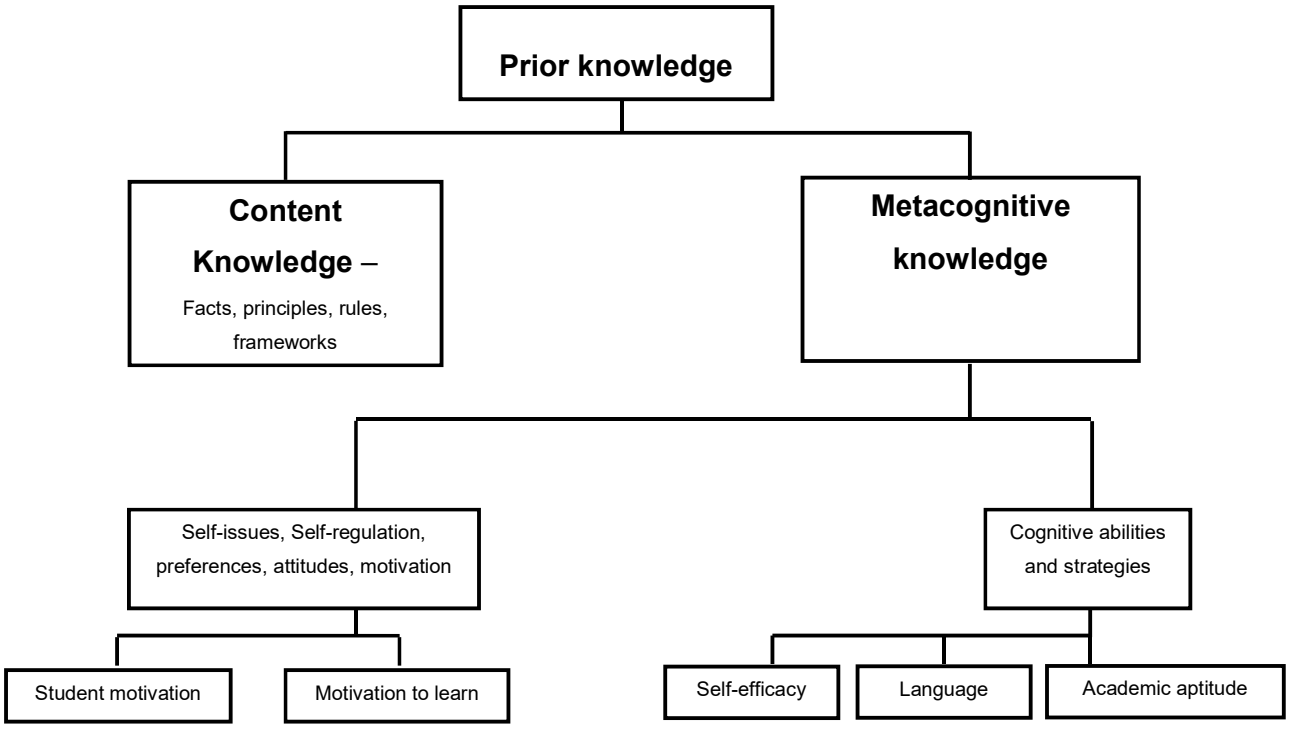

Figure 7. The theoretical framework for metacognition (Adapted from Rankin et al. 2003)

One of the variables that received attention in the prior literature was motivation, which, in itself, is a very extensive term that includes a range of constructs. The value of the inclusion of a proxy for motivation was emphasised (Bartlett *et al*. 1993; Doran *et al*. 1991; Mitchell 1988; Xiang & Gruber 2012) and recommended. Subsequent studies included an array of proxies for motivation: majoring in Accounting (Schroeder 1986; Tan & Laswad 2008), the number of assessments taken (Eskew & Faley 1988), self-expectation of the examination (Gul & Fong 1993), degree programme and number of tutorials attended (Rankin *et al.* 2003), interest in Accounting (Tickell & Smyrnios 2005), and self-efficacy and student motivation (Byrne & Flood 2008).

The next section reviews prior literature pertinent to academic aptitude (cognitive abilities), self-efficacy (cognitive strategies), student motivation and motivation to learn.

5.2.2 Cognitive abilities: Academic aptitude

Academic aptitude refers to a student's ability to absorb and retain information (Thompson & Zamboanga 2004), and includes cognitive skills that will assist students in achieving academic success. Academic aptitude can be summarised as prior academic performance (Koh & Koh 1999), cognitive ability and an indicator of metacognitive knowledge (Rankin *et al.* 2003), and it can also serve as a proxy for a student's intelligence (Auyeung & Sands 1994), level of commitment and diligence (Seow *et al.* 2014).

Various proxies have been used for academic aptitude in order to include its effect as a control variable on academic performance. The most commonly used measurement of academic aptitude is some form of an entrance examination conducted by the university (also known as the SAT or ACT scores) (Eskew & Faley 1988; Rankin *et al.* 2003; Schroeder 1986). Some studies have also used the Grade Points Average (GPA)[24], which is equivalent to the South African Academic Performance Score (APS). GPA and APS are based on the performance of students in the last year of high school and has been used as proxies by, amongst others, Doran *et al.* (1991), Koh and Koh (1999), Tickell and Smyrnios (2005), and Van Rensburg *et al.* (1998). Doran *et al.* (1991) also included a dummy variable for taking Accounting as a major as a proxy for academic aptitude.

[24] American terminology

The majority of studies reviewed concluded that academic aptitude is a significant predictor of academic performance in Accounting. Some authors even claim that it is the most important or most significant predictor of academic performance in Accounting (Doran *et al.* 1991; Seow *et al.* 2014). In most of the studies, academic aptitude was included as a control variable to determine the effect of Accounting at school. The significance of academic aptitude was confirmed by Byrne and Flood (2008), Evans and Farley (1998), Koh and Koh (1999), Rankin *et al.* (2003), Rohde and Kavanagh (1996), and Tickell and Smyrnios (2005).

Academic aptitude is also a significant predictor for first-year non-Accounting students (Lane & Porch 2002a), but Lane and Porch reported contradictory findings in a subsequent study that suggested that academic aptitude is an insignificant predictor (Lane & Porch 2002b). In Lane and Porch's (2002b) second study, prior academic achievement (used in conjunction with other factors in a regression analysis), produced an R^2 of only 13.7%, indicating that other unobserved factors might contribute to the understanding of predictive factors for academic performance. Also, in the absence of a control group in their study, any inferences based on the findings should be made with caution.

5.2.2.1 Cognitive abilities: Language

Speaking, writing and understanding a particular language is part of metacognitive abilities, since a person learns through the use of language in a cognitive process. Comprehension of spoken language (during lectures) and written language (textbooks or assessments) are essential skills needed for academic progress. Metacognition in this context entails a student's ability to regulate comprehension (knowing when to stop learning or pay more attention) and evaluate comprehension (knowing whether he/she understands a concept or not), which means that metacomprehension is applied (Schleifer & Dull 2009). However, metacomprehension can only take place if the language of tuition is fully understood. Therefore, second language learners are often more actively involved metacognitively, because they constantly need to evaluate their understanding of the language, and thereafter of the concept that was explained (Tan & Laswad 2008).

The effect of mother-tongue versus non-mother-tongue education has received much attention in education research. Nyika (2015) argues that the use of second-language instruction may contribute to poor performance by students at some universities in developing countries. It is generally argued that students who study in their mother tongue

enjoy an advantage over their peers studying through their second (or indeed their third or other) language. Accounting students learning in a second language may face "language-based comprehension problems" (Janse van Rensburg, Coetzee & Schmulian 2014:12) to such an extent that it has been suggested that second-language instructors give language and reading comprehension instruction to Accounting students. The ability to receive and share information is enhanced if the language of instruction is the same as the home language of a student (Sugahara, Suzuki & Boland 2012), which conversely implies that second-language Accounting students may experience academic difficulties if the language of instruction differs from their home language (Coetzee & Schmulian 2013).

5.2.2.2 Cognitive strategy: Self-efficacy as a construct of metacognitive knowledge

What was initially referred to as Social Learning Theory (SLT) (Bandura 1969) developed into Social-Cognitive Theory (SCT) when the construct of self-efficacy was added (Bandura 1986). SCT is defined as a theory that can predict the behaviour of a person based on what the person believes of him/herself, better than the mere use of a person's actual capabilities. Academic self-efficacy relates to a student's confidence in his/her own abilities and capabilities to perform certain academic tasks in order to be academically successful (Schunk 1991). Students with higher self-efficacy tend to set more demanding goals for themselves (Torres & Solberg 2001), experience less stress (Solberg, O'Brien, Villarreal, Kennel & Davis 1993), recover more quickly from setbacks (Pajares & Schunk 2002), and are more likely to engage with lecturers or tutors to ask for assistance (Torres & Solberg 2001). By contrast, low self-efficacy manifests as a sense of an inability to cope, stress and anxiety about academic preparation and performance (Pajares & Schunk 2002).

Self-efficacy focuses on cognitive beliefs. According to Zimmerman (2000), these cognitive beliefs are influenced by four types of experience. The first – and this is the most influential source of self-efficacy – are the outcomes of personal experiences. For example, if a student in Accounting experiences success in resolving an Accounting question correctly, the student's self-efficacy is strengthened because of the personal experience of getting it right. The second type of experience that influences cognitive beliefs (or self-efficacy) is vicarious influences. These influences depend on a student's self-comparison with someone else. For example, students often compare their academic performance to that of their peers or to the average mark obtained by the group. Through this comparison, students can enhance their

self-efficacy, or conversely, the comparison may erode self-efficacy regarding their performance in Accounting. The third experience is verbal persuasion, which has an influence, albeit limited, on self-efficacy. Verbal persuasion refers to the description of the outcomes (or results) to the student. How strong the influence of verbal persuasion is, largely depends on the credibility of the persuader. In an academic scenario, a lecturer or senior tutor is seen as a credible persuader. The opinion of a lecturer of the academic performance (or lack thereof) of a student will influence a student's academic self-efficacy. Finally, students use physiological reactions to judge their self-efficacy. Physiological reactions include fatigue, stress, inability to cope and any emotions that might be interpreted as physical incapability. If students feel overwhelmed by their academic responsibilities, then it will probably have a negative influence on their academic self-efficacy. This can be overcome by proper mentorship and the teaching of time management skills. Zimmerman (2000:89) argues that

> …empirical evidence of [self-efficacy's] role as a potent mediator of students' learning and motivation confirms the historic wisdom of educators that students' self-beliefs about academic capabilities do play an essential role in their motivation to achieve.

Academic self-efficacy seems to contribute to better use of metacognitive strategies (Byrne & Flood 2008). Students who have no prior Accounting knowledge and who apply metacognitive strategies are more likely to adapt in an Accounting course, and metacognitive skills could assist students in mastering unfamiliar concepts (Schleifer & Dull 2009). It is, therefore, to be expected that there is a direct, positive correlation between self-efficacy and academic performance, and a positive association between self-efficacy and academic performance has indeed been confirmed (Christensen, Fogarty & Wallace 2002; Byrne, Flood & Griffin 2014).

Students form their own expectations of Accounting, especially if they did not have prior exposure to Accounting training. These expectations, or even opinions, are created by their own experiences (for example, struggling with Accounting at school or with mathematics) or the experiences of fellow students (for example, shared information on the perceived difficulty of understanding Accounting). In turn, these expectations or opinions may influence the way they perceive themselves and their abilities to do Accounting.

Students with no prior academic knowledge of Accounting often perceive Accounting as a difficult subject to master (Dull *et al.* 2015; Lucas 2000; Lucas & Meyer 2005; Mladenovic 2000). Learning Accounting relies on the conceptions of students' view of what learning is. Thus preconceptions about Accounting may have an influence on students' learning and mastering Accounting (Abhayawansa & Fonseca 2010; Dull *et al*. 2015; Lucas 2001; Sharma 1997). According to Dull *et al.* (2015) and Ballantine, Duff and McCourt Larres (2008), Accounting students tend to start out as strategic learners. This means that they tend to look for ways to perform better in Accounting. However, in the absence of an intervention, strategic learning tends to become surface learning (rote memorising of facts and methods). In this case, students default to an 'if all else fails, then learn it by heart' attitude and turn to memorising techniques to pass an Accounting assessment.

The inclusion of variables to control for motivation, in one form or another, has been given more attention since the 1990s. Although motivation as a control variable was not included in their studies, various researchers (Bartlett *et al*. 1993; Doran *et al*. 1991; Mitchell 1988) recommended the inclusion of such a construct. Gul and Fong (1993) heeded the recommendation of these researchers and included various variables that were previously not considered in studies aimed at determining the predictors of success in introductory Accounting. In their multiple regression analysis, they included a proxy for self-efficacy, namely self-expectation of examination results. The main limitation, according to these authors, of their study was the timing of the measurement of self-expectation. Gul and Fong (1993) admitted that the significant contribution of self-efficacy as a predictor of academic performance in Accounting was to have been expected, because the survey on the self-expectation of the examination results was carried out three weeks before the final examination. Nonetheless, the inclusion of a variable to control for motivation paved the way for further research. This was the first study, as far as could be ascertained in this literature review, that considered students' beliefs of their own capabilities, expressed as a self-efficacy variable.

Byrne *et al.* (2014) were among the limited number of Accounting education researchers to include background factors such as students' motives, expectation and preparedness for university studies. They implemented a self-developed questionnaire to measure student motivation and self-efficacy specific to Accounting, theoretically grounded in theories proposed by Bandura (1986), who argued that self-efficacy is domain-specific. One aspect

of self-efficacy (students' beliefs about their own ability to succeed in Accounting) was significantly associated with performance in Accounting. Byrne *et al.* (2014) regard self-efficacy as a stronger predictor of academic success than university entry scores (a proxy for academic aptitude). This finding concurs with prior research done by Pintrich and De Groot (1990), who reported that self-efficacy emerged as one of the best predictors of performance[25].

Aside from Accounting education, academic self-efficacy was strongly associated with academic performance in a study conducted among all first-years enrolled at the University of California (Chemers, Hu & Garcia 2001). In mathematics, self-efficacy was also a strong predictor of persistence among children (Bouffard-Bouchard, Parent & Larivee 1991). These authors also contend that self-efficacy has a positive influence on academic performance, irrespective of cognitive ability. Hence, their results provide support for the "construct validity of self-efficacy as (being) different from cognitive competence" (Bouffard-Bouchard *et al.* 1991:153).

To date, no comparison between self-efficacy and other constructs of motivation (such as student motivation and motivation to learn) has been included in an Accounting education study investigating their effects on first-year students who are not specialising in Accounting.

a. Metacognitive knowledge: Student motivation

Student motivation is grounded in Self-Determination Theory (SDT), which was initially developed by Deci and Ryan (1985). SDT is a meta-theory which Deci and Ryan (n.d) describe as "a formal theory that defines intrinsic and varied extrinsic sources of motivation, and [provides] a description of the respective roles of intrinsic and types of extrinsic motivation in cognitive and social development and in individual differences". Student motivation is described by Afzal, Ali, Khan and Hamid (2010) as the "element that leads students' attitudes towards learning" (2010:81). Students proceed to study at university for various different reasons. These reasons manifest as motivational factors that drive them as intrinsic or extrinsic motivators, or as a combination of these (Byrne & Flood 2005). Biggs (1996:348) contends that a "learner brings an accumulation of assumptions, motives, intentions and previous knowledge that envelopes every teaching/learning situation and

[25] It should be noted that this study was conducted among school learners.

determines the course and quality of learning that may take place". It is expected that highly motivated students would outperform less motivated students in introductory Accounting.

Of interest is the observation made by numerous authors that it is important to determine the source of a student's motivation, since differences in the academic performance of intrinsically versus extrinsically goal-oriented students have been reported by numerous authors (Dev 1997; Lumsden 1994; Paulsen & Gentry 1995). Intrinsically motivated students tend to

- be characterised by a desire to learn for the sake of understanding (Byrne & Flood 2005);
- have the inherent drive to achieve personal goals and experience development (Paulsen & Gentry 1995);
- engage keenly in learning out of personal interest and the desire to achieve (Afzal *et al.* 2010);
- not need rewards or incentives to participate and complete assigned activities (Dev 1997); and
- often use deep learning strategies to master a discipline (Lumsden 1994).

Afzal *et al.* (2010:81) describe intrinsically motivated students as "more enthusiastic, self-driven, challenging" and state that "they feel pleasure in their studies". These students are more likely to become lifelong learners (Kohn 1993) and, therefore, perform better academically than their extrinsically motivated counterparts.

By contrast, extrinsically motivated students are students who engage in learning in order to avoid punishment (Dev 1997) or for the sake of earning some reward (mostly in the form of academic credits). These students also prefer tasks that are less challenging (Lumsden 1994), apply surface learning strategies (Paulsen & Gentry 1995) and tend to regress to the point where the least amount of effort is expended to meet the minimum requirements (Lumsden 1994).

Authors in other disciplines (Afzal *et al.* 2010; Chemers *et al.* 2001; Pintrich & De Groot 1990; Struthers, Perry & Menec 2000) have observed a positive correlation between motivation (in general) and academic performance. The relationship between motivation and performance is "reciprocal, meaning [that] students who are more motivated perform better

and student(s) who perform better are more motivated" (Afzal *et al.* 2010:84). Various authors in Accounting education recognise the importance of including a proxy for motivation (Bartlett *et al.* 1993; Doran *et al.* 1991; Mitchell 1988; Xiang & Gruber 2012), although only a few studies have thus far attempted to include defined constructs of motivation.

From the articles reviewed on Accounting education, it seems that proxies for motivation have often been selected at random. Proxies for motivation include students' academic majors (Schroeder 1986; Tan & Laswad 2008), the number of assessments completed (Eskew & Farley 1988), self-expectation of the examination (Gul & Fong 1993), type of degree enrolled for and number of tutorials attended (Rankin *et al.* 2003), and interest in Accounting (Tickell & Smyrnios 2005). Although these proxies aimed to capture an element of motivation, specific domains in motivation are necessary to achieve an understanding of the learning process concerned. Hence, more value can be added to a learning environment if specific elements of motivation can be addressed.

b. Metacognitive knowledge: Motivation to learn

Brophy (1983) provides elaborate definitions of motivation to learn. Motivation to learn is much more specifically about the cognitive processes that take place, as opposed to student motivation, which also includes affective (emotional) aspects. Brophy (1983) states that "the term 'motivation to learn' refers primarily to the motivation underlying these [referring to conceptual learning] covert processes that occur during learning rather than to the motivation that drives later performance" (Brophy 1983). Motivation to learn is the driving force behind a student's desire to engage in training and to master the content of a course (Noe 1986). Similar to self-efficacy, motivation to learn also fits into SLT.

It can, therefore, be expected that students with a higher motivation to learn will outperform peers with less motivation to learn, since motivation to learn drives the internalisation and mastering of content and skills. The value of the quality of a student's cognitive involvement in mastering the subject matter is underscored and evident in students with a higher motivation to learn (Brophy 1983). To illustrate this construct more fully, it can be said that students with lower motivation to learn typically focus on academic performance (an extrinsic reward). This group of students tend to apply their cognitive involvement in order to increase their academic performance, and not necessarily to master what is taught (an intrinsic reward).

According to Brophy (1986), motivation to learn is acquired through general experience and is greatly influenced by the modelling provided by students' parents and teachers. Thus, prior experiences, abilities, talents, aspirations and diverse factors influencing a student's background (such as social and political factors) may affect a student's motivation to learn (Afzal *et al.* 2010).

There is only a limited amount of literature available in Accounting education which has included motivation to learn as a construct. Unless a tested instrument measuring motivational constructs is used to study Accounting education, it is difficult to find proxies for motivation to learn. Bartlett *et al*.(1993) maintain that the inclusion of other intervening variables, such as student motivation and "changes in attitude and maturity [and the] ability to make the transition from the more structured and disciplined regime of 'A' level study to the relative independence of university study", among others, might provide a more crystallised answer to the predictors of academic performance in undergraduate Accounting. However, they admitted that these constructs might be hard to measure.

A number of studies have attempted to measure motivation to learn, but the findings are inconclusive regarding its significance as a predictor of academic performance in Accounting. Although it is not stated specifically in these studies that they set out to determine 'motivation to learn', the variables used can be categorised as relating to this construct, according to the definition of motivation to learn. Lane and Porch (2002b) found that a positive attitude towards Accounting was significant in predicting performance in Accounting. This is similar to the results reported by Rankin *et al.* (2003), who used a student's major field of study and the number of tutorials attended as proxies. Tickell and Smyrnios (2005) used 'interest in Accounting' as a proxy for motivation to learn Accounting and reported that this variable was significant in determining the effect of prior knowledge of Accounting. By contrast, Tan and Laswad (2008) found no difference between the academic performance of Accounting of students who intended to major in Accounting and that of those who were majoring in other business disciplines.

5.2.3 Other predictive factors

5.2.3.1 Gender

The learning approaches of male and female students tend to differ (Elias 2005), so it seems important to determine what the effect of gender is on academic performance in Accounting, as this may change the way Accounting is taught. The inclusion of gender as a variable in regression models has also resulted in numerous contradictory findings, which has led to the formation of three schools of thought:

- that men outperform women (Bartlett *et al.* 1993; Koh & Koh 1999; Lipe 1989; Seow *et al.* 2014; Williams 1991);
- that women outperform men (Fraser, Lyttle & Stolle 1978; Mutchler, Turner and Williams 1987; Tan & Laswad 2008; Tyson 1989); and
- that gender (as a variable) is an insignificant variable with little explanatory value of the variance in performance (Buckless, Lipe & Ravenscroft 1991; Byrne & Flood 2008; Canlar & Bristol 1988; Carpenter, Friar & Lipe 1993; Eskew & Faley 1988; Gist *et al.* 1996; Lee 1999; McDowall & Jackling 2006; Tho 1994; Tickell and Smyrnios 2005).

The study conducted by Doran *et al.* (1991) reported very interesting findings. These findings could not place them in any of the above schools of thought: they found that men generally outperformed women in the first semester's Accounting course, but that women performed better in the second semester of the same course.

The results from prior research render the effect of gender inconclusive, with various reports of different findings.

5.2.3.2 Age

Most students enrol for university immediately after completing high school; therefore, age was not a variable of interest in many studies. Most first-year students are between the ages of 18 and 19 years. Nevertheless, it is important to be aware of the age(s) of a student cohort, since a higher age is normally associated with a level of responsibility. Also, understanding the capabilities of a specific age group allows lecturers (and students) to develop and manage realistic expectations. Those studies that did include age as a variable

usually did so in order to use it as a control variable in determining the effect of prior Accounting knowledge.

Koh and Koh (1999) describe age as a significant determinant of academic performance in Accounting. Lane and Porch (2002a, 2002b) reported in two studies that older students performed better than their younger counterparts. Tickell and Smyrnios (2005) and Tan and Laswad (2008) found that age was an insignificant predictor. Findings of prior research are, therefore, unclear when it comes to the inclusion of age as a predictor. However, it remains important to be aware of the age of a cohort of students, since teaching practices and interventions may need to be adjusted to suit the average age of a group.

5.2.3.3 Socio-economic factors

Socio-economic factors refer to background factors that may have an influence on how students learn and what hinders or prepares them for learning at university. In the prior literature, the type of school attended (Bartlett *et al.* 1993; Evans & Farley 1998; Lee 1999; Tickell & Smyrnios 2005) and residential status (Tho 1994) were control variables included in analyses to isolate the effect of prior Accounting knowledge.

Results pertaining to the significance of these variables are inconclusive in terms of their influence on the effect of prior Accounting knowledge. Bartlett *et al.* (1993) and Tho (1994) reported that these factors were insignificant, but their results were contradicted by those of Lee (1999) and Tickell and Smyrnios (2005), who found that the type of school attended explained a significant percentage of the effect of prior Accounting knowledge as a variable of interest. The results of a study by Evans and Farley (1998) regarding the effect of the type of school was inconclusive. These authors reported mixed results in their study, which investigated the significance of attending government or independent schools in Australia. They found different results between the three university campuses that were included in the study: in one instance, significant differences were found between non-Catholic independent schools and government schools, and in the other two instances, no significant differences were reported that could be ascribed to school categories if all the other factors were equal.

In South Africa, schools are generally divided into public (government-supported) or private schools. If a school is categorised as a private school, that school does not receive any

assistance or support from the government. In general, tuition fees are more expensive at private schools than at government-supported public schools. Given the large disparity between income groups and racial divides in the country, variables for socio-economic status cannot be ignored.

5.3 CONCLUSION

In an effort to evaluate the intervention, the prior literature was reviewed to identify the most prominent potential predictors of academic performance in introductory Accounting. This task was complicated by the fact that the literature on the impact of prior Accounting knowledge and the quest to determine the predictors for academic success in an introductory Accounting course is riddled with contradictions. After more than 40 years of research, there is still no agreement on the significance of prior Accounting knowledge, gender, age and socio-economic variables. There is more consensus on the fact that academic aptitude, mathematics (or numeric aptitude) and motivation (expressed in various forms) are significant predictors or determinants of academic success in an introductory Accounting course. The language of instruction can be a barrier to academic performance if it differs from the home language of a student, so its effect on performance in Accounting has also been reviewed and included in the current study. The literature on the effects of socio-economic factors are limited in the South African context, therefore a proxy was included as a control variable in the regression analysis.

CHAPTER 6:
RESEARCH DESIGN: EMPIRICAL TESTING

6.1 INTRODUCTION

PTA was developed to assist students in making the transition from high school to university, by addressing underpreparedness in Accounting through the introduction of appropriate learning strategies. In order to evaluate the effectiveness of the intervention, I investigated whether or not there is an association between the attendance of PTA and academic performance in the three relevant assessment opportunities.

I have been the primary presenter and facilitator of PTA since its inception. As I am involved in the mainstream lectures to the first-year students, I also lecture in the introductory Accounting course. However, to avoid a conflict of interest, while I was gathering the data for this study, I only started lecturing the FRK 111 course after the first formal assessment (Module test 1) (after the first six weeks of the formal mainstream academic programme). I was also not involved in any way in setting Module test 1, the outcome of which provided important data for the study.

In the remainder of this chapter, first, the ontological and epistemological paradigms employed in the study are discussed. Next, the research design is presented, including the three stages of statistical analysis (multiple regression analysis, PSM and Heckman's selection model). The reasons for this design, and the advantages and disadvantages of each stage of the statistical analysis are explored. Then details of the method, the data collection strategy and data analysis are presented, as well as a description of the data collected. Lastly, the limitations of the study and the ethical procedures followed precede a summary and the conclusion of this chapter.

6.2 RESEARCH STRATEGY: ONTOLOGY AND EPISTEMOLOGY

The methodology of a study should be aligned with its underlying ontology and the associated epistemological assumptions. An ontology and epistemology create a holistic view of how knowledge is viewed and how this knowledge can be gained.

In this study, I applied a dualistic approach: a constructivist approach was followed for the underlying educational theories of the study and an objectivist ontology was followed for the methodology of the study.

Objectivist ontology dominates research in Accounting and Finance. Most of the articles published in leading Accounting journals are predicated on positivist Accounting theory (Bisman 2010). Positivist research assumes "that Accounting is objective, and that Accounting hypotheses can be statistically tested to produce generalisable findings" (Bisman 2010:6).

I, therefore, followed a positivist approach in the methodological part of this study, which required me to obtain data and apply analysis methods that were appropriate to establish objective associations between the constructs. My research design is quantitative, and I applied ordinary least-squares for the multiple regression analyses, propensity score matching for creating a new sample, and the Heckman procedure to isolate the effect of the intervention.

Positivism requires the key epistemological assumption that there is an independent, objective relationship between a subject and an object (this is known as theory-neutral observational language). According to Wong, Khin and Heng (2012), the acceptance or rejection of new knowledge relies on the extent to which facts are accumulated objectively. The following criteria need to be fulfilled when a positivist approach is applied in the accumulation of facts: causality and internal validity, reliability and replicability, generalisability and operationalism (Johnson & Duberley 2003).

To meet causality and internal validity criteria, the independent variables need to be carefully identified. Prior research was thus consulted to identify predictors of academic performance for Accounting students, in an attempt to investigate the association between academic performance and course attendance – the variable of interest. A questionnaire was used to determine motivation to learn, students' motivation and their learning self-efficacy.

Reliability and replicability are achieved if the results are achieved consistently. Hence, data were analysed using three different models (an entire group, a matched group and an IV) to ensure reliability. The steps involved in all these stages are described in this thesis to ensure replicability in future studies.

Generalisability refers to the requirement that the results of a particular study can be read as applying to the population represented by the sample group. To meet this criterion, econometric analyses previously used in Accounting education were applied. Propensity scores (PS) were used for sensitivity analysis and prudent inferences were drawn from these results (as discussed in detail later in this chapter). An additional technique, Heckman's Inverse Mills ratio, was borrowed from fields such as Medicine, the behavioural sciences and Accounting. As far as I could ascertain, this method has not previously been applied in Accounting education in general, or in programme evaluation in Accounting education in particular. Its use strengthens the findings and isolates the effect of the intervention.

In conclusion, an objectivist ontological view with a positivist approach requires data to be collected as objectively and consistently as possible. Measurements need to be kept constant and all the participants in the study should be treated in the same way. I adhered to these guidelines during the data collection and analysis phases of this study.

6.3 RESEARCH DESIGN

For this section of the study a positivist approach was followed. This study used a quasi-experimental design[26] as a form of evaluation research (programme evaluation) (Becker 2013). A quasi-experimental design is appropriate where attendees are subject to treatment conditions (in this case, PTA as an intervention) without randomisation (Kleinbaum, Kupper, Nizam & Rosenberg 2013). Control measures play an important role in quasi-experiments (Steiner, Cook, Shadish & Clark 2010). A number of statisticians and econometricians agree that "simple variance control is no longer the method of choice" (Guo & Fraser 2010:36), so a number of control variables **Error! Reference source not found.**were included, based on results from prior studies (Afzal *et al*. 2010; Byrne *et al.* 2014; Coetzee & Schmulian 2013; Coetzee *et al.* 2014; Domina 2009; Jansen & De Villiers 2016; Müller *et al*. 2007; Seow *et al.* 2014).

Because the subjects were not randomly assigned, the research design had to mitigate for the effect of 'always takers' (students who are more motivated than their peers to perform).

[26] Quasi-experimental designs differ from experiments based on the non-randomised sample selection. Experimental designs are commonly applied in the natural sciences, where samples can be randomly assigned to treatment.

For this reason, a proxy for motivation was included in the analyses to perform programme evaluation.

The sections below explain the three stages of analysis as part of the research design. I also comment on the alternatives available (where applicable), the advantages and disadvantages of the methods used, and the rationale for applying the methods used in this study.

6.3.1 Multiple regression analysis

Researchers in Accounting education frequently use regression analysis, due to its wide applicability (Kleinbaum *et al.* 2013). Its application has increased in the last three decades (Doran *et al.* 1991; Byrne & Flood 2008; Eskew & Faley 1988; Keef 1988; Koh & Koh 1999; Lynn *et al.* 1994; Tickell & Smyrnios 2005; Van Rensburg *et al.* 1998).

The advantage of using multiple regression is that it is regarded as a robust statistical method to analyse quantitative data. Regression analysis makes provision for the inclusion of various factors that may predict the outcome variable (Field 2009). One of the more appealing attributes of using regression analysis is that a

> …single regression coefficient captures the net impact of an independent variable on the dependent variable […] if the researcher successfully includes all control variables, and if the regression model meets other assumptions, then τ is an unbiased and consistent estimate of the average treatment effect. (Guo & Fraser 2010:63)

The disadvantage of multiple regression is that a number of assumptions need to be met before inferences can be made with confidence. These assumptions include the use of a continuous dependent variable, independence of observations, a linear relationship between the dependent variable and each independent variable, homoscedasticity of residuals, no multicollinearity between independent variables, no significant outliers, and the approximate normal distribution of residuals (errors). In essence, a multiple regression should be evaluated for goodness-of-fit before any inferences can be drawn (Field 2009).

The rationale for using multiple regression in this study is two-fold: firstly, it is used frequently in Accounting education, so other researchers who would read the study are familiar with the technique. Secondly, it creates a foundation to expand the analysis to include PS, Heckman's selection and treatment effect models.

Self-selection bias (a form of endogeneity) is one of the disadvantages of non-randomised experimental designs in the social and economic sciences. Endogeneity occurs when an explanatory variable is correlated with the error term. This correlation can be a result of measurement error, auto-regression with auto-correlated error, simultaneous causality or omitted variables. In prior Accounting studies, multiple regression analysis was used to mitigate the effect of self-selection bias (Shipman, Swanquist & Whited 2017), although more robust econometric techniques can be applied to negate endogeneity. For a multiple regression to address endogeneity properly in non-randomly assigned experiments, the relation between the outcome and variables needs proper specification. Misspecification may produce biased estimates (Shipman *et al.* 2017).

In Accounting education, specifying the relation between variables is problematic, due to the nature of education, human behaviour and other unobservable factors which could influence students' academic performance. Specific relations and associations are not as clear as in the natural sciences, for example. Lastly, on an individual observational level, it is impossible to observe the treatment effect on a subject[27] as well as the effect of not being treated for the same subject[28] ($Y_i = 1$ and $Y_i = 0$); therefore, more robust techniques, such as PSM, are needed to conduct programme evaluation.

6.3.2 Propensity score matching: estimating counterfactuals

A common characteristic (and limitation) of experiments in the social and economic sciences is the use of non-randomised experimental designs. One limitation of using these designs is that the *ignorable treatment assignment assumption* is violated. This assumption refers to the fact that the assignment of participants to binary treatment is independent of the outcome, in other words, being treated (Y_1) or not treated (Y_0). Ignorability is fundamentally untestable because only the treatment, control variables and outcomes can be observed (Wooldridge 2010). In randomised experimental designs, researchers can be confident that the observations are balanced between the treatment and the control groups, making the treatment assignment independent of the outcomes under the two conditions (Rosenbaum 2002; Rosenbaum & Rubin 1983), but in a study such as this one, a randomised experimental design would have been unethical, as some students would have been denied

[27] Where a student attended PTA.

[28] Observing the effect if the same student did not attend PTA.

the opportunity to enrol for the PTA. When the ignorable treatment assignment assumption is violated, an ordinary least squares regressions' estimate of the treatment effect is "biased and inconsistent" (Guo & Fraser 2010:36), and then the research design calls for more robust econometric techniques.

Interventions in education, such as short courses, aim to improve an outcome, for example, the academic performance of students. Course evaluation inevitably borders on making causal inferences, since the intention of presenting a course is to increase academic performance. In essence, programme evaluation is the study of cause-and-effect relationships (Guo & Fraser 2010). Prior to the development of robust econometric models, researchers in Accounting education relied on regression analysis with control variables to determine the association between treatment (for example, an intervention) and academic performance (Coetzee *et al.* 2014; Jackson 2014; Janse van Rensburg *et al.* 2014).

This study introduces the use of an econometric model that is novel to Accounting education. This model relies on a key conceptual framework in the investigation of causality – the "Neyman-Rubin counterfactual framework of causality*"* (Neyman 1923; Rubin 1974) – that uses a counterfactual, which can be defined as the

> …potential outcome, or the state of affairs that would have happened in the absence of the cause. Thus, for a participant in the treatment condition, a counterfactual is the potential outcome under the condition of control; for a participant in the control condition, a counterfactual is the potential outcome under the condition of treatment. […] counterfactual is not observed in real data. Indeed it is a missing value. Therefore, the fundamental task of any evaluation is to use known information to impute a missing value for a hypothetical and not observed outcome. (Guo & Fraser 2010:24)

The Neyman-Rubin counterfactual framework is a useful tool for the statistical exploration of causal effects,[29] but any inferences should be made with great caution, as causality can only be inferred in the presence of substantive theories. Therefore, a limitation of the counterfactual framework is that it is only reliable "under the guidance of appropriate theories and substantive knowledge" (Guo & Fraser 2010:30).

The use of this framework in Accounting education will contribute to research methods for the purposes of programme evaluation. However, there is limited evidence supporting the application of this framework in the existing Accounting education literature, as only one of the models proposed under this framework has been used, as far as I could ascertain,

[29] The framework was expanded by researchers from several disciplines, including statistics (Cox 1958; Fisher 1935), psychometrics (Thurstone 1930) and economics (Haavelmo 1943; Quandt 1958; Roy 1951).

namely by Jackson (2014). However, he did not articulate using this framework in the methods applied in his study.

In estimating counterfactuals, Guo and Fraser (2010) proposed the following four models:

- PS analysis with nonparametric regression, as developed by Heckman, Smith and Clements (1997). The main attribute of this method is that each treated subject is compared to all nontreated subjects, based on the distance between the PS. A nonparametric regression is used to analyse the average treatment effect (ATE) of the treatment group. This approach is followed by applying it to data at two time points, known as difference-in-differences.
- Matching estimators, as discussed by Abadie and Imbens (2006), estimate various types of treatment effects, for example, the sample ATE and the sample average treatment effect on the treated (ATT) by directly imputing counterfactuals through the Mahalanobis metric.
- The PSM model, discussed by Rosenbaum and Rubin (1983), assigns a value of probability of receiving treatment to each subject in the sample. Resampling is done by matching each treated subject to a non-treated subject, based on the PS per subject that was calculated. Through PSM, an approximate randomised design can be achieved, as described by Rubin (2008:815):

  > A crucial idea when trying to estimate causal effects from an observational data set is to conceptualise the observational data set as having arisen from a complex randomised experiment, where the rules used to assign the treatment conditions have been lost and must be reconstructed.

- Heckman's sample selection model (1978, 1979) and Heckit's treatment effect models (Maddala 1983), can also be used. A feature of these models is that it applies an exogenous variable that acts as a switch, putting subjects either in the treatment group or in the non-treatment group. A discussion of this option follows this section.

A PS is a function of control variables that contribute to the probability that an individual would be selected to receive treatment (Rosenbaum & Rubin 1983; Tucker 2010). PS relies on observed variables in order to "recreate a situation that would have been expected in a randomised experiment" (Thoemmes & Kim 2011:92). PS is calculated per subject, based on selected variables or all variables. The PS takes on a scalar variable between 0 and 1, according to the Propensity Score Theorem (Rosenbaum & Rubin 1984). Therefore PSM

estimates the effects of treatments obtained from comparing the results of participants (the treatment group) to the results of those who did not attend the course (the control group). PSM aims to estimate the effects of the intervention "that are uncontaminated by selection bias" (Domina 2009:135). PSM has been applied in a range of fields, including medicine (Ye & Kaskutas 2009), education (Hong & Yu 2008), the behavioural sciences (Staff, Patrick, Loken & Maggs 2008), public health and criminology (Thoemmes & Kim 2011), organisational management (Li 2013), Accounting and finance (Tucker 2010) and Accounting education (Jackson 2014).

The rationale for using PSM is to mitigate endogeneity that results from self-selection bias. The purpose of PSM is to "eliminate a greater proportion of the systematic differences in baseline characteristics between treated and untreated subjects" (Austin 2011:409). Although PSM does not alleviate endogeneity, it is a mitigation tool that relies on observable factors making it possible to analyse treatment effects with more robustness (Tucker 2010).

Austin (2011) and Thoemmes and Kim (2011) have commented that some studies applying PSM (in Accounting in particular) lack adequate descriptions of the analytic choices made. Hence, "researchers trying to evaluate or replicate findings of a published paper may not be able to do so because critical information about analytic choices might be missing" (Thoemmes & Kim 2011:91). Therefore, decisions made in every step of the current study are discussed to enable replication of the study.

The advantage of using PSM is that it provides a mechanical means to create a control group with attributes similar to those of the treatment group. The matching is based on the dimensions using the estimated likelihood of receiving treatment (Shipman *et al*. 2017).

One of the limitations of using PSM is that subjects can only be matched on the basis of observed variables. Unobserved or hard-to-measure variables are excluded by the use of PSM (Shipman *et al.* 2017).

Different estimation methods[30] lead to different treatment effects.[31] There are a number of different treatment effects, but, for the purposes of this study, I consider the ATE at the population level, the ATT and the local average treatment effect (LATE). The ATE, also known as the average causal effect, is normally estimated by the standard estimator, written as

$$\text{ATE} = \tau = E(Y_1|W = 1) - E(Y_0|W = 0)$$

ATE is estimated using PSM, but can also be estimated using stratification based on PS-quintiles, ANCOVA using PS-logits, PS-weighting or simple ANCOVA without PS (Shipman *et al.* 2017; Steiner *et al.* 2010). One of the disadvantages of estimating ATE is that its effect is averaged across the population, including those subjects who were not eligible for the treatment.

The effects of treatment between the ATE and the ATT groups overlap due to randomisation, if one assumes that the population in general is not systematically different from the treated group (Austin 2011). However, due to the actual differences between the ATE and the ATT, the results of PS regressions can arguably only be generalised to those receiving the treatment. The benefit of the intervention to those who have received the treatment lies at the core of programme evaluation (Heckman 2005), and, therefore, ATE cannot be equated to ATT. Following Winship and Morgan (1999), an estimation of the ATT and those who would assign themselves to the treatment should be of interest in determining the benefit of an intervention, programme or policy.

Due to the limited number of studies available in Accounting education that address endogeneity, I decided to apply strategies from behavioural research (Austin 2011), psychology (Hong & Yu 2008) and the Accounting and finance literature (Tucker 2010). However, in order to make more robust inferences, the LATE was estimated by using Heckman's models.

[30] The following balancing methods aim to estimate ATE: regression estimators using key regression functions, matching estimators comparing outcomes between treated and control units, approaches using a PS, a combination of methods (for example, combining regression with one of the other methods), and Bayesian approaches (Imbens 2004).

[31] Intent-to-treat (ITT) effect and efficacy effect (EE) (Shadish, Cook & Campbell 2002), marginal treatment effect (MTE), and treatment effect for people at the margin of indifference (EOTM) (Heckman 2005).

6.3.3 Heckman's selection model and expanded treatment model

Heckman (1979) emphasises the importance of modelling selection effects, arguing that inferences drawn from regression models used in observational studies (without conditioning on unobserved variables or subjects) are inconsistent and biased, because some selection decisions may introduce bias.

Three types of decisions during the research design process for a treatment model could create selection bias (Maddala 1983). These are individual selection, administrator selection and attrition selection. Figure 8 shows a schematic illustration of the various selection decisions. Some stages were added for ease of reference where applicable to my study.

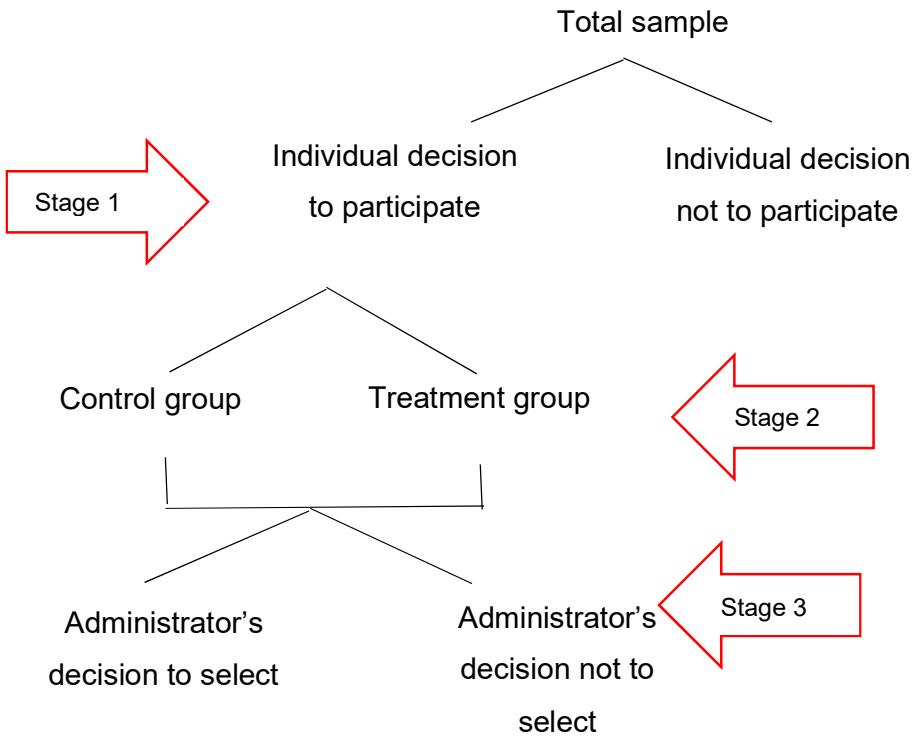

Figure 8. Decision tree for programme evaluation (Adapted from Maddala 1983)

During Stage 1, students were invited to attend the intervention (PTA). Students based their decision on various factors, including affordability, their availability, the perceived benefit of attending the course, and their own motivation to engage in an academic activity before the start of the academic year. Since students were not randomly assigned to attend the course,

individual selection created self-selection bias during Stage 1. Measurement of students' motivation levels allowed comparison between the treatment group and the control group, but this only partially mitigated self-selection bias on the observed variables.

No selection bias was created during Stage 2. Those who attended PTA were classified as the treatment group, and those who did not attend were classified as the control group. Questionnaires were used as the instrument to measure motivation levels. The questionnaires were distributed during the last lecture in FRK 111 before Module test 1. Only those students who attended PTA and also completed a questionnaire on motivation were included in the sample as the treatment group. The control group was treated in the same way: if a student did not attend PTA, but completed the questionnaire on motivation, then that student formed part of the sample for the control group.

From those who attended, PSM was done and a selection was made to match treated with untreated subjects. Bias may be created by my choice of the variables included in the multiple regression analyses and how subjects were matched, even though the choice was methodologically correct. A number of unmatched subjects were excluded from the evaluation in Stage 3.

A number of econometric remedies[32] are available to address self-selection in programme evaluation, but these models have not been used extensively in Accounting and finance research. Instead, the Accounting literature suggests that self-selection bias may be addressed by using Heckman's selection model (Lennox, Francis & Wang 2012). I, therefore, adopted this method. Although it has been used in Accounting literature, it has, as far as I could ascertain, not yet been applied in Accounting education.

Heckman's sample selection model was one of the most significant contributions to programme evaluation in the 20th century (Guo & Fraser 2010). Its contribution lies in the manner in which it addresses the limitations of programme evaluation, where data can often only be collected from a sample that attended the programme. This means that limited information is available to evaluate a programme where a random selection process is not applied (this is known as incidental truncation) (Guo & Fraser 2010). A truncated distribution occurs when sample data is "drawn from the subset of a larger population" (Guo & Fraser

[32] Two-stage least-squares (Heckman & Robb 1985), Wilcoxon's rank-sum test (Lehmann 2006), Bayesian approaches (Imbens 2004), and regression discontinuity designs (Winship & Morgan 1999).

2010:86). Then the truncated distribution is used to "infer the untruncated […] distribution for the entire population" (Guo & Fraser 2010:87). Incidental truncation deviates from the assumption that a randomised sample was used in an experimental study. The task of Heckman's selection model is to assist in making inferences from the limited sample, thus 'creating incidents' or 'moments' that can be used to make inferences about associations or relationships. Heckman's sample selection model uses the inverse Mills ratio to estimate the outcome variable in a regression model.

Since the development of Heckman's selection model, other statisticians and econometricians expanded on this model to develop the treatment effect model (Guo & Fraser 2010). These models are referred to as Heckit models (Greene 2012) or Heckman-type models (Guo & Fraser 2010). It is important to distinguish between Heckman's selection model and a treatment effect model. In a selection model, the outcome can only be observed in the treated group (i.e. observations where $\omega_i = 1$). The observed variables are used to estimate the regression coefficients $\boldsymbol{\beta}$ that are applicable to the subjects who were excluded in the first stage of analysis. The treatment effect model differs from the selection model, because the outcome in a treatment effect model can be observed or predicted in both groups: the treated as well as the untreated group (in other words, observations where $\omega_i = 1$ and $\omega_i = 0$). The greatest benefit of a treatment effect model is the "direct application of the sample selection model to estimate the treatment effects in observational studies" (Guo & Fraser 2010:97). In other words, the treatment effect model incorporates the selection model to predict the outcome for both groups.

The treatment effect model (using *etregress* in Stata) conveniently uses the dummy variable for receiving treatment ($\omega_i = 1$ and zero otherwise) directly in the regression equation, but the outcome variable of the regression equation is observed for both conditions, i.e. receiving treatment ($\omega_i = 1$) or not ($\omega_i = 0$). Quandt (1972) states that there are two observed outcomes. There is an outcome for those who were treated when $\omega_i > 0$, $\omega_i = 1$:

$$y_i = \chi_i\beta + (z_i\gamma + u_i)\delta + \varepsilon_i$$

There is also an outcome model for those who were not treated when $\omega_i \leq 0$, $\omega_i = 0$:

$$y_i = x_i\beta + \varepsilon_i$$

These estimations can be done in Stata using a two-step procedure that is similar to the selection model.

In a non-randomised research design, an IV can be applied to estimate the LATE. LATE is neither the ATE for the entire population, nor the treatment effect of a subpopulation constructed by identifiable variables (Guo & Fraser 2010). LATE is the "average treatment effect for individuals whose treatment status is influenced by changing an exogenous regressor that satisfies an exclusion restriction" (Angrist & Imbens 1994). The LATE theorem introduces the use of an IV with the following characteristics: it is "as good as randomly assigned, affects the outcome through a single known channel, has a first stage, and affects the causal channel of interest only in one direction" (Angrist & Pischke 2009:155). An IV ($\mathbb{Z}$) should be independent of the outcomes (Y_1 or Y_0), but highly predictive of treatment (ω_i), although uncorrelated with the error term (ε). Finding a good IV depends on knowledge of the processes that determine a decision to participate in treatment (the variable of interest) and institutional knowledge (Angrist & Pischke 2009).

Using an IV estimates the treatment effect of the group whose behaviour (for example, participation or non-participation) would be changed if the IV was applied. Therefore, the IV is not a population estimator. In a population such as students, subjects can be divided into 'defiers', 'compliers', 'always takers' and 'never takers'. In a non-randomised experiment, it would be biased to compare 'compliers' (those who participate voluntarily) to 'defiers' (those who choose not to participate), because the 'compliers' might include subjects who should be categorised more accurately as 'always takers' (students who are more motivated than their peers to learn and who jump at any opportunity to increase their knowledge or skills). Therefore, a less biased approach would be to compare the 'compliers' with the 'potential compliers'. 'Potential compliers' are those students who would have chosen to participate, but could not, because of issues such as financial or time constraints, prior engagements or uncertainty about whether their application to study has been successful.[33]

Using the treatment effect model with an IV depicts the LATE, thus the effect on those who attended and those who could potentially attend. The IV, therefore, excludes the 'never

[33] Students usually only receive their final Grade 12 marks during the first two weeks of January. Their application to study is accepted or rejected based on their Grade 12 marks. Hence, some students are reluctant to engage in any preparatory activity until their application is accepted.

takers' and the 'always takers'. The estimation of LATE is applicable to the potential compliers, and cannot be generalised to the population at large (Jo & Muthén 2001).

An advantage of using the IV to estimate the LATE is that an estimation can be conducted under weak conditions with relaxed assumptions for a regression analysis. Two disadvantages of using LATE are that it measures the effect of the treatment on a generally unidentifiable subpopulation and that the definition of exactly what the 'local' in LATE is depends on the IV that is available (Wooldridge 2010). It is important to specify to which subset of the population the LATE applies in order to avoid biased inferences.

Figure 9 contains a schematic illustration of the three stages of the research design that I followed in this study. The diagram also provides an overview, which elucidates the structure of the remainder of this chapter.

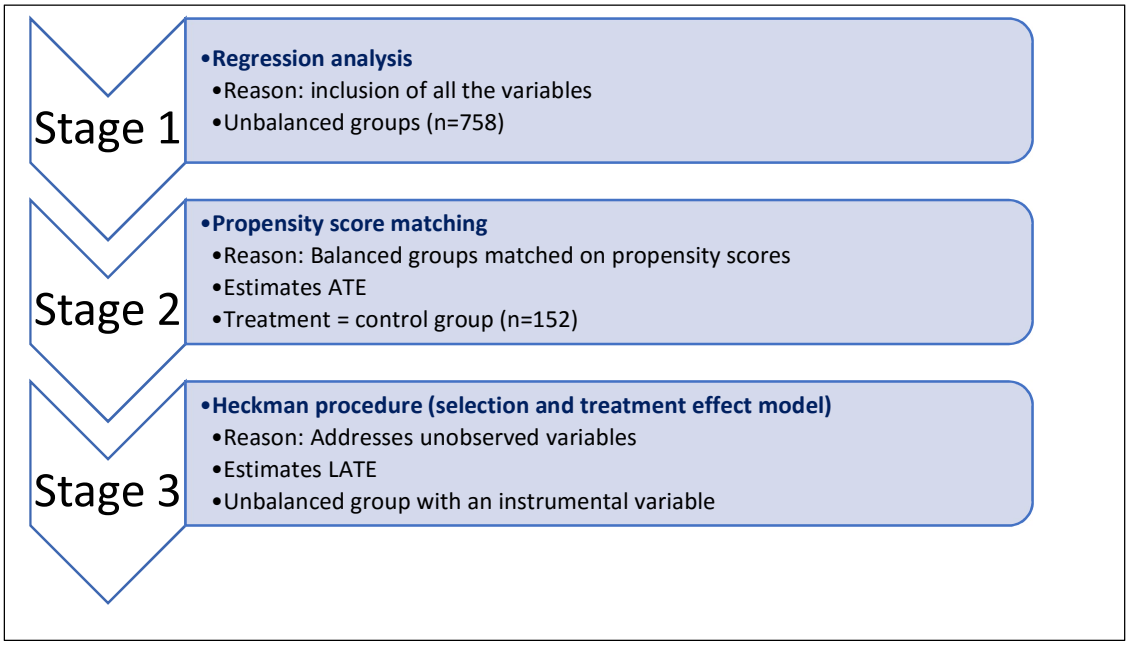

Figure 9. Schematic illustration of research design applied

6.4 METHOD

6.4.1 Sample selection and data collection

I invited all prospective BCom students (approximately 2 000 provisionally placed students) to enrol for PTA via e-mail in the year preceding their first academic year. These students were selected because the introductory Accounting course is a prescribed module for every BCom-student, except for BCom Accounting Sciences students.[34] Although prospective BCom Accounting Sciences students were not invited to attend the course, a number of these students normally attend on recommendation of fellow students, parents or previous participants. These students were excluded from the sample for the purposes of this study, because I was interested in the effect of PTA on the academic performance of non-Accounting students.

In my study, eligible students included those who did not complete Accounting at school, but who completed mathematics at school. The sample thus consisted of students who completed Accounting or mathematics at school and who need to take the introductory Accounting course at university, but who are pursuing a degree other than BCom Accounting Sciences.

The e-mail sent to parents, sponsors and students contained information about the need for, and merits of, an intervention of this kind, the objectives of PTA, as well as the logistic arrangements such as the venue, time and cost. Students enrolled online and made electronic payments to complete the registration process. Course fees were payable in advance and could not be added to the student's tuition account held by the university. Since the course is presented under the auspices of an entity held by the university, not by the university itself, it is also not possible for bursary holders to enrol for the course if they intend to have the fees deducted from their bursaries. Thus, a portion of students are excluded from attending PTA due to their (or their sponsor's) financial constraints. The course fee is lower than that of similar short courses presented in the private sector, and is reasonable in comparison to fees charged by private tutors. However, some students can barely afford tuition fees at university, let alone additional preparatory courses.

[34] BCom Accounting Sciences students enrol for a more technical, advanced introductory course that differs from the other Accounting courses.

PTA commenced two weeks before the official academic year, similar to 90% of the studies included in a review by Perna, Rowan-Kenyon, Bell, Thomas and Li (2008). These authors found that the beginning of the year was the most common time for interventions. PTA's curriculum includes all the topics that are assessed in Module test 1, which in this case was scheduled six weeks into the academic year.

On the last day of PTA, students in the treatment group were briefed on the details of the research. It was made clear that participation in the research was voluntary and did not count any marks. The data requested in the questionnaire (which participants only completed later, on the same day as the control group) were quasi-anonymous, as student numbers were used to track academic performance. A week after the completion of PTA, the academic year commenced.

It was decided to collect the data for the proxy for motivation on the day before Module test 1. The lecture before a formal assessment is normally well attended and the rationale was to aim for the inclusion of students of all motivation levels – those who normally attend (and are expected to be more motivated than those who attend more seldom) and those who do not normally attend lectures (and are expected to be less motivated towards their academic performance). I distributed The University Students' Motivation, Satisfaction and Learning Self-Efficacy Questionnaire, version 3 (TUSMSLSEQ3) to all students attending the selected lecture in the introductory Accounting course, known as Financial Accounting 111 (FRK111). The attenders on that day included students who had been part of the treatment group (attendees of PTA). However, since class attendance is not obligatory or monitored, some students from the treatment group did not attend the lecture during which the questionnaire was distributed. Hence, a proxy for their motivation was not collected. These students were excluded for the purposes of analysis. The rest of the student cohort who did not attend PTA but who completed a questionnaire formed the control group.

Data capturing started with numbering each individual questionnaire. The scores of each component of the questionnaire were totalled: student motivation as a total percentage (with a maximum of 8 on the Likert scale, 25 questions), learning self-efficacy (with a maximum of 8 on the Likert scale, 14 questions) and motivation to learn (with a maximum of 8 on the Likert scale, 21 questions). These percentages were used to determine a score for student motivation, learning self-efficacy and motivation to learn.

Master files were compiled with demographic information per student. This information was obtained from the university's database and included each student's home language, preferred language of instruction[35], whether or not the students had completed Accounting in Grade 12 (entered as binary values), grades achieved for mathematics (Grade 12) (entered as percentages) and the APS obtained overall in Grade 12 (used as a proxy for academic aptitude). The participant's student number at the UP, gender, age and which type of school (public or private school) the student went to were filled in on the questionnaire and were verified by means of the data available on the university's administrative database.

The marks achieved in Module test 1, the examination and the final marks were obtained from the university's database and matched to each individual student by means of student numbers. Academic performance was measured by using the percentage scored in each of these instances. The grades were reported retrospectively, since research suggests that retrospective reporting is more accurate than students' own estimates of their future performance (Massey, Charles, Lundy & Fischer 2002).

Two formal tests (summative assessments) were completed during the semester. The examination is a summative written assessment aimed at assessing mastery of the content taught during the semester. The final mark is calculated by combining the semester mark (which contributes 50%) and the examination mark (which contributes the remaining 50% of the final mark).

Sample selection and sample size are two important considerations in any study. Parameters for appropriate sample size are described by Eng (2003). If a small statistical difference is expected between comparison groups, the sample size should increase to indicate that relatively small statistical difference (Eng 2003). I am confident that the number of participants in the treatment group and the control group was sufficient – the total sample contained 758[36] subjects. In similar prior studies, the sample sizes were n=193 (Rodriguez, Jones, Pang & Park 2004), n=342 (Afzal *et al*. 2010), and n=3 924 (Fischer 2007).

Before conducting the main phases of the analyses, descriptive statistics and other analyses (for example, independent samples t-tests) were conducted to ensure that the necessary

[35] Students can choose to attend lectures either in Afrikaans (one of the official languages in South Africa) or in English.

[36] Becker (2013) also conducted a quasi-experiment with an unbalanced sample.

assumptions for regressions were met. These assumptions included independence of observations, homoscedasticity of residuals, the absence of multicollinearity between the independent variables (for example, Pearson's correlations), the absence of significant outliers, and an approximately normal distribution of residuals (errors). As an initial analysis, the means between the groups were compared.

6.4.2 Multiple regression

A quasi-experimental design with a non-equivalent (unbalanced) control group was used to conduct this study. Where there is an unbalanced control group, the *n* differs between the treatment group and the control group (Cohen, Manion & Morrison 2007). Performance in each of the three marks (the mark for the first test, the examination mark and the final mark) was used as the dependent variables in separate equations.

As I have shown in the literature review in Chapter 5, the results from prior studies in Accounting education concerning predictors of academic success are inconclusive. Consequently, I decided to include all the variables included in prior Accounting studies. This enhances the contribution of this study, as more evidence is submitted to the literature regarding the predictive strength of these variables. Another consideration was the fact that most Accounting education studies thus far have been conducted in countries other than South Africa. Although there is no apparent reason to expect different results, thus far no study that includes all these variables has, as far as I could ascertain, been replicated in a South African academic setting.

The non-equivalent group consisted of students from the treatment group, as well as students from the control group (n = 758).

The exploratory ordinary least-squares regression model used in the analysis was adapted from Coetzee, Janse van Rensburg and Schmulian (2016). Coetzee *et al.* (2016) included variables previously identified as predictors of reading comprehension,[37] which are similar to the predictors of academic performance:

[37] Coetzee *et al.* (2016) applied variables for first language, language of instruction, population group, school attended, academic performance, gender and the attendance of a reading course in their exploratory ordinary least-squares regression analysis.

$$\textbf{Reading comprehension} = \beta_0 + \beta_1\textbf{FirstLanguageAfrikaans}_i + \beta_2\textbf{FirstLanguageAfrican}_i + \beta_3\textbf{InstructionLanguage}_i + \beta_4\textbf{PopGroupAfrican}_i + \beta_5\textbf{PopGroupOther}_i + \beta_6\textbf{HighSchool}_i + \beta_7\textbf{Academic performance}_i + \beta_8\textbf{Thuthuka}_i + \beta_9\textbf{ReadCourse}_i + \beta_{10}\textbf{Gender}_i + \varepsilon$$

However, I adapted their model in two ways. Firstly, I included variables identified in the prior literature as being included in studies to determine that variable's effect on academic performance in Accounting. Secondly, I omitted variables in Coetzee's (2016) model that were not applicable to my study. My final model was the following:

$$\textbf{Performance} = \beta_0 + \beta_i\textbf{CourseAttended}_i + \beta_i\textbf{APS}_i + \beta_i\textbf{AccSch}_i + \beta_i\textbf{MathMark}_i + \beta_i\textbf{LearningSE}_i + \beta_i\textbf{Gender}_i + \beta_i\textbf{Age}_i + \beta_i\textbf{SameLang}_i + \beta_i\textbf{School}_i + \beta_i\textbf{StudentMot}_i + \beta_i\textbf{MotivLearn}_i\ \varepsilon$$

Table 3 shows the coding used for the independent variables to simplify referencing in the model.

Table 3. Independent variables and coding used

Independent variables	Code	Measurement
Academic Aptitude	APS	Continuous
Accounting at school	AccSch	Yes = 1; No = 0
Age	Age	Continuous
Course attended	Course	Yes = 1; No = 0
Gender	Gender	Males = 1; Females = 0
Home and language of instruction	SameLang	Same = 1; Different = 0
Learning self-efficacy	LearningSE	Continuous (%)
Mathematics mark in Grade 12	Mathmark	Continuous (%)
Motivation to learn	MotivLearn	Continuous (%)
School attended	School	Public = 1; Private = 0
Student motivation	StudentMot	Continuous (%)

The variable of interest was the attendance of PTA. Hence, that variable was included to determine the presence or absence of any association between attendance of PTA and academic performance. *APS*, *AccSch, MathMark, LearningSE, Gender, Age, SameLang* and *School* had previously been included in some studies, although mixed results were

reported pertaining to the significance of the effect of these variables on academic performance in Accounting.

StudentMot and *MotivLearn* were added; their inclusion is novel to Accounting education. These constructs were included to refine the constructs of motivation that might influence academic performance. I anticipate that a refinement of the constructs of motivation will provide educators with clearer strategies to motivate students, as each of these constructs requires specific actions in order to be increased.

6.4.3 Propensity score

Students who decide to enrol for an intervention (in this case, PTA) are arguably more motivated than their counterparts who choose not to attend that intervention (Jackson 2014). In addition, because attendance of PTA was not free, only students who could afford the course could consider enrolment. The main regression used in this study applied various control variables that could influence performance in the analysis, but the PS aims to isolate the treatment effect by creating more balanced groups, resulting in a more robust setting.

Since attendance of PTA was voluntary and not free, I argue that more motivated students and/or more affluent students might have decided to enrol, resulting in self-selection bias. Self-selection bias is a form of endogeneity. There are few studies in Accounting education that have thus far attempted to address endogeneity. Jackson (2014) disclosed steps taken to mitigate for selection bias, but does not mention the use of PSM. Jackson (2014) initially included seven control variables (excluding the variable of interest, namely attendance of the intervention) in his regression analysis. After this step, a more balanced group was formed by creating matched pairs, thereby matching students with similar scores based on three of these variables. This step reduced Jackson's sample from 278 in the group to 168 participants, of which half were attendees and the other half were not. Although an attempt was made to address endogeneity in Jackson's study, it is suggested that PSM could be applied in a more robust method. Furthermore, in order to expand the existing literature in terms of the application of econometric techniques, I also took up the call for describing the methodology used in greater detail, which will make it easier to replicate my study so that its findings can be confirmed or contradicted.

I addressed self-selection bias by applying two strategies. First, to mitigate for an anticipated difference in motivation levels between attendees and non-attendees, proxies for motivation of three constructs (motivation to learn, learning self-efficacy and student motivation) were included. The instrument used to determine these constructs is an adaptation of Neill's (2008) The University Students' Motivation, Satisfaction and Learning Self-Efficacy Questionnaire, version 3 (TUSMSLSEQ3)[38],[39] which was also used by Afzal *et al.* (2010)[40]. The inclusion of these constructs served as a mechanical way to address self-selection bias, but could not eliminate possible endogeneity altogether. Second, I calculated a PS for each participant. These scores were used to match attendees with similar non-attendees, based on the PS. This resulted in a balanced group consisting of an equal number of attendees and non-attendees.

I calculated the PS for each individual (n = 758) by including the four statistically significant independent variables identified in the main regression on the entire sample, as recommended by Domina (2009) and Jackson (2014). Although the inclusion of a limited number of control variables has been criticised by Pearl (2009) and Rosenbaum and Rubin (1983), I decided to continue with the most significant independent variables, due to the significant differences between the p-values of the dominant four variables, compared to the other control variables, as described by Guo and Fraser (2010).

Another reason for not matching all the variables was a potential decrease in the sample size due to matching. Since PSM is expected to enhance the robustness of the regression analysis, I would argue that the largest possible sample should be maintained.

PS were calculated as follows: a binary logistic regression was run with Course attendance (*Course*) as a dependent variable (attendance was equal to one, zero otherwise). The four dominant control variables were included and entered in order of dominance: APS score, Accounting at school (*AccSch*), Mathematics score (*Mathmark*) and Learning self-efficacy

[38] This instrument was developed by Prof James Neill, an associate professor at the Centre of Applied Psychology (School of Health Sciences) at the University of Canberra, Australia.

[39] Byrne and Flood (2005) and Byrne, Flood and Griffin (2014) developed a questionnaire to determine the levels of self-efficacy of Accounting students. I could not, however, use this questionnaire for two reasons: firstly, the authors were not prepared to allow the use of this questionnaire and secondly, from what I could ascertain from parts of the questionnaire that were published, one needed some form of Accounting experience to complete the questionnaire.

[40] This study was published in the International Journal of Business and Management – an international, double-blind peer-reviewed journal published by the Canadian Center of Science and Education.

(*LearningSE*). The predicted values of probabilities were saved as an additional variable for all the participants in the entire study. Then the file was split into the treatment group and the control group.

After a PS had been calculated, the next step was to match treated subjects with untreated subjects. Matching can be done in one of two ways: matching **with** replacement (untreated subjects are matched to more than one treated subject) or matching **without** replacement (untreated subjects are only matched once). In this study, untreated subjects were matched using matching without replacement.

PS values are numeric values that include decimal figures, so exact matches to values are not always possible. Rosenbaum (2002) has suggested two methods of matching once the subjects are selected. The first method is what he calls 'greedy matching', which means that untreated subjects are matched to the closest possible value of a treated subject selected at random. The other method for consideration is the 'optimal matching method', which entails matching within a predetermined calliper. Gu and Rosenbaum (1993) compared the two methods and found no real difference between the application of these two methods. They reported that the groups formed in this way were balanced, regardless of whether greedy or optimal matching was applied.

I applied optimal matching through nearest neighbour matching within a specified calliper distance (two decimals) in this study. However, if the values were equal, based on two decimals, then values were matched to the third decimal. If no match could be found for a treated subject, then that subject was removed from the sample. A new, more balanced group was thus formed (n=152, of which 76 attended PTA and the other half formed the control group).

I identified three limitations with the application of PSM in this study. The first limitation was the fact that the creation of a balanced group decreased the number of observations included in the study. A sufficient sample size ensures that valid inferences can be made based on subsequent regressions. If the sample size had been larger than that used in this study, another option might have been to use stratified PSM. Strata could be created with ranges in the PS, thus creating 'groups within groups'. For example, groups of students with a PS ranging from 0.1 to 0.3 could be used. Within this range, a regression analysis could be used to determine the effect of treatment in this stratum. Using strata might yield

additional information that can be used to predict the effect of treatment on those who did not undergo treatment. This method is commonly used in public health studies where large samples are often obtained (Beddhu, Samore, Roberts, Stoddard, Ramkumar, Pappas & Cheung 2003; Novak, Reardon, Raudenbush & Buka 2006).

Rosenbaum and Rubin (1983) recommend matching based on a function of control variables rather than individual variates. In my study, functions of control variables might increase multicollinearity, but they might also decrease the sample size, due to limited matchings. However, I acknowledge that matching on functions of control variables, as well as various variables, would definitely increase the robustness of the balanced statistical design. It is recommended that this method be followed in future studies where the sample size permits.

The second limitation is that the results of PS regressions can arguably only be generalisable to those receiving the treatment, due to the difference between the ATE (the average effect of treatment on population level) and the ATT (average treatment on those who were treated). The effects of treatment between the ATE and ATT groups may overlap (due to randomisation) if one assumes that the population in general will not be systematically different from the treated group (Austin 2011). However, it can be argued that the generalisability of findings needs to be extended to students that ought to have received the treatment, but did not. Therefore findings need not be extended to the population at large, but only to the eligible population of like students. Barriers to participation (or the likelihood of participation) need to be considered before inferences can be made based on ATE or ATT. Based on the fact that PTA was offered at a cost, on the main campus and during a non-academic period, it is fair to expect that these factors were barriers to treatment. Therefore, it would be prudent to accept that the inferences made based on the results should be limited to those who received the treatment, i.e. ATT.

The third limitation is that, because the PS is predicated on observed variables, bias may be increased because of the presence of an unobserved variable (Pearl 2009). To mitigate the possible effect of an unobserved variable, Heckman's procedure was added to analyse the treatment effect.

Self-selection bias is prevalent in most quasi-experimental designs, since students cannot be forced to receive treatment through an intervention. Bedeian (2014:132) confirms that "some error is virtually always present in sampling, as even random samples are rarely

perfectly representative". However, control for self-selection bias, acknowledging the limitations, was exercised by implementing PSM in an attempt to address endogeneity.

6.4.4 Heckman's procedure

Heckman's selection model and subsequent treatment model rely on an IV that is as good as randomly assigned, is independent of the outcome, and affects the variable of interest only in one direction. The choice of a suitable IV is also dependent on the observational data available on an individual level. Hence, 'Distance from campus' was chosen as an IV. Distance from campus was observed as the distance between the school that was attended by a student (either a participant or non-participant in treatment) and the main campus of the UP.

'Distance from campus' meets the criterion for a suitable IV for the following reasons:

- it is randomly assigned (students from across the country enrol at the UP);
- it is independent of the outcome and, therefore, was not included in the original regression because it is not believed to influence the outcome (the distance from campus does not have a direct influence on the academic performance in Accounting of a student);
- it affects the variable of interest (the intervention) in one direction only (students living further from campus would incur more travel and accommodation expenses than those who live closer by);
- the IV would be the exclusion restriction and was supposed to break the correlation between treatment and the error term (due to unobserved variables).

It is believed that the IV (Distance from campus) would influence a student's decision to attend the course, but not his/her academic performance in Accounting. Also, distance from campus can be a proxy for financial ability: if a student lives far away from campus, that student needs to be able to afford both transport and accommodation for the duration of the course.

'Distance from campus' was obtained by using the demographic data obtained from the university regarding the secondary school attended and doing an internet search on the distance from campus to each particular school. These distances were entered as continuous variables.

Stata was used to conduct the analyses on all three dependent variables (performance in Module test 1 and the examination, and the combined final mark). The function in Stata – *treatreg* (Guo & Fraser 2010:101) – was replaced by *etregress* (Cerulli 2014) and the following command was used:

etregress depvar [indepvars], treat (depvar_t = indepvars_t) [twostep]

where

- *depvar* is the outcome, in other words, performance in the assessments on which the difference between the treatment and the control group would be assessed;
- *indepvars* is the variables hypothesised to have an influence on academic performance, i.e. $\beta_i APS_i + \beta_i AccSch_i + \beta_i MathMark_i + \beta_i LearningSE_i + \beta_i Gender_i + \beta_i Age_i + \beta_i SameLang_i + \beta_i School_i + \beta_i StudentMot_i + \beta_i MotivLearn_i$;
- *depvar_t* is the treatment membership that denotes being treated (1) or zero otherwise;
- *indepvars_t* is the IV that is anticipated to determine the selection process, i.e. Distance from campus (continuous variable); and
- *twostep* request an estimation using a two-step consistent estimator.

6.5 LIMITATIONS

PTA has been presented as a preparatory course since 2011. Since then, other universities have developed and facilitated similar courses to prepare their first-year students. It would have strengthened the study to have collected data from these universities, but, given that there are significant differences between the course structures at different universities,[41] inferences might have been inaccurate.

A second limitation of the study is that the inclusion of more than one year would have strengthened the inferences drawn from the study. However, even though data were collected for the 2017 year, I have reason to suspect that the 2017 group differs significantly

[41] Some universities offer these courses only to selected students, for example, underperformers; other universities offer these courses at a substantially lower fee, since subsidies are applied for preparatory courses. This creates a vastly different population to draw a sample from. Also, some of these preparatory courses are only for selected degree programmes and are not accessible to all students studying towards a BCom degree.

from the group included in the current study (the 2016 group). Initial analysis showed no similarity on the means of tests, motivation levels or even enrolment. One can only speculate about the reasons for this – I would suggest that the possible effect of the protest actions that were suffered by the UP and other higher education institutions in late 2015 and in 2016 may have played a role. Therefore, it was decided to include only the 2016 cohort and rather analyse it in depth.

A third limitation is that, to understand fully why some students decided to enrol for the course and some did not, semi-structured or structured interviews could have been conducted to contribute to our understanding of the self-selection bias in this study. However, I decided to exclude a qualitative outcome for two reasons. Firstly, the aim of this study was to determine the effect of the course on academic performance; therefore, I focused on quantitative techniques to determine the effect of the course. Secondly, time and resource constraints made it difficult to collect such additional data, to process and interpret them in a meaningful way, whilst remaining cognisant of the deadlines imposed on this project.

Lastly, Accounting education is still developing in its use of econometric techniques. Various techniques are available to conduct causality analyses, but only a few of these techniques have thus far been applied and the results published in academic journals. This study was conducted within the parameters of econometric structures that Accounting education researchers are familiar with, with the application of the Heckman procedure that is novel.

6.6 ETHICAL CONSIDERATIONS

The UP has a transparent policy on ethical practices when research on students is conducted. Ethical clearance was obtained by following the guidelines prescribed by the UP and, specifically, the Faculty of Economic and Management Sciences. In line with this policy, permission was obtained from the Dean of Student Affairs to use the demographic information and data on the academic performance of students.

A questionnaire was used as part of this study to measure the students' motivation levels. This questionnaire was also included with the research proposal for the perusal of the ethics committee in the application for ethical clearance. Although students indicated their student numbers on the questionnaire, these were used solely to match their motivation levels with

their academic performance and their other demographic information, such as the school attended.

Lecturers and researchers are very sensitive towards first-year students who participate in research. Since for many of them, this is the first time that they participate in research, care is taken to explain that participation is voluntary and that they will not be penalised for non-participation.

6.7 SUMMARY AND CONCLUSION

The methodological section of this study followed a positivist approach, and was designed as a quasi-experimental study. An adapted version of Neill's (2008) The University Students' Motivation, Satisfaction and Learning Self-Efficacy Questionnaire, version 3 (TUSMSLSEQ3) was used to determine a proxy for three constructs of motivation: learning self-efficacy, student motivation and motivation to learn. Data analysis was done by means of regression analysis using different models. First, an unbalanced group was used to determine the overall association between the intervention (PTA) and academic performance. Then, the subjects in the treatment group were matched with subjects in the untreated group, based on the most dominant predictors that resulted from the first regression. This step created a balanced group, where the only difference was the fact that half of the group had attended the intervention and the other half had not. Finally, the IV was implemented in Heckman's procedure as an econometric means to mitigate the effect of self-selection bias by determining the effect of unobserved variables.

CHAPTER 7:
RESULTS

7.1 INTRODUCTION

The objective of the intervention evaluated in this study was to prepare students for Accounting at tertiary level and, in particular, provide learning strategies that can be applied in an introductory Accounting course. Secondly, this study aimed to evaluate the impact of the bridging programme on the academic performance in introductory Accounting by means of various strategies and techniques.

The research questions of this study are:

- RQ1: What does a pre-university intervention that is developed based on various learning strategies and Accounting fundamentals entail?
- RQ2: What is the association between attendance of PTA and academic performance in Module test 1 (the first formal assessment), the examination and the final marks of students in an introductory Accounting course?
- RQ3: How is Propensity score matching and the Heckman procedure applied in the evaluation of an intervention in Accounting?

The remainder of this chapter starts with a section on descriptive statistics to provide an overview of the sample and the control group. This is followed by a discussion of the results of the analyses conducted to ensure that the assumptions for using multiple regression analysis were met. Next, I show how the strategies set out in Chapter 6 were followed. The analyses were conducted in three phases, namely the main regression phase, the PSM phase, and the Heckman inverse Mills phase. This is followed by a summary of the most significant results.

7.2 DESCRIPTIVE STATISTICS

7.2.1 Entire group

In 2016, 1 609 students enrolled for FRK 111, the introductory Accounting course prescribed for all BCom undergraduates, excluding BCom Accounting Sciences (the students specialising in Accounting).

PTA was specifically developed for students who did not complete Accounting at school; in other words, students with no prior Accounting knowledge are the target market for this intervention. Of the total cohort of students enrolled, 838 students did not complete Accounting at school, and this is the group for whom PTA is intended. In 2016, 142 students attended the course, of which 90 students were non-Accounting[42] students (the remainder were BCom Accounting Sciences students, who were excluded from this study). PTA is intended for students who did not complete Accounting at school and, therefore, this group of 90 students is of particular interest. Based on the numbers in Figure 10, the uptake of the course was 8.72% of eligible students, if only students with no prior Accounting are considered.

[42] 'Non-Accounting students' refers to students who are not specialising in Accounting, although they might decide to major in Accounting as part of their BCom degree.

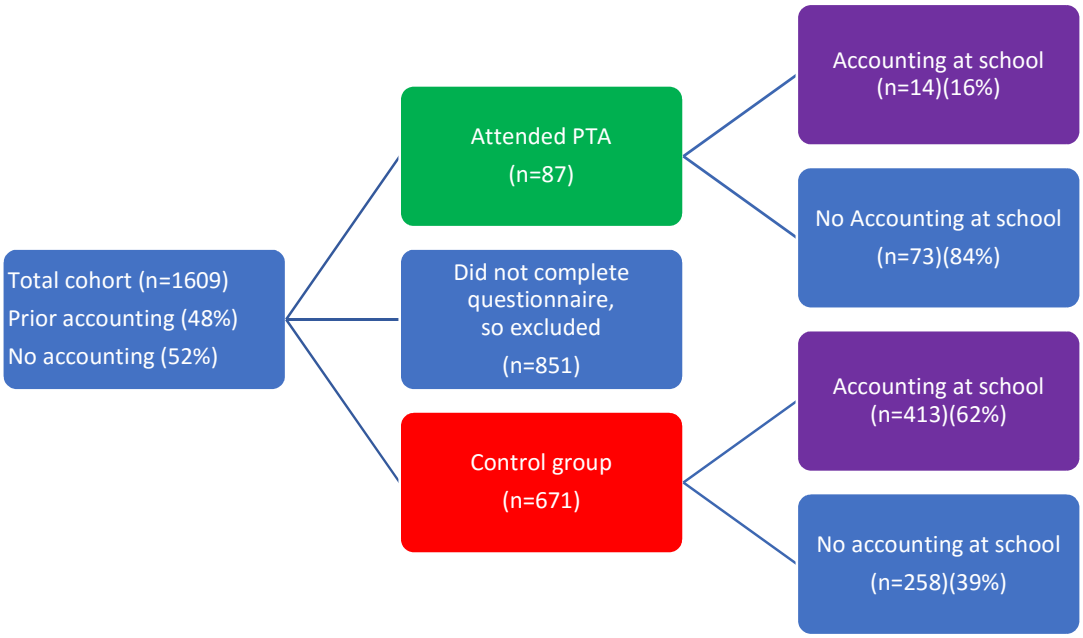

Figure 10. Total student cohort: schematic illustration of sample selection

Students who completed the questionnaire on motivation were included in the research. A total of 758 completed questionnaires were received, of which 87 were completed by students who attended PTA. Table 4 shows the descriptive statistics of the 758 students that formed the sample of this study in the main regression, after outliers with a standard deviation of more or less than three were removed, as recommended by Chaloner and Brant (1988).

The APS is a proxy for academic aptitude and is calculated by the university, based on a points system allocated to a symbol (A or B, etc.) scored in the Grade 12 year. The maximum score a student can achieve is 42 points. Every degree programme presented by the UP requires a minimum APS score, and often other pre-requisites must be met before a student is accepted into the programme concerned. The sample consisted mainly of students studying towards BCom degrees, but also included students studying other degree programmes for which an introduction in Financial Accounting (FRK111) is a compulsory module. This explains the higher than expected standard deviation, since some degree programmes require a lower APS than some of the BCom degree programmes. Prospective BCom Accounting Sciences students were removed from the sample.

Table 4. Descriptive statistics for the entire sample.

	N	Minimum	Maximum	Mean	Std. Deviation
APS	758	25	42	33.89	3.432
Gender	758	0	1	0.44	0.497
Age	758	17	25	18.66	1.051
SameLang	758	0	1	0.58	0.495
School	758	0	1	0.69	0.464
AccSch	758	0	1	0.56	0.496
Mathmark	758	41	98	65.45	9.816
StudentMot	758	36	98	76.19	9.849
LearnSE	758	26	100	76.17	11.037
MotivLearn	758	30	93	70.30	8.868
MT1	758	36	99	77.93	12.856
Exam	742	6	98	60.08	17.559
FM	742	20	96	66.25	14.641
Course	758	0	1	0.11	0.319
Valid N (listwise)	742				

There were more women than men in the sample. This is not surprising, since an increase in the participation rates of women in South African higher education has been observed since 2013 (CHE 2016).

The majority of the students (86%) were between the ages of 17 and 19 years, and the age of the oldest person in the sample was 25 years. Some ‘older’ students sometimes enrol for an introductory Accounting course, mainly because they changed degree programmes after completing one of two years of another degree programme. Some students also choose first to work for a while, or take time off after school before enrolling at university, which explains the presence of a slightly older group of students.

More than half (58%) of this cohort of students reported the same language of tuition as their home language. Although lectures were still presented at the UP in both English and Afrikaans in 2016, PTA was presented only in English. Non-English and non-Afrikaans speaking students come from diverse backgrounds, and the UP attracts students representing most of the other indigenous groups in the country.

Most of the students in the sample attended public schools (also known as government schools). Although these schools are divided into different quintiles,[43] a dummy variable of one was used to indicate a public school, and zero was used otherwise, in order to be able to compare the results of this study to the results of relevant international studies.

A dummy variable of one was used to indicate the completion of Accounting in Grade 12, and zero otherwise. Of the entire sample, 56% had completed Accounting at school.

The school mathematics mark was used as a continuous variable. The minimum percentage achieved is a fail grade, according to university standards, but learners only need a minimum of 30% in order to pass mathematics in Grade 12. Also, for some degree programmes, mathematics in Grade 12 is not a prerequisite. Thus, a range in mathematics marks apply to the diverse range of students who enrol for an introductory course in Accounting in the first semester.

Student motivation, learning self-efficacy and motivation to learn were measured using The University Students' Motivation, Satisfaction and Learning Self-Efficacy Questionnaire, version 3 (TUSMSLSEQ3). The constructs were measured using a Likert scale and the scores were converted to a percentage for each construct.

The outcomes were analysed on the basis of three marks, namely the marks for Module Test 1 (the first formal assessment) and the examination (which included only a few of the topics covered in Module Test 1), plus the final mark (a combined mark consisting of the module mark and the examination mark). Only 742 students wrote the examination, because a minimum semester mark of 30% is required to be admitted to the examination. If a student is not admitted to the examination, the student fails the module. In order to pass the module, a minimum final mark of 50% is required.

[43] School quintiles are a poverty indicator assigned by the Department of Basic Education. This value (from 1 to 5) indicates the level of the government's financial support, but it is also an indication of the performance levels of the school. Quintile 5 (the highest quintile) is assigned to the schools that receive the least financial support from the government, and these are normally schools that perform well. On the other end of the scale there would be Quintile 1 schools – these schools are highly dependent on financial support from the government and generally perform poorly. I have included the separate quintiles as proxies, but since more than 80% of students enrolled for the course in introductory Accounting attended Quintile 4 and 5 schools, these proxies were not significant when included in the regression analysis.

Participation in (attending) PTA, denoted as 'Course' in the table, was indicated by means of a dummy variable of one, and zero otherwise. Of the 758 students included in the sample, 11% (n=83) attended the course.

7.2.2 Balanced group

PSM was done to create a balanced group of participants with similar attributes. The predicted probabilities, using the APS, Accounting at school, the Mathematics Mark and Learning Self-Efficacy, were calculated for the entire group and individually matched between the treatment and control group (untreated group). This resulted in a more balanced group, n=152, of which 50% were treated.

Figure 11 shows how the balanced group comprised of two groups with similar traits in prior knowledge of accounting as the strongest predictor of selection into either group.

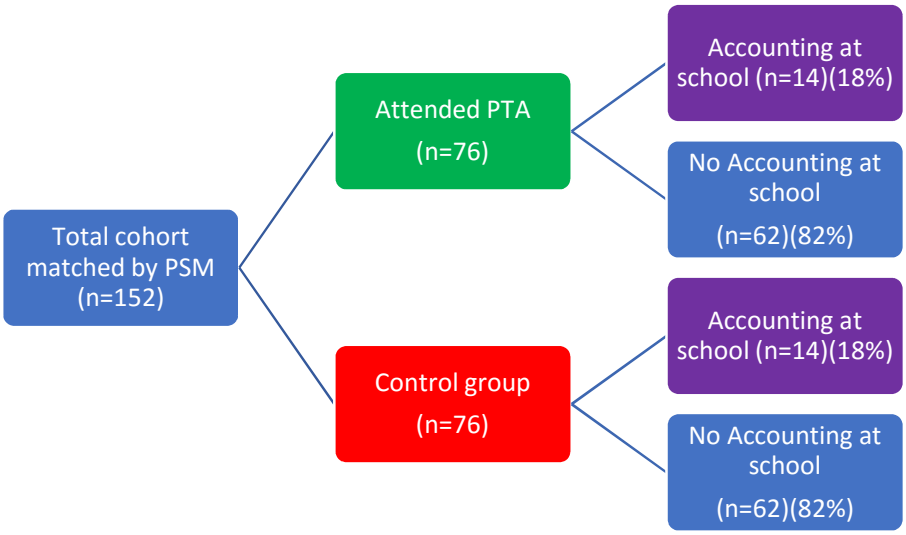

Figure 11. Balanced group student cohort: schematic illustration of sample selection

The descriptive statistics in Table 5 show that more women were included in the balanced group. This is due to the fact that gender was not used to match participants for inclusion in the balanced group. The same can be said about *SameLang*: 70% of the total cohort received tuition in the same language as their mother tongue, however this was expected since *SameLang* was not used to match participants on.

Table 5. Descriptive statistics for the balanced sample

	N	Minimum	Maximum	Mean	Std. Deviation
APS	152	26	42	34.61	3.156
Gender	152	0	1	0.40	0.492
Age	152	17	25	18.45	0.968
SameLang	152	0	1	0.70	0.461
School	152	0	1	0.62	0.487
AccSch	152	0	1	0.18	0.389
Mathmark	152	42	87	65.91	9.492
StudentMot	152	41	98	77.30	9.755
LearningSE	152	49	97	77.16	9.879
MotivLearn	152	43	90	71.37	8.381
MT1	152	43	99	75.23	12.323
Exam	150	24	96	53.86	15.657
FM	150	33	96	61.22	13.079
Course	152	0	1	0.50	0.502
Valid N (listwise)	150				

7.3 TESTING FOR NORMALITY

In order to conduct parametric analyses, various assumptions of normality need to be met so that legitimate inferences can be drawn. The strength of the correlation between the variables was tested by means of a Pearson correlation coefficient (see Table 6):

- Small correlations were observed between *Course* and the dependent variables (MT1, *r*=0.022; Exam, *r*=-0.126 and FM, *r*=-0.087).
- There was a moderate positive correlation between *APS* and the dependent variables (MT1, r=0.299; Exam, r=0.344 and FM, r=0.336).
- The strongest correlation was observed between *AccSch* and the dependent variables (MT1, *r*=0.509; Exam, *r*=0.529 and FM, *r*=0.555).
- A significant (2-tailed) negative correlation was observed between *Course* and *AccSch*, *r*=-0.292.

None of the independent variables displayed correlations greater than 0.7. No multicollinearity was noted when the tolerance and variance inflation factors (VIF) were observed. No multicollinearity was observed between the independent variables as

assessed by tolerance values (all independent variables were greater than 0.1) and VIF (all independent variables were less than 10).

There was demonstrable independence of residuals, as assessed by a Durbin-Watson statistic of 2.043, indicating that there was no correlation between residuals. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values.

Leverage points were all assessed (all values were lower than 0.2) and no leverage points were observed. Influential points were assessed using Cook's Distance Values. No cases were influential (the values were all less than 1). The normal distribution of residuals was assessed by means of a histogram and a visual inspection of a P-P Plot and normal Q-Q Plot of studentized residuals. The data complied with all the assumptions of normality, and, therefore, the analyses could proceed.

Table 6. Correlation coefficients of all variables

		Course	APS	Gender	Age	Same Lang	School	AccSch	Mathmark	Student Mot	Learning SE	Motiv Learn	MT1	Exam	FM
Course	Corr.	1	0.038	-0.053	-0.061	0.100**	-0.070	-0.292**	0.010	0.023	0.015	0.099**	0.022	-0.126**	-0.087*
	Sig. (2-tailed)		0.290	0.146	0.095	0.006	0.055	0.000	0.776	0.528	0.688	0.006	0.543	0.001	0.017
APS	Corr.	0.038	1	-0.145**	-0.122**	0.104**	0.066	0.020	0.579**	0.100**	0.172**	-0.044	0.299**	0.334**	0.336**
	Sig. (2-tailed)	0.290		0.000	0.001	0.004	0.067	0.588	0.000	0.006	0.000	0.229	0.000	0.000	0.000
Gender	Corr.	-0.053	-0.145**	1	0.121**	0.053	0.002	-0.081*	0.060	-0.082*	-0.016	-0.124**	-0.136**	-0.187**	-0.190**
	Sig. (2-tailed)	0.146	0.000		0.001	0.144	0.946	0.025	0.100	0.025	0.659	0.001	0.000	0.000	0.000
Age	Corr.	-0.061	-0.122**	0.121**	1	-0.190**	0.112**	-0.090*	0.053	-0.052	-0.028	0.028	-0.041	-0.069	-0.071
	Sig. (2-tailed)	0.095	0.001	0.001		0.000	0.002	0.013	0.149	0.152	0.448	0.435	0.264	0.059	0.052
SameLang	Corr.	0.100**	0.104**	0.053	-0.190**	1	-0.131**	-0.095**	0.098**	0.057	-0.025	-0.060	0.015	-0.030	-0.011
	Sig. (2-tailed)	0.006	0.004	0.144	0.000		0.000	0.009	0.007	0.118	0.496	0.098	0.686	0.420	0.759
School	Corr.	-0.070	0.066	0.002	0.112**	-0.131**	1	0.066	0.016	-0.046	0.019	-0.028	0.065	0.046	0.048
	Sig. (2-tailed)	0.055	0.067	0.946	0.002	0.000		0.069	0.658	0.205	0.600	0.448	0.075	0.211	0.191
AccSch	Corr.	-0.292**	0.020	-0.081*	-0.090*	-0.095**	0.066	1	0.013	0.020	0.109**	-0.073*	0.509**	0.529**	0.555**
	Sig. (2-tailed)	0.000	0.588	0.025	0.013	0.009	0.069		0.714	0.575	0.003	0.044	0.000	0.000	0.000
Mathmark	Corr.	0.010	0.579**	0.060	0.053	0.098**	0.016	0.013	1	0.031	0.118**	-0.048	0.259**	0.288**	0.291**
	Sig. (2-tailed)	0.776	0.000	0.100	0.149	0.007	0.658	0.714		0.391	0.001	0.189	0.000	0.000	0.000
StudentMot	Corr.	0.023	0.100**	-0.082*	-0.052	0.057	-0.046	0.020	0.031	1	0.378**	0.421**	0.083*	0.059	0.073*
	Sig. (2-tailed)	0.528	0.006	0.025	0.152	0.118	0.205	0.575	0.391		0.000	0.000	0.023	0.107	0.048
LearningSE	Corr	0.015	0.172**	-0.016	-0.028	-0.025	0.019	0.109**	0.118**	0.378**	1	0.443**	0.220**	0.180**	0.201**
	Sig. (2-tailed)	0.688	0.000	0.659	0.448	0.496	0.600	0.003	0.001	0.000		0.000	0.000	0.000	0.000
MotivLearn	Corr.	0.099**	-0.044	-0.124**	0.028	-0.060	-0.028	-0.073*	-0.048	0.421**	0.443**	1	0.046	0.015	0.023
	Sig. (2-tailed)	0.006	0.229	0.001	0.435	0.098	0.448	0.044	0.189	0.000	0.000		0.209	0.678	0.529

**. Correlation is significant at a 1% level (2-tailed). *. Correlation is significant at a 5% level (2-tailed).

7.4 INDEPENDENT-SAMPLES T-TEST

7.4.1 Entire group

The independent-samples *t*-test is a robust statistical analysis of the means (in terms of significant differences) between two groups. Where it is not feasible to have every eligible person as a participant in a study, an independent-samples *t*-test can ascertain whether the difference between the means of the samples reflect the difference between the means of the population. The purpose of an independent-samples *t*-test is to establish whether statistical differences between groups are a result of sampling variation or perhaps the effect of an independent variable. An independent-samples *t*-test was, therefore, conducted as an initial stage analysis to evaluate the difference between the treatment and the control group. The null hypothesis was assumed – it states that the mean value of the treatment group is equal to the mean value of the non-treatment group in the population:

$$H_0: \mu_1=\mu_2$$

where 1 denotes the treatment group in the population, and 2 the untreated group in the population.

Three assumptions underlie the independent-samples *t*-test:

- the assumption of independence (participants could only be measured once and in only one of the groups);
- the assumption of normality (the dependent variable is normally distributed within each of the groups); and
- the assumption of homogeneity of variance (also called the equality of variances).

The assumption of homogeneity of variances assumes that the variances in the two groups are equal. If the assumption of independence is violated, the independent-samples *t*-test is not appropriate to use. If the assumptions of normality and homogeneity of variances are violated, then the adjusted values for *t*, degrees of freedom and significance levels are used, since the variances between the groups are then significant.

Levene's test was used as a pre-test to determine whether the two samples had been drawn from a population with the same variances. The significance value calculated by Levene's test indicates whether these variances between the groups in the population are the same.

If the significance value is p>0.05, then the population variances are equal and the null hypothesis is met. However, if p<0.05, then the assumption of homogeneity is violated and, therefore, the null hypothesis must be rejected. In this case, the modified *t*-test (or unequal variance test) provided adjusted values in order to continue with inferences from the means.

The assumption of homogeneity of variances was met for the following variables (see Table 7): APS scores (*p*=0.4), Mathmark (*p*=0.148); LearningSE (*p*=0.979); Age (*p*=0.211); StudentMot (*p*=0.231); MotivLearn (*p*=0.156); MT1 (*p*=0.092); Exam (*p*=0.664) and FM (*p*=0.410) as assessed by Levene's test for equality of variances. This means that, in terms of these variables, the samples were drawn from a population with the same variances.

However, for AccSch (*p*=0.000); Gender (*p*=0.000); SameLang (*p*=0.000) and School (*p*=0.003), the assumption of homogeneity of variances was violated, as assessed by Levene's test for equality of variances. Therefore, results from the unequal variance *t*-test were used for these variables. These variances in the means of these variables might be attributed either to sampling variability (in other words, the samples drawn were not from a population with the same variances) or to the effect of an independent variable (in this case, the attendance of PTA).

To determine whether the variances in the means were due to sampling variability or to the effect of an independent variable, the statistical significance of the mean difference was used. If the two-tailed significance score is >0.05, then there are no statistical differences between the two mean differences. The variances in the means would, therefore, be attributed to sampling variability that might be caused by the imbalance between the numbers of participants in the two groups (treatment group n=87, untreated group n=671). However, if the two-tailed significance value is <0.05, then the variance in means is likely to be due to the manipulation of an independent variable.

There was a statistically significant difference in the means scores for Accounting at school (AccSch) (*p*=0.000), as expected. This variable indicates whether students completed Accounting at school (dummy variable of 1) or not (dummy variable of 0). The treatment group obviously did not complete Accounting at school (that is the reason for their attendance of PTA), therefore, the statistically significant difference in means between the groups is expected. Table 7 contains the results of the independent samples *t*-test.

Table 7. Comparison between the treatment (attendees) and non-treatment group

	Treatment group				Non-treatment group				
Variables	N	Mean	Std. Deviation	Std. Error Mean	N	Mean	Std. Deviation	Std. Error Mean	t
APS	87	34.25	3.203	0.343	671	33.84	3.460	0.134	1.058
AccSch	87	0.16	0.370	0.040	671	0.62	0.487	0.019	-10.365***
Mathmark	87	65.74	8.654	0.928	671	65.42	9.962	0.385	0.284
LearnSE	87	76.62	10.601	1.137	671	76.11	11.098	0.428	0.402
Gender	87	0.37	0.485	0.052	671	0.45	0.498	0.019	-1.484
Age	87	18.48	0.926	0.099	671	18.68	1.065	0.041	-1.670*
SameLang	87	0.71	0.455	0.049	671	0.56	0.497	0.019	2.961***
School	87	0.60	0.493	0.053	671	0.70	0.459	0.018	-1.816*
StudentMot	87	76.82	9.388	1.006	671	76.11	9.911	0.383	0.631
MottoLearn	87	72.74	8.083	0.867	671	69.98	8.921	0.344	2.735***
MT1	87	78.72	11.018	1.181	671	77.83	13.079	0.505	0.608
Exam	87	54.02	16.697	1.790	655	60.89	17.525	0.685	-3.452***
FM	87	62.74	13.498	1.447	655	66.71	14.732	0.576	-2.387**

Note: Sig. (2-tailed) is denoted by *** 1%, ** 5% and * 10%.

The variance in means for gender was insignificant (p=0.141), suggesting that differences are likely to be due to sampling variabilities.

The variance in means for language was significant (p=0.004), suggesting that the treatment group was probably affected by PTA. The fact that the course was presented only in English, although the course could be attended by students with any home language, may provide some understanding of the significance of this variance.

The variance in means for the type of school attended (School) was not significant (p=0.072), suggesting that the variance in means could be attributed to sampling variability.

Therefore, after the analyses of the variables, H_0: $\mu_1=\mu_2$ was accepted for all the variables except *AccSch, Gender, Language and School*, indicating that the samples were drawn from populations with equal variances.

7.4.2 Balanced group (PSM)

PSM was done to create a balanced group of participants with similar attributes. The predicted probabilities for the entire group were calculated based on the four dominant control variables and individually matched between the treatment group and the control group (untreated group). This resulted in a more balanced group, with n=152, of which 50% were treated. The predicted probabilities were calculated using the APS, Accounting at school (AccSch), Mathematics Mark (Mathmark) and Learning Self-Efficacy (LearningSE) as predictors.

Table 8 contains the results of the independent samples t-test. The assumption of homogeneity of variances was met for the following variables: APS scores (p=0.75), Age (p=0.282); SameLang (p=0.163); School (p=0.194); AccSch (p=1); Mathmark (p=0.513); StudentMot (p=0.424); LearnSE (p=0.269); MotivLearn (p=0.779); MT1 (p=0.216), Exam (p=0.228) and FM (p=0.336) as assessed using Levene's test for equality of variances. This implies that, in terms of these variables, the samples were drawn from a population with the same variances.

Table 8. Comparison between the treatment and non-treatment group in a balanced sample

	Treatment group				Non-treatment group				
Variables	N	Mean	Std. Deviation	Std. Error Mean	N	Mean	Std. Deviation	Std. Error Mean	t
APS	76	34.58	3.121	0.358	76	34.64	3.211	0.368	-0.128
AccSch	76	0.18	0.390	0.045	76	0.18	0.390	0.045	0.000
Mathmark	76	66.17	8.933	1.025	76	65.66	10.074	1.156	0.332
LearnSE	76	77.46	10.230	1.173	76	76.87	9.574	1.098	0.368
Gender	76	0.34	0.478	0.055	76	0.46	0.502	0.058	-1.490
Age	76	18.41	0.836	0.096	76	18.49	1.089	0.125	-0.501
SameLang	76	0.72	0.450	0.052	76	0.67	0.473	0.054	0.703
School	76	0.59	0.495	0.057	76	0.64	0.482	0.055	-0.664
StudentMot	76	77.22	9.587	1.100	76	77.38	9.984	1.145	-0.099
MotivLearn	76	73.38	8.071	0.926	76	69.36	8.249	0.946	3.041***
MT1	76	79.34	10.803	1.239	76	71.11	12.438	1.427	4.357***
Exam	76	55.33	16.367	1.877	74	52.35	14.852	1.727	1.167
FM	76	63.67	13.285	1.524	74	58.70	12.457	1.448	2.361**

Note: Sig. (2-tailed) is significant at the following levels: *** significant at a 1% level, ** significant at a 5% level, and * significant at a 10% level.

Two students were not admitted to the examination and failed the course, hence the reduction in the sample size for the examination and the final marks.

Gender (p=0.01) violated the assumption of homogeneity in variances, but since the two-tailed significance value indicated insignificance (p=0.138), it is likely that the difference in means is due to sampling variability.

Therefore, after the analyses of the variables, the hypothesis H_0: $\mu_1=\mu_2$ was accepted for all the variables except *Gender*, indicating that the samples were drawn from populations with equal variances.

7.5 COMPARISON OF MEANS BETWEEN GROUPS

A comparison of the means of the dependent variables was conducted (see Table 9, below) between the entire sample and the balanced sample. The balanced sample contained subjects with similar attributes, therefore, the only difference (within the calliper range used for PSM) between treated and untreated subjects would be expected to be only the treatment condition.

Table 9. Comparison of means between entire and balanced groups

	Entire group		Balanced group	
	Course attended		Course attended	
	Yes	No	Yes	No
Accounting at school:				
Module Test 1 mean	83.57%	83.69%	83.57%	77.55%
	n=14	n=413	n=14	n=14
Examination mean	64.20%	68.28%	64.20%	59.13%
	n=14	n=409	n=14	n=13
Final mark mean	71.79%	73.34%	71.79%	64.62%
	n=14	n=409	n=14	n=13
No Accounting at school				
Module Test 1 mean	77.79%	68.44%	78.89%	69.65%
	n=73	n=258	n=62	n=62
Examination mean	52.07%	48.59%	53.33%	50.90%
	n=73	n=246	n=62	n=61
Final mark mean	61%	55.68%	61.84%	57.44%
	n=73	n=246	n=62	n=61

Since the course was intended for students who did not complete Accounting at school, the issue of interest would be the comparison between the means of students who did not complete Accounting at school in the entire group and the means of students in the balanced group. The mean scores of the dependent variables (the first formal assessment, in other words, the first module test, MT1, the examination and the final mark) of the treated subjects in the balanced group were higher in every instance than those of the untreated subjects in the balanced group. Comparison of means is only an initial analysis and no inference with regard to association, causality or relationship can be drawn from these.

7.6 MULTIPLE REGRESSION

After it had been shown that all the assumptions for linear regressions were satisfactorily met, an exploratory ordinary least squares regression analysis was performed on the entire group. This analysis included all the variables:

$$\mathbf{Performance=\beta_0 + \beta_i CourseAttended_i + \beta_i APS_i + \beta_i AccSch_i + \beta_i MathMark_i + \beta_i LearningSE_i + \beta_i Gender_i + \beta_i Age_i + \beta_i SameLang_i + \beta_i School_i + \beta_i StudentMot_i + \beta_i MotivLearn_i + \varepsilon}$$

The regressions were conducted on all three dependent variables and are represented in Table 10, Table 11 and Table 12. The results for the entire group are presented along with the results from the balanced group.

7.6.1 Attendance of PTA and performance in Module Test 1

If one compares only the means of groups, the effect of other variables on the dependent variable is disregarded. Therefore, an OLS regression was used to include multiple variables in an attempt to isolate the effect of the attendance of PTA as the intervention. All the independent variables were included in this exploratory ordinary least squares regression, after meeting all the assumptions for normality.

Table 10 shows the results for the regression analysis.

Table 10. PTA and performance in Module Test 1

		Entire sample			Balanced group		
	Prediction	**β**	**Std. Error**	**T**	**β**	**Std. Error**	**t**
(Constant)		12.169	8.783	1.386	12.208	23.365	0.522
Course	+	6.655***	1.209	5.503	8.289***	1.848	4.485
APS	+	0.677***	0.138	4.896	0.675*	0.387	1.744
AccSch	+	14.111***	0.790	17.852	9.193***	2.505	3.670
Mathmark	+	0.175***	0.047	3.727	0.212	0.118	1.795
LearnSE	+	0.117***	0.039	2.982	0.085	0.100	0.845
Gender	-	-1.752*	0.771	-2.273	0.154	1.953	0.079
Age	?	0.582*	0.366	1.589	0.343	0.982	0.349
SameLang	+	1.020*	0.771	1.322	-2.346	2.002	-1.172
School	+	0.683	0.802	0.852	2.509	1.892	1.326
StudentMot	+	-0.016	0.042	-0.376	0.059	0.111	0.527
MotivLearn	+	0.054	0.050	1.088	0.035	0.134	0.259
N		758			152		
Adjusted R^2		39.3			23.3		

Note: Unstandardised regression coefficient shown; *** significant at a 1% level, ** significant at a 5% level, and * significant at a 10% level.

The *adjusted* R^2 is used to assess the overall goodness of fit of a regression model and shows the portion of the variability in a dependent variable that can be explained by the addition of independent variables. The *adjusted* R^2 provides a value that would be expected in the population, as opposed to the R^2 based on the sample (www.statistics.laerd.com n.d.).

The *adjusted* R^2 for the model for Module Test 1 is 39.3% for the entire group (n=758). The balanced group has a lower adjusted R^2 of 23.3% (n=152). These values are comparable to the adjusted R^2 values between 14.6% and 23.9% that have been reported in prior studies (Betts & Morell 1999; Coetzee, Janse van Rensburg & Schmulian 2016; Cook *et al.* 2011)

The coefficient for *Course* is positive and significant at a 1% level, indicating that better performance in Module Test 1 is associated with attendance of the course. This association

between the attendance of PTA and performance in Module Test 1 is stronger for the balanced group, which was also significant at a 1% level.

In terms of other variables that have been discussed in prior literature, the results are interesting when the two groups are compared. AccSch is positive and significant at a 1% level in both instances, but its effect was less marked in the balanced group. This variable is the only variable that was highly significant in both the entire and balanced groups.

The significance for APS and Mathmark changed between the groups. For the entire group, APS and Mathmark were positive and significant at a 1% level, but for the balanced group, these variables are not significant.

LearningSE was the only construct of motivation that was significant (p=0.003) for the entire group.

Table 10 shows the coefficient for LearningSE to be positive and significant at a 1% level, compared to StudentMot and MotivLearn, which were not significant in the entire group. However, the LearningSE is not a significant variable in the performance of Module Test 1 for the balanced group.

Gender was negatively associated with performance in Module Test 1 in the entire group (although it was only significant at a 10% level and can, therefore, be regarded as not significant).[44] Although participants were not matched on gender for the balanced group, this variable is not significant in the balanced group.

7.6.2 Attendance of PTA and performance in the examination

The *adjusted* R^2 for the model for the examination was 41.1% for the entire group (n=742), whilst the balanced group had a lower adjusted R^2 of 21.2% (n=150). The decrease in the sample was due to the fact that some students failed to meet the admission requirements to write the examination (admission to the examination is granted only if a student achieves a module mark of 30% or more).

In contrast with the performance in Module Test 1, the coefficient for *Course* was positively, but not significantly, associated with performance in the examination. The results suggest

[44] Gender was coded as 1 for men and zero otherwise.

that attendance of PTA did not benefit a student in the examination (β=0.525). Similar results were obtained for the balanced group, where the attendance of PTA resulted in β=1.672. This may be due to the fact that the topics covered in the examination were more advanced topics. Topics covered in PTA were basic, fundamental principles for understanding Accounting. Although these are necessary for the comprehension of more advanced topics, knowledge of and understanding of these concepts were not assessed in the examination as such.

In comparison to the results from Module Test 1, APS was a significant variable in both groups at a 1% level. AccSch remained highly significant (p<0.01) and positively associated with performance in the examination, and these results are consistent across both groups.

Although the significance of Mathmark was lower for the balanced group, it was also positively and significantly (p<0.05) associated with performance in the examination. Mathmark was significant at a 5% level in the module test for the entire group, but these results indicate that Mathmark was a significant variable at a 1% level for performance in the examination for the entire group.

LearningSE was the only construct of motivation that was significant at a 5% level, although it was lower than LearningSE in Module Test 1 (at a 1% level) for the entire group. However, similar to results in Module Test 1, LearningSE was not a significant variable for performance in the examination for the balanced group.

Gender was negatively associated with performance in Module Test 1 in the entire group (although it was only significant at a 10% level and should, therefore, be regarded as not significant). The results for the examination indicate the same trend: gender was negatively and significantly (p<0.01) associated with performance in the examination. These results suggest that women outperformed men in the examination, if one considers the results from the entire group. Although participants were not matched on gender for the balanced group, this variable was not significant in the balanced group, although it was also negatively associated with performance in the examination.

An interesting result was that SameLang as a variable was negatively and significantly (p<0.05) associated with performance in the examination for the balanced group. Students were not matched in the balanced group based on whether their home language was the same or different from the language of instruction. The results shown in Table 11, overleaf,

suggest that students who did not receive tuition in the same language as their home language performed better than students whose home language and language of instruction were the same.

Table 11. PTA and performance in the examination

		Entire sample			Balanced group		
	Prediction	B	Std. Error	t	β	Std. Error	t
(Constant)		-14.643	11.942	-1.226	-32.019	30.504	-1.050
Course	+	0.525	1.632	0.322	1.672	2.398	0.697
APS	+	1.089***	0.188	5.792	1.380***	0.500	2.760
AccSch	+	18.248***	1.077	16.942	15.544***	3.279	4.740
Mathmark	+	0.275***	0.064	4.318	0.305**	0.152	2.000
LearnSE	+	0.102**	0.053	1.924	0.088	0.129	0.681
Gender	-	-4.206***	1.048	-4.012	-3.472	2.524	-1.376
Age	?	0.022	0.500	0.044	0.308	1.286	0.240
SameLang	+	-0.157	1.048	-0.150	-5.770**	2.592	-2.226
School	+	0.031	1.090	0.029	-2.133	2.438	-0.875
StudentMot	+	-0.037	0.058	-0.648	-0.067	0.146	-0.457
MotivLearn	+	0.084	0.068	1.235	0.194	0.173	1.123
N		742			150		
Adjusted R^2		41.1			21.2		

Note: Unstandardised regression coefficient shown; *** significant at a 1% level, ** significant at a 5% level, and * significant at a 10% level.

7.6.3 Attendance of PTA and performance as indicated by the final mark

The *adjusted* R^2 for the model for the final mark was 44.8% for the entire group (n=742), the highest of all three models. The balanced group had an adjusted R^2 of 21.4% (n=150), which is comparable to the model fit reported in other studies (Betts & Morell 1999; Coetzee, Janse van Rensburg & Schmulian 2016; Cook *et al.* 2011).

The coefficient for *Course* was positively and significantly associated with the final mark (β=4.258, p<0.05) for the balanced group, although it was not significant for the entire group.

The results suggest that attendance of PTA benefitted students in the balanced group, although the benefit declined from the benefit enjoyed in Module Test 1.

AccSch was positively and significantly associated with passing the course, as indicated in Table 12. For the entire group, the unstandarised coefficient was β=16.414 ($p<0.01$) and it was β=12.82 ($p<0.01$) for the balanced group. This result is consistent in all three models.

Mathmark and Gender were both significantly associated with a passing final mark; Mathmark was positively associated (β=0.232, $p<0.01$), and Gender was negatively associated ($p<0.01$), albeit in the entire group. Compared to the balanced group, Mathmark remained significant, although only at a 5% level, whereas Gender was not significant, although it was also negatively associated with passing the introductory Accounting course.

LearningSE was the only construct of motivation that was significant at a 5% level. The association was lower than that for LearningSE in Module Test 1 ($p<0.01$) for the entire group, but similar to that for LearningSE in the examination ($p<0.05$). However, similar to results in the module test and the examination, LearningSE was not a significant variable for performance in introductory Accounting, based on the results for the balanced group.

Based on the results from the balanced group, SameLang is not significant ($p<0.1$) and it was negatively associated with the final mark, similar to results obtained for the examination.

Table 12. PTA and performance as measured by the final mark

		Entire sample			Balanced group		
	Prediction	**B**	**Std. Error**	**T**	**β**	**Std. Error**	**t**
(Constant)		-.506	9.644	-.053	-7.445	25.463	-0.292
Course	+	2.695*	1.318	2.046	4.258**	2.001	2.128
APS	+	.876***	.152	5.771	0.970**	0.417	2.326
AccSch	+	16.414***	.870	18.871	12.820***	2.737	4.683
Mathmark	+	.232***	.051	4.509	0.270**	0.127	2.127
LearningSE	+	.108**	.043	2.524	0.084	0.108	0.777
Gender	-	-3.535***	.846	-4.177	-2.795	2.107	-1.327
Age	?	.110	.403	.273	0.441	1.073	0.411
SameLang	+	.465	.846	.549	-4.100*	2.164	-1.895
School	+	.196	.880	.223	-1.001	2.035	-0.492
StudentMot	+	-.020	.046	-.437	-0.027	0.122	-0.221
MotivLearn	+	.065	.055	1.184	0.069	0.144	0.475
N		742			150		
Adjusted R^2		44.8			21.4		

Note: Unstandardised regression coefficient shown; *** significant at a 1% level, ** significant at a 5% level, and * significant at a 10% level.

7.7 HECKMAN'S SELECTION AND TREATMENT MODELS

Heckman's selection and treatment model uses the IV to estimate LATEs. In Stage 1 (see Table 13), a regression analysis was conducted, excluding the variable of interest, namely PTA. Instead, the IV – Distance from campus – was included. Then, in Stage 2, the analysis was completed with the probabilities for attending PTA (Stage 1) as a variable.

The attendance of PTA was positively associated with performance in Module Test 1 (β=15.798) at a 5% significance level. Although a positive association was observed between attendance of PTA and academic performance in the examination and the final mark, attendance of the course was not significant in these instances.

AccSch, APS and *MathMark* remained positive and significant at a 1% level in all three measurement instances.

Gender was negatively associated with academic performance in all three instances, but the significance levels varied. For Module Test 1, *Gender* was not significant ($p<0.1$), but it was highly significant ($p<0.01$) for the examination and the final mark. These results suggest that women outperformed men in at least two assessments.

Neither the type of school attended (School), nor the variable for language was significant for performance in Module Test 1, the examination or the final mark.

In terms of constructs for motivation, the results of the OLS regression are confirmed: *LearningSE* was positively and significantly associated with performance in Module Test 1 (β=0.113, $p<0.01$), but its significance decreased in the examination to $p<0.10$ and increased again for the final mark ($p<0.05$). *MottoLearn* and *StudMot* were not significant in any of the three measurement instances.

Table 13 shows the results from the regression analysis that was conducted in the treatment model with 'Distance from campus' as an IV. The results of the Heckit model corroborated the results of both the multiple regression analyses and the PS analyses.

Table 13. Treatment model with IV included in two-stages

	MT1			Exam			Final mark		
	β	t	p	β	t	p	β	t	p
Intercept	9.095	0.980	0.327	-18.413	-1.467	0.142	-3.062	-0.304	0.761
AccSch	15.817***	11.145	0.000	20.289***	10.282	0.000	17.797***	11.156	0.000
Age	0.760*	1.919	0.055	0.221	0.413	0.680	0.245	0.572	0.567
APS	0.656***	4.587	0.000	1.068***	5.551	0.000	0.862***	5.592	0.000
Course	15.798**	2.486	0.013	11.123	1.282	0.200	9.881	1.404	0.160
Gender	-1.397*	-1.684	0.092	-3.811***	-3.417	0.001	-3.268***	-3.654	0.000
LearningSE	0.113***	2.789	0.005	0.099*	1.814	0.070	0.106**	2.431	0.015
Mathmark	0.173***	3.593	0.000	0.272***	4.180	0.000	0.230***	4.411	0.000
MotivLearn	0.028	0.510	0.610	0.054	0.736	0.462	0.045	0.760	0.447
School	0.909	1.082	0.279	0.313	0.276	0.782	0.387	0.426	0.67
SameLang	0.649	0.780	0.436	-0.572	-0.511	0.609	0.183	0.204	0.838
StudMot	-0.008	-0.180	0.857	-0.026	-0.447	0.655	-0.013	-0.273	0.785
Stage 1: Course									
Intercept	0.034	0.021	0.984	0.107	0.064	0.949	0.107	0.064	0.949
AccSch	-1.066***	-7.325	0.000	-1.083***	-7.419	0.000	-1.083***	-7.419	0.000
Age	-0.110	-1.511	0.131	-0.103	-1.417	0.156	-0.103	-1.417	0.156
APS	0.008	0.294	0.769	0.005	0.212	0.832	0.005	0.212	0.832
Distance from campus	-0.000	-0.967	0.334	-0.000	-1.039	0.299	-0.000	-1.039	0.299
Gender	-0.205	-1.447	0.148	-0.194	-1.362	0.173	-0.194	-1.362	0.173
LearningSE	0.002	0.328	0.743	0.002	0.257	0.798	0.002	0.257	0.798
Mathmark	0.001	0.103	0.918	0.002	0.197	0.844	0.002	0.197	0.844
MotivLearn	0.020**	2.073	0.038	0.019**	1.982	0.047	0.019**	1.982	0.047
School	-0.122	-0.878	0.380	-0.130	-0.932	0.351	-0.130	-0.932	0.351
SameLang	0.205	1.431	0.152	0.196	1.361	0.174	0.196	1.361	0.174
StudentMot	-0.008	-1.011	0.312	-0.008	-1.084	0.278	-0.008	-1.084	0.278
Hazard									
Lambda	-5.050	-1.468	0.142	-5.870	-1.246	0.213	-3.980	-1.040	0.298
N	758			742			742		

Note: Unstandardised regression coefficient shown; *** significant at a 1% level, ** significant at a 5% level, and * significant at a 10% level.

7.8 CONCLUSION

The association between the attendance of PTA and academic performance has been investigated by means of three separate models. First, an exploratory ordinary least-squares regression was used to analyse the entire group. Then, a more balanced group was created through PSM and the association between PTA and academic performance was investigated. Lastly, Heckman's procedure (Heckit) was applied to mitigate for self-selection bias. In the Heckit model, an IV, Distance from campus, was introduced in Stage 1 and thereafter the results were obtained from the regression analysis in Stage 2.

The results obtained from the various analyses corroborated each other on various levels. A statistically significant positive association between attendance of PTA and performance in the Module Test 1 was established in the main regression on the entire group (β=6.655) at 1% level and the balanced group (β=8.105) at the 1% level, and in terms of the local average treatment (LATE) using the Heckit models (β=15.798) at the 5% level.

No statistically significant association could be found between attendance of PTA and academic performance in the examination, based on the regression results for the entire or the balanced groups. This was also the case for the Heckit model.

Mixed results were found for the attendance of PTA and its association with final marks. Based on results from the entire group, PTA was not significant (β=2.695) at the 10% level, but it was significant at a 5% level for the balanced group (β=4.258). Results from the Heckit model suggest that PTA was not significant in performance in the final mark.

AccSch, included as a proxy for prior knowledge of Accounting, is a significant variable and a positive association was found between AccSch and Module Test 1 (entire sample β=14.111, at 1% level; balanced sample β=9.193, at 1% level; Heckit β=15.817, at 1% level), as well as AccSch and the performance in the examination (entire sample β=18.248, at 1% level; balanced sample β=15.544, at 1% level; Heckit β=20.289, at 1% level), and AccSch and the final mark (entire sample β=16.414, at 1% level; balanced sample β=12.820, at 1% level; Heckit β=17.797, at 1% level)..

Results from Module Test 1 suggest that academic aptitude (APS) is positively and significantly associated with academic performance in the first test (entire sample β=0.677, at 1% level; balanced sample β=0.675, at 5% level; Heckit β=.656, at 1% level). There was

also a strong association between APS and performance in the examination (entire sample β=1.089, at 1% level; balanced sample β=1.380, at 1% level; Heckit β=1.068, at 1% level), as well as in the final mark (entire sample β=.876, at 1% level; balanced sample β=.970, at 5% level; Heckit β=.862, at 1% level).

Mathematics was positively and significantly associated with performance in Module Test 1 (entire sample β=.175, at 1% level; Heckit β=.173, at 1% level), but the association was not significant for the balanced sample. Results for the examination also suggest that mathematics at school was positively and significantly associated with performance in the examination (entire sample β=.275, at 1% level; balanced sample β=.305, at 1% level; Heckit β=.272, at 1% level) and the final mark (entire sample β=.232, at 1% level; balanced sample β=.270, at 5% level; Heckit β=.230, at 1% level). With the exception of the results obtained from the balanced sample, the results indicate high significance.

The inclusion of gender rendered mixed results. Based on the results of Module Test 1, *Gender* is not significant for any of the three statistical models – the entire sample, balanced sample or Heckit model. However, *Gender* was negatively and significantly associated with performance in the examination, based on results from the entire sample (β=-4.206, at 1% level). The association was not significant for the balanced group, but *Gender* was negatively and significantly associated with performance in the examination based on results from the Heckit model (with β=- 3.811, at 1% level). A negative significant association was found with the final mark (β=- 3.535, at 1% level) for the entire sample, but the association was not significant in the balanced sample (β=- 2.795).

I expected that language (denoted as a difference or not between the effect of home language and language of tuition) would be a significant predictor of academic performance in introductory Accounting. However, based on the evaluation of the results from the regression on Module Test 1, it seems language was not significant in the entire sample, the balanced sample or the Heckit model. Results from the regression on the examination indicated no significance for the entire sample or the Heckit model, although significance at a 5% level was found for the balanced sample (β=-5.770). This suggests that students who were not taught in their home language outperformed those who were taught in their home language. No significance was found for the final mark in any of the groups.

Type of school (public or private school) was used as a proxy for socio-economic factors. This variable was not significant in any of the measurement instances, or in any of the models.

Mixed results were found for Learning self-efficacy (LearningSE), although the association was only highly significant and positive in Module Test 1 (entire sample β=0.117, at 1% level and Heckit model β=.113, at 1% level). No significance was found in the balanced group. Results from the regression where performance in the examination and the final marks were the dependent variables show the same trend. No significance was found in the balanced group, but significance at a 5% level was reported for the entire sample (examination β=0.102 and final mark β=0.108) and the Heckit model (examination β=0.108 and final mark β=0.106). Although no highly significant results were found, compared to the other constructs of motivation, results suggest that *LearningSE* was more significant than student motivation and motivation to learn.

Results from the regression analyses suggest that neither student motivation (StudMot) nor motivation to learn (MottoLearn) were significant variables.

A discussion and implications of the results follow in the next chapter. Implications for policy makers and the contribution of the study are also discussed.

CHAPTER 8:
DISCUSSION AND CONCLUSION

8.1 INTRODUCTION

In this study, I aimed to evaluate a pre-university intervention, PTA, based on its effect on academic performance in an introductory Accounting course. The evaluation of interventions is not a regular practice at many universities. Where it is done, evaluations rely mostly on surveys or anecdotal evidence.

The evaluation of the effects of PTA at the UP was conducted by means of an analysis that controlled for the effect of other factors previously identified in the literature that might influence academic performance in Accounting.

8.2 BACKGROUND TO MY STUDY

South African universities are under pressure to increase student participation, but also to maintain quality standards and accreditation from various professional bodies. South African schools do not deliver students that are prepared for higher education, and underpreparedness is observed on many levels. Prior knowledge of Accounting has been identified as one of the significant predictors of success in an introductory Accounting course. For that reason, a pre-university intervention was developed in order to alleviate underpreparedness by focusing on key skills needed to complete the introductory Accounting course.

PTA has been well received by prospective students, and the popularity of the course has grown significantly since 2011, to the extent that prospective students from other universities and higher institutions enrol for this course.

Although feedback from participants has always been positive and constructive, I wanted to investigate whether there was an association between the attendance of PTA and academic performance in the course.

8.3 DISCUSSION OF FINDINGS

In this study, a thick description of the intervention – that was presented as a bridging course – was provided. This description entailed the learning strategies that are embedded in an introductory Accounting context.

The association between the attendance of PTA and academic performance has been investigated by means of three separate models. Results from several regression analyses, including a Heckit model, were presented for each of the three measurement instances, namely Module Test 1, the examination and the final mark.

As an initial analysis, the means between groups were compared (see Table 9). PTA was developed specifically for students who have not done Accounting at school, therefore, I was particularly interested in a comparison between the means of students with no prior Accounting knowledge who attended versus the means of students with no prior Accounting knowledge who did not attend. The results of the means comparison indicated that students who did not complete Accounting at school but attended PTA scored, on average, 9.24% better in the first test, 2.43% better in the examination, and 4.4% better in the final mark. However, no control variables were included in this analysis and the statistical significance of these differences were not calculated. Therefore, to make more accurate inferences, these findings should be interpreted together with the findings from the econometric analyses.

I found evidence in support of a positive significant association between attendance of the pre-university intervention (PTA) based on the results from the OLS regression on the entire sample (β=6.655, at 1% level), the balanced sample (β=8.105, at 1% level) and the Heckit model (β=8.105, at 1% level). These findings confirm the results of prior studies by Etter, Burmeister and Elder (2000), Jackson (2014), and Jones and Fields (2001), who have also evaluated interventions in Accounting, although they did not consider pre-university interventions for first-year non-Accounting students. Also, these authors did not measure the effect of the interventions under review in the three instances used in my study.

No evidence was found to support a positive association between attendance of PTA and performance in the final examination. This finding might be explained by the difference between the scope of the final examination and the PTA curriculum. The examination is

written towards the end of the semester and more weight is awarded to advanced Accounting topics. The focus of PTA is to equip students with knowledge of fundamental Accounting concepts that are not assessed, per se, in the examination.

The final mark of a student is calculated as the sum of the performance in two module tests (weighted 50%) and the examination (weighted 50%). Although a positive association between attending the intervention and Module Test 1 was found, that association was diluted in the calculation of the final mark. Due to the fact that PTA was only significant at a 5% level for the balanced sample in the analysis of the association between PTA and the final mark, I concluded that only limited evidence was found to support a significantly positive association between attending the intervention and successfully completing an introductory Accounting course.

8.4 THE EFFECT OF CONTROL VARIABLES

Although not part of the aims of this study, the results yielded evidence in support for, or in contradiction of, previous studies concerning predictive factors of success in Accounting. Accounting at school was found to be a strong predictor of performance in an introductory Accounting course for non-Accounting students. This variable was found to be highly significant. It was positively associated with performance in the first module test and the examination, as well as with the final mark.

These results were expected, considering that almost 90% of the school syllabus is repeated in the introductory Accounting course. The reason for the repetition is to accommodate students who were admitted to study towards BCom degrees, for which Accounting is a prescribed course at university, but for which Accounting in Grade 12 is not a prerequisite. No differentiation was made in the PTA between students who did Accounting at school and those who did not. Some schools do not teach Accounting principles (the reasons for some Accounting procedures), as they prefer to focus on the actual procedures. Accounting at university strongly emphasises the IFRS, which forms the basis of Accounting education at university, and how the IFRS are applied. Therefore, many students who had Accounting at school only learn the reason for Accounting procedures at university.

The positive association found between prior knowledge and performance and the conclusion that Accounting at school is indeed a predictor for academic performance in

Accounting at university confirm studies done by Eskew and Faley (1988), Doran *et al.* (1991), Farley and Ramsay (1988), Keef and Hooper (1991), Mitchell (1985), and Schroeder (1986). It emphasises the need for interventions that can assist students who did not have Accounting at school, because to these students Accounting at university is difficult to master. The pace at university is often too fast and many students fall behind.

However, these findings contradict the results of some previous studies (Baldwin & Howe 1982; Byrne & Flood 2008; Keef 1988; Koh & Koh 1999; McDowall & Jackling 2006). The findings of my study might be more comparable to those of others if they had analysed the overlap between school and university Accounting curricula. Unfortunately, these authors did not comment on the overlap between school and university curricula.

Strong evidence was found in support of a positive association between APS and performance in introductory Accounting. Significance was reported mostly at a 1% confidence level between the samples, and in all instances, APS was shown to be positively associated. These results are in line with results from previous studies (Evans & Farley 1998; Rankin *et al.* 2003; Rohde & Kavanagh 1996; Tickell & Smyrnios 2005), although I do not agree with Doran *et al.* (1991) and Seow *et al*. (2014) that APS is the most significant predictor of academic performance. APS is a significant predictor, but its contribution to the performance in Accounting was not as significant as prior Accounting knowledge.

I expected mathematics at school to be associated with performance in Accounting, due to the origins of Accounting. The results suggest that taking mathematics at school is indeed a strong predictor of performance in Accounting, after the evaluation of the regression models for Module Test 1 (entire sample β=0.175, at 1% level; Heckit model β=0.173, at 1% level), the examination (entire sample β=0.275, at 1% level; balanced sample β=0.305, at 1% level; Heckit model β=0.272, at 1% level) and the final mark (entire sample β=0.232, at 1% level; balanced sample β=0.270, at 5% level; Heckit model β=0.230, at 1% level).

Previous studies have also submitted evidence in support of a positive association between taking mathematics at school and performance in Accounting (Eskew & Faley 1988; Evans & Farley 1998; Farley & Ramsay 1988; Gist, Goedde & Ward 1996; Gul & Fong 1993; Seow *et al.* 2014; Tho 1994). However, the findings reported in my study contradict the findings reported by Burdick and Schwartz (1982) and Keef (1988). The difference might be due to the level of mathematics used as a proxy. The difference in results between my study and

these studies might be two-fold: first, the analysis of non-respondents in Keef's (1988:303) study "showed a bias" and, secondly, these studies included mathematics at a university level, as well as mathematics at school level, as one proxy. This may mean that the results cannot be compared meaningfully, since my study only considered mathematics (and not mathematical literacy) at school as a proxy for previous mathematical knowledge.

I found mixed results for the inclusion of gender as a predictor for academic performance in Accounting. The results ranged from being significant to insignificant, and the association was shown to be negatively associated in every instance (regardless of significance). These results suggest that female students outperformed male students in the examination and on the final mark. These findings are consistent with findings reported by Tan and Laswad (2008*),* but contradict findings reported by Koh and Koh (1999) and Seow *et al.* (2014) who found that men outperformed women. My findings also contradict the conclusions of Byrne and Flood (2008), Gist *et al.* (1996), McDowall and Jackling (2006) and Tickell and Smyrnios (2005), who found that gender is not a significant predictor of academic performance.

Tan and Laswad (2008) found that English first language students outperformed second language users at a university in New Zealand where English is the language of instruction. Also, based on research done on the benefits of mother-tongue education (Nyika 2015; Yeld 2005), I expected students who received instruction in their home language to outperform students who did not receive instruction in their home language. The contrary was found: results from the regressions on Module Test 1, the examination and the final mark suggest that mother-tongue education is not a significant predictor of academic performance in the introductory Accounting course at the UP. However, no inferences can be drawn from these results, because the regression analyses yielded insignificant results. These results contradict those of Tan and Laswad (2008), but are consistent with those of Coetzee *et al.* (2016) and Janse van Rensburg, Coetzee and Schmulian (2014).

Type of school (public or private school) was used as a proxy for socio-economic factors. Due to the known income inequality in South Africa, I expected this variable to be a predictor of academic performance in an introductory Accounting course. However, I have found that this variable was not significant in any of the measurement instances, nor in any of the models. This finding is consistent with findings reported by Bartlett *et al.* (1993) and Evans and Farley (1998). It can be argued that different results might have been found if a more diverse student cohort has been included in the sample. Although some students at the UP

are from poor backgrounds, the poor segment of society might be underrepresented in the PTA.

Of the three constructs of motivation, only the analysis of *LearnSE* rendered significant results, albeit mixed results from the different measurement instances. Learning self-efficacy was positive and significant at a 1% level for academic performance in Module Test 1 for the entire sample, as well as the Heckit model. *LearnSE* was not significant for the balanced sample in Module Test 1, but it can be argued that this anomaly can be attributed to the research design. The balanced sample was formed based on values of *LearnSE*, therefore, it was to be expected that subjects in the treatment group would have more or less the same *LearnSE* as subjects in the untreated group. Results from the analyses of performance in the examination and the final marks also showed no significant results for the balanced sample. However, *LearnSE* was significant at a 5% level for both the examination and the final marks for the entire sample and the Heckit model. This finding confirms the findings of Byrne and Flood (2008).

Student motivation and motivation to learn are two constructs that have not yet been included in studies to determine predictors of academic performance in introductory Accounting. Although the importance of student motivation has been recognised and its effect has been explored in other disciplines (Pintrich & De Groot 1990; Struthers, Perry & Menec 2000), it has not been included in Accounting education research as a separate construct. Some studies included constructs of motivation, but whether the proxies for student motivation used in the prior Accounting education research actually meet the definition of ‘student motivation’ is debatable. Nonetheless, it was found to be a significant predictor of academic performance in Accounting in a number of studies (Gul & Fong 1993; Schroeder 1986; Tickell & Smyrnios 2005).

Lane and Porch (2002b), Rankin *et al*. (2003) and Tickell and Smyrnios (2005) used proxies for motivation to learn and found significant results, but I found no evidence in support of a positive association between motivation to learn and academic performance in Accounting. These results are consistent with a study by Tan and Laswad (2008), who found no difference between students intending to major in Accounting and those who did not.

To summarise, I have found a positive, significant association between attendance of PTA and academic performance in Module test 1. It is important to note that I do not claim

causality, even though I used robust statistical methods to confirm the positive association between attendance and performance. Furthermore, I found more evidence in support of, and in some cases in contradiction to, previously inconclusive or contradictory findings in studies where variables such as prior knowledge of Accounting were studied. Lastly, learning self-efficacy was shown to be the most significant predictor of academic performance in Accounting, as opposed to student motivation and motivation to learn, which were not found to be significant predictors.

8.5 CONTRIBUTION

The contributions of my study can be observed on various levels. Firstly, a thick description of a bridging course in introductory Accounting provides educators with the application of learning strategies that are contextualised in Accounting.

Secondly, the evidence I found in support of the effectiveness of the pre-university intervention can be used to justify the investment made in assisting students to be more prepared for Accounting at university. Based on these empirical findings, it will be easier to convince funders to sponsor students who are not in a financial position to pay to attend PTA. The empirical evidence found for the effectiveness of PTA will also be used to convince the university's management to consider subsidising PTA for students who did not complete Accounting at school.

Thirdly, similar pre-university courses can be developed for other modules, and evaluated using the same model. In several disciplines there are modules that meet the definition criteria for 'High Impact Modules', namely that low pass rates in these modules affect large groups of students. Therefore, these disciplines could consider the implementation of similar interventions and assess their effectiveness in a similar way.

Fourthly, drawing from various disciplines, I have described in detail how PSM can be applied in Accounting education. Prior literature did not disclose all the steps or decisions taken during the PSM process, although these decisions are important if studies are to be replicated. Greater clarity on the options available in PSM and information on which options were chosen are contributions made by this study, so that similar studies can be undertaken. The Heckman procedure, with the inclusion of an IV, has not been applied in Accounting education before, as far as I could ascertain, making this the first study in Accounting

education to explain and apply this statistical method. Thus the research expands the methodology for Accounting research.

Fifthly, the contribution of my study lies in the inclusion of more specific forms of motivation (such as student motivation and motivation to learn) as possible factors in student success in Accounting. Although learning self-efficacy has been included in some prior studies, those studies did not mention or did not discuss the theoretical framework underlying motivation in any detail. Consequently, my inclusion of these constructs of motivation and the underlying theoretical framework is novel to Accounting education research. I have also increased awareness about other constructs of motivation and how these fit into the theoretical framework for metacognition. This expands the inclusion of motivation as a success factor in Accounting education research.

Indirect contributions lie in the investigation of the associations between a number of variables that were included in some prior studies, but for which contradictory results were reported. My study, therefore, contributes to the body of literature in Accounting education by submitting more empirical evidence supporting or contradicting previous studies.

Lastly, according to Apostolou, Dorminey, Hassell and Rebele (2016, 2017b), Accounting education research has hitherto lacked rigour. By adopting a quasi-experimental research design, I have made a contribution to this field of research by employing more robust methods to ensure more reliable research findings. I thus responded to Apostolou *et al.*'s call for more experimental designs in Accounting education when they remarked:

> To the extent that the classroom is the laboratory in which educational treatments are applied, the advancement of Accounting education must include the *application of coherent and cohesive theories* that can be measured with some level of precision and then empirically tested with sufficient rigor. Undoubtedly, the extensive controls, randomization, and manipulations necessary for a strict experimental approach may be untenable. In such cases, we recommend that researchers consider the rigor available through a proper *implementation of a quasi-experiment.* (Apostolou *et al*. 2017b:7; emphasis added)

8.6 IMPLICATIONS

The implementation of interventions confirms that universities consider some of their students as lacking in certain skills or knowledge. Universities are concerned with the quality and standards of students' academic abilities and, therefore, it is expected that universities will offer academic support. The purpose of academic support is "…to serve students' needs;

and especially the needs of those students who are underprepared or have difficulty adjusting to the academic environment" (Madni 2008:3).

The positive and significant association demonstrated in my research between attendance of PTA and academic performance in the first assessment implies that the intervention should be made available to more students. This implies that more ways to finance the course should be sought to include students that would previously be excluded because of their financial constraints.

A second implication would be that other programme co-ordinators should endeavour to evaluate their programmes by implementing the same robust statistical analyses as those adopted in this study.

Until this study, educators and researchers were intuitively aware of the importance of motivation, but this far, in Accounting education, motivation has been defined by randomly selected proxies, resulting in evidence for ill-defined constructs of motivation. The evidence in this study in support of an association between learning self-efficacy and academic performance in Accounting should be noted by Accounting educators. More specific strategies are needed to increase the self-efficacy of students, especially before the first formal assessment. For example, learning self-efficacy can be enhanced by timeous and honest feedback, as opposed to attempting to motivate the larger cohort of students by encouraging them to 'work hard'.

8.7 LIMITATIONS

I have identified several limitations to the study. Each is discussed below for the benefit of researchers who wish to replicate this study.

Firstly, although PTA has been presented since 2011, I decided to only use one year's student intake, namely the 2016 cohort. Extraneous factors such as the South African student protests during and around the period in which this study was undertaken may also have affected the different intakes in 2015, 2016 and 2017. I also needed to balance the cost and benefit from incorporating more than one year into the study. Moreover, including more than one year's student cohort or extending this study into a longitudinal study may obscure the effect of various factors as predictors of academic performance in Accounting, including the effect of PTA.

Secondly, this study was conducted only at one university in South Africa. To my knowledge, PTA was the first intervention of its sort in Accounting, and other universities have only followed suit during the last few years. Extending the investigation to include other universities might strengthen the study, although researchers need to be cognisant of resource constraints and the possible differences between universities regarding their curricula, the structure of the intervention and differences in the introductory Accounting courses themselves.

Thirdly, South Africa is characterised by a widening inequality gap in terms of wealth distribution. This has an impact on education in schools and at university. South Africa is by no means the only country with such a divide, so social inequality has been addressed in research from some other countries. Some of the prior literature from various countries has used 'type of school attended' to control for socio-economic factors. The best proxy for socio-economic factors in my study would have been the inclusion of the effect of school quintiles, but this would have made the results difficult to compare to the findings of studies in other countries. I, therefore, decided to include proxies for public (government-funded) and private schools, in line with the prior literature. Another consideration was that more than 80% of the UP's students come from Quintile 5 and 4 schools, which would most likely render inconclusive results on the effect of lower quintile schools.

Fourthly, a student's overall score in Grade 12 (the last year of high school) was included as a proxy for academic aptitude. Although this is in line with the procedure in prior research, the standard and reliability of South African school results are questionable (Yeld 2005). Another option might have been to incorporate the results from the universities' 'National Benchmark Test', which is used as a university's entrance examination.

8.8 SUGGESTIONS FOR FUTURE RESEARCH

In general, projects with an experimental or a quasi-experimental design, the application of PSM and the Heckit model are encouraged. These would contribute to research rigour in Accounting education and strengthen the robustness of any statistical findings. Also, through the application of more econometric strategies, greater research capacity can be developed among Accounting education researchers.

A replication of this study on another intervention would complement what I have found in this study by submitting evidence that either supports or contradicts my findings. Various interventions in Accounting are undertaken, but empirical research is needed to determine an association between attendance of such interventions and academic performance.

The findings that I have submitted in support or contradiction of previous findings on predictors of academic performance in introductory Accounting contribute to a greater understanding of the predictive power of those variables. However, my findings do not alleviate all concerns about the differences between previous findings. Therefore, more robust research designs are necessary to gather evidence that can be used to determine whether there is an association between gender, mother-tongue education, prior knowledge of mathematics on the one hand, and academic performance in introductory Accounting on the other hand. The association between prior knowledge of mathematics and performance in Accounting is especially relevant to South African policy-makers at this time, since the South African Institute of Chartered Accountants (SAICA) is considering removing mathematics at school as a pre-requisite for the BCom Accounting Sciences degree (the undergraduate qualification required to become a chartered accountant).

From a South African perspective, it is also important to investigate the effect of socio-demographic variables and which proxies can be used to do so. Moreover, the effect of school quintiles on the academic performance of first-year non-Accounting students in South Africa requires further investigation.

Lastly, since this study is the first to introduce student motivation and motivation to learn in Accounting education research, more research is needed to either confirm my findings or to contradict my findings. The inclusion of more constructs of motivation may increase our understanding of the learning experience of students; therefore, more research on motivation is needed in Accounting education, especially in South Africa.

8.9 CONCLUDING REMARKS

The pre-university intervention, called PTA, which was considered in this study has been presented for a number of years, but its association with academic performance in the first assessment was not previously empirically determined. In this thesis I have presented a

thick description of the intervention and the underlying learning strategies to address the first research question.

This study reports a positive, significant association between the attendance of PTA and performance in the first formal assessment. Due to the difference in results on the various assessments, research question two is addressed varying associations between attendance of PTA and academic performance.

By describing the econometric techniques that was applied to develop a strategy for the evaluation of an academic intervention, I have addressed research question 3. This evaluation strategy can be applied across disciplines to determine the association between an intervention (or any other academic programme) and academic performance.

Variables identified in the prior literature were also included in the regression analyses, rendering more evidence in support or contradiction of previous findings.

Based on the results of the analyses, it can be concluded that there is a positive, significant association between academic performance in introductory Accounting and (i) attending the intervention (PTA), (ii) prior Accounting knowledge, (iii) academic aptitude, (iv) prior knowledge of mathematics and (v) learning self-efficacy.

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APPENDIX

Table 14. Summary of the content covered in PTA compared to content covered in the module

	Preparation for Tertiary Accounting	
	Topic	**Activity / Assessment**
	Outcome for Day 1: The purpose of the first day is to emphasise the application of accounting in our everyday lives as well as the application of accounting in various 'non-accounting' careers. An individual assignment is given that should be completed after the contact session and submitted the next day. This assignment is marked by the lecturer and detailed, constructive feedback is provided to each individual student.	
Day 1	Introduction by the lecturer. Discussion of differences between university and school: self-discipline, respect for others and taking responsibility for yourself.	Students are encouraged to become co-creators of learning. The first step is to identify house rules for 'us' for the duration of PTA.
	Discussion of skills needed to study accounting, i.e. reading, paraphrasing, mathematical abilities, critical evaluation and reasoning and time management.	Brain teasers are given to students as an ice breaker. The purpose – developing critical thinking skills – is explained. Students form informal groups to solve the brain teaser. Prizes are awarded for the correct answers.
	Introduction to research, academic journals and referencing style.	Individual assessment (should be completed after class): reading an academic article on the history of Accounting. Answer short questions and reflect on the article. Consult other academic sources (not Wikipedia) with the application of the referencing style commonly used at the UP. The outcomes of this assignment is fourfold: 1) to introduce a student to the history and development of accounting, 2) to expose a student to academic writing, 3) to expose a student to academic publications and commonly used referencing techniques and last to create an understanding of the application of accounting in a student's specific field of study.
	Revision of mathematical ratios	Class activity (individual)

	Making a profit: one of the reasons for doing business	Class activity: calculations using gross profit percentages and calculating either the cost, selling price or profit on inventory items.
	Revision of mathematics: unknown factors	Class activity: scenarios where the rent was increased during the year, but only the percentage increase is known.
	What is a financial period?	Class activity: preparing time lines and how to use timelines in solving Accounting questions.
	What is Accounting?	Internal vs External users; different types of Accounting; an introduction to the accounting cycle. What is IFRS and a discussion on the Conceptual Framework and its purpose. Examples of source documents and different transactions are discussed.
Day 2	Outcomes for Day 2: The purpose of Day 2 is to explain the double entry principle to students by making use of the definition and recognition requirements contained in the Conceptual Framework. Effort is made to 'demystify' the jargon that is entailed in the definitions by making use of a lot of class discussions during which examples for the elements are discussed. Students are required to form groups of not more than four members per group. Ideally group members should be enrolled for the same degree programme. Activities undertaken on Days 2 and 3 will be in the form of a competition. Marks for group assignments as well as points scored in the activity on the last day will be used to decide the winning team. Group assignments are completed after the contact session, on campus. The venues are reserved for these students' exclusive use. The lecturer is also available on campus for one-on-one consultations if students need assistance with any content.	
	The Conceptual Framework: definition and recognition requirements	Explanations in ordinary language is given for 'definition requirements' and 'recognition requirements'. Thereafter students are required to, in their groups, classify items according to the elements of the Accounting equation (Assets = Equity + Liabilities). Class activities are marked in class so students receive immediate feedback and have the opportunity to reflect on their learning.
	Explanation of the Accounting equation and the double entry principle.	Various class activities provide students the opportunity to collaborate as a group in class. The analysis of transactions (according to its effect on the Accounting equation) are done extensively. A group assignment is given where students are required to analyse transactions according to its effect on the

		elements. Students also need to indicate the source document that is issued or received per transaction.
	Integration of Accounting skills and knowledge: case study.	A second group assignment is given in the form of a case study. Part 1 of the case study is the analysis of transactions according to its effect on the Accounting Equation. The difference between this case study and the other assignments is that the type of transactions and activities included in the case study simulate a real-life business and it is, therefore, more authentic. Some of the information in the case study is ambiguous, unclear or inadequate. This is by design and its purpose is to stimulate critical thinking. Students are encouraged to obtain assistance from various sources, including the lecturer, textbooks or the internet. Students are also encouraged to teach each other. This assists in fostering a learning community.
Day 3	Outcomes for Day 3: The purpose of Day 3 is to explain the purpose of source documents as well as the purpose of various subsidiary journals.	
	Accounting cycle	The Accounting cycle is explained and discussed in detail. The lecturer explains how the journals are identified and used to record a particular transaction. Class activities are done in groups with the lecturer as the facilitator. Students are encouraged to ask for assistance and to overcome barriers of learning in this way.
		Part 2 of the case study is the analysis of transactions according the appropriate subsidiary journal. This part of the assignment is completed after the contact session, in groups, on campus or anywhere else as per arrangement among the members.
Day 4	Outcomes for Day 4: The purpose of Day 4 is to complete the Accounting cycle. Posting to the general ledger, preparing a trial balance and preparing elementary financial statements for sole proprietors from part of the learning outcomes for this day.	
	Posting to the general ledger	The column totals of the subsidiary journals in the suggested solutions of the case study are used to complete the general ledger.

	Preparing a trial balance	Based on the previous activity, the accounting process is continued by preparing a trial balance from the general ledger that was just done.
	Preparing the statement of profit or loss and other comprehensive income as well as the statement of financial position (elementary statements without the accompanying notes	The trial balance is used to prepare the two basic financial statements for the entity used in the case study. A class discussion is facilitated through which the statements are interpreted. The lecturer facilitates a question and answer session and students are encouraged to participate with possible suggestions to questions such as: 'Why is the profit for the period not equal to the cash Nomsa (the entrepreneur) has in the bank?'
	Close of PTA and integration	PTA is closed off by playing a betting game which provides groups a final opportunity to earn points. The objective of the game is to build a structure from recycled material that can catch an egg when the egg is dropped from a height of about 1.7metres above ground. Each group receives the same amount of virtual money. Each group has to appoint a treasurer and a bidder. Groups get the opportunity to bid for items (such as rubber bands, newspapers, toilet rolls, plastic bags, masking tape, paper boxes etc). The highest bid for a single item wins. Prices paid are subtracted from the group's virtual bank balance. After bidding has closed, the group plans what will be used to build the structure. Excess goods are put up for public auction. In this phase groups can also bid to buy items from one another, but the money goes to the seller and is subtracted from the buyer. The last phase entails building of the actual structure. A fresh egg is dropped on each structure. If the egg is undamaged, the group scores a point. If more than one group succeeded, the group with the highest bank balance wins. The winners of the final phase gets a point and this is added to the marks obtained throughout group assignments. The winning group is announced and walks away with a prize.
	Notes:	

	• Contact sessions are 5 hours with a 10 minute body break every 50 minutes. This is to simulate the duration of lectures during the semester. A longer break (25 minutes) is taken after half way through the programme. During this time students are encouraged to meet fellow students. • During breaks students play a game of “Amazing Race”. This is a group activity and the objective of the game is to find a specific venue (decided upon and communicated by the lecturer). The first team to take a picture of themselves in front of the venue and then sends it to the lecturer’s phone, scores points and wins that round of the “Amazing Race”.