Understanding Factors that Influence Academic Performance in Senior Secondary VCE Physical Education

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

Rachael Jayne Whittle
Bachelor of Applied Science (Human Movement) Hons
Bachelor of Education (Physical Education)
Deakin University

School of Health and Biomedical Sciences
College of Science, Engineering and Health
RMIT University

October 2016
As the doctoral thesis supervisor of Rachael Whittle, B.App.Sci (Hons), B.Ed, I certify that I consider this thesis “Understanding factors that influence academic performance in senior-secondary VCE physical education” to be suitable for examination.

Signed: ______________________

Date: ______________________

Dr. Amanda. C. Benson
Senior Lecturer, PhD
 Discipline of Exercise Sciences
 School of Health and Biomedical Sciences
 RMIT University, Australia

Signed: ______________________

Date: ______________________

Assoc. Professor Amanda Telford
Discipline of Exercise Sciences
School of Heath and Biomedical Sciences
RMIT University, Australia
Declaration of the Author

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

Signed: ____________________________

Rachael J Whittle

Date: ____________________________
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PUBLICATIONS AND SUBMISSIONS

Parts of the work published in this thesis have been published or submitted for publication or have been presented in the following forums.

Published Peer-Reviewed Journal Articles (Appendix A)


Manuscripts under review

- **Whittle, R. J., Benson, A. C., Ullah, S. & Telford, A.** Investigating the influence of question type and cognitive process on academic performance in VCE Physical Education: a secondary data analysis; 2016; Under review

- **Whittle, R. J., Benson, A. C., & Telford, A.** Exploring context specific teacher efficacy in senior secondary (VCE) Physical Education teachers; 2017; Under review

- **Whittle, R. J., Telford, A., & Benson, A. C.** Insights from senior secondary physical education students on teacher-related factors they perceive to influence academic achievement; 2016; Under review

- **Whittle, R. J., Telford, A., & Benson, A. C.** Teachers’ perceptions of how they influence student academic performance in VCE Physical Education; 2017; Under review
Peer-Reviewed Conference Presentations

Oral Presentations (Appendix B)

- **Whittle, R.J.,** Telford, A., Benson, A.C., *An exploration of student perceptions of teacher-related factors that may influence academic performance in Unit 3 and 4 VCE Physical Education.* The joint Australian Association for Research in Education and New Zealand Association for Research in Education Conference. 30 November – 4 December 2014, Brisbane, Australia.


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<tr>
<td>ACHPER</td>
<td>Australian Council for Health, Physical Education and Recreation</td>
</tr>
<tr>
<td>ACT</td>
<td>Australian Capital Territory</td>
</tr>
<tr>
<td>AITSL</td>
<td>Australian Institute for Teaching and School Leadership</td>
</tr>
<tr>
<td>ATAR</td>
<td>Australian Tertiary Admission Rank</td>
</tr>
<tr>
<td>BGCSE</td>
<td>Botswana General Certificate of Secondary Education</td>
</tr>
<tr>
<td>CI</td>
<td>Confidence interval</td>
</tr>
<tr>
<td>CSEC</td>
<td>Caribbean Secondary Education Certificate</td>
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<tr>
<td>ES</td>
<td>Effect size</td>
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<tr>
<td>IB</td>
<td>International Baccalaureate</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and communication technology</td>
</tr>
<tr>
<td>GCE</td>
<td>General Certificate of Education</td>
</tr>
<tr>
<td>HSC</td>
<td>Higher School Certificate</td>
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<tr>
<td>NBPTS</td>
<td>National Board for Professional Teaching Standards</td>
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<tr>
<td>NCEA</td>
<td>National Certificates of Educational Achievement</td>
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<tr>
<td>NSW</td>
<td>New South Wales</td>
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<td>Northern Territory</td>
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<td>New Zealand</td>
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<td>NZQA</td>
<td>New Zealand Qualifications Authority</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>PDHPE</td>
<td>Personal development, Health and Physical Education</td>
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<tr>
<td>PETE</td>
<td>Physical education teacher education</td>
</tr>
<tr>
<td>QLD</td>
<td>Queensland</td>
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<tr>
<td>SA</td>
<td>South Australia</td>
</tr>
<tr>
<td>SD</td>
<td>Standard deviation</td>
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<tr>
<td>SES</td>
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<td>SQA</td>
<td>Scottish Qualifications Authority</td>
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<td>TCE</td>
<td>Tasmanian Certificate of Education</td>
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<td>TSES</td>
<td>Teacher sense of efficacy scale</td>
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<td>UK</td>
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<td>Victorian Curriculum and Assessment Authority</td>
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<td>Victorian Institute of Teaching</td>
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**DEFINITIONS**

<table>
<thead>
<tr>
<th>Term</th>
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<tbody>
<tr>
<td>Compulsory education</td>
<td>Period of education that is required by law for all persons.</td>
</tr>
<tr>
<td>Government/state schools</td>
<td>Schools that are government funded.</td>
</tr>
<tr>
<td>Independent/private schools</td>
<td>Schools that are privately funded.</td>
</tr>
<tr>
<td>High school</td>
<td>Period of education encompassing years 10, 11 and 12.</td>
</tr>
<tr>
<td>Middle school</td>
<td>Period of education encompassing years 7, 8 and 9.</td>
</tr>
<tr>
<td>Post-compulsory education</td>
<td>Education beyond the compulsory years.</td>
</tr>
<tr>
<td>Primary (elementary) education</td>
<td>Education from the Foundation year through to Year 6 in Australia. Approximate ages 5-12 years of age.</td>
</tr>
<tr>
<td>Secondary education</td>
<td>Education from year 7 to Year 12 in Australia. Approximate ages 13-18 years of age.</td>
</tr>
<tr>
<td>Senior secondary education</td>
<td>Final two years of post-compulsory education. Approximate ages 16-19 years of age.</td>
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Thesis summary
THESIS SUMMARY

Background

Student academic performance in senior secondary physical education may impact on a student’s opportunity to access further educational, vocational or employment opportunities. Greater accountability for schools and increased demand for places in higher education contribute to an increased focus on improving student academic achievement. Senior secondary education is characterised by increased subject specialisation, including physical education. Understanding the status and structure of senior secondary physical education courses for certification nationally, and internationally, is imperative if strategies to improve the effectiveness of the learning and teaching are to be investigated. Research has shown the strong influence of the teacher on student academic achievement. However, little is known of the teacher-related factors that influence student academic achievement in the context of senior secondary physical education.

Purpose

This PhD thesis sets out to explore teacher-related factors that influence academic performance in senior secondary physical education, specifically in the context of Victorian Certificate of Education (VCE) Physical Education. The aims, rationales, objectives, content and assessment of senior secondary physical education courses nationally and internationally were reviewed to establish the context for the research. Student performance data on the external written assessment task (examination) in VCE Physical Education were analysed in relation to question content, type and cognitive level. An understanding of the influence of self-efficacy on teacher effectiveness underpinned the rationale to determine teachers’ sense of efficacy within the context of senior secondary physical education. The perceptions of students as key stakeholders in this context were explored to identify the teacher-related factors that may influence academic achievement. Finally, teacher perceptions of how they influence student academic performance were also considered.
Review of Literature

The intention of the literature review was to understand the teacher-related factors that influence student academic performance. The review aimed specifically to identify influences on academic performance in senior secondary education and determine if these influences are consistent across contexts. Furthermore, the review sought to identify the characteristics of teacher effectiveness and what is known in relation to the specific context of senior secondary physical education.

Findings suggest that teacher-related factors are the greatest influences on student academic achievement (over which teachers have some control). Teacher-related factors have been associated with teacher effectiveness, which is a key influence on student academic achievement. However, the recommendation from this review is that teacher effectiveness is context specific, and taking a generic approach to improving teacher effectiveness is ineffectual. Teacher-related factors that influence student academic achievement are likely to be different depending on the curriculum area, content, the student and the teaching context.

Study One: Enrolment, content and assessment: a review of examinable senior secondary (16-19 year olds) physical education courses: an international perspective

A document analysis of the official curricula of 15 senior secondary physical education courses nationally and internationally was conducted to understand the current status of enrolment, content and assessment. Of the countries reviewed, available enrolment data for four of the Australian courses, Botswana, New Zealand and Scotland revealed increased numbers of students electing to undertake senior secondary physical education. Content in all 15 courses reviewed was based in both the biophysical and sociocultural fields of study. The review identified similarities in content and assessment practices and revealed that written examinations were used by 10 of the 15 courses, (including the course that is the focus of this thesis, VCE Physical Education) as the main form of external assessment. Many factors may impact on student academic success as measured
primarily through written examinations in senior secondary physical education, and therefore understanding the influences on student academic performance is imperative.

**Study Two: Investigating the influence of examination content, question type and cognitive process on academic performance in VCE Physical Education: A secondary data analysis**

Analyses of student performance data from the 2011 and 2012 external VCE Physical Education examination students (2011 n=9323; 2012 n=8781) were conducted. Student performance was not consistent across all content, question types or cognitive level. Students had difficulties answering questions based on curriculum content in ‘planning, implementing and evaluating a training program’. Students performed significantly better on multiple-choice questions. However, student performance on short answer type questions was a better predictor of overall examination performance. Low achieving students performed well below the examination mean, regardless of question type.

Ultimately, to meet the intended aims and learning objectives of VCE Physical Education, students must perform well in high-stakes assessment tasks that require content knowledge and utilisation of higher-order thinking skills. An understanding of the teacher-related factors that influence student academic performance was important to consider, as excellence in teaching has been shown to be the greatest source of variance in student academic performance.

**Study Three: Exploring context specific teacher efficacy: senior secondary VCE Physical Education teachers**

Teachers’ sense of efficacy has been shown to increase academic achievement. Based on findings of the literature reviewed conducted (Chapter 1), teacher-related factors that may influence student academic performance are likely to be context specific. Study three sought to determine the levels of efficacy of VCE Physical Education teachers. This study revealed that senior secondary
teachers of physical education in Victoria, Australia were found to have high levels of efficacy. Teacher self-efficacy was invariant of teaching experience or specifically VCE Physical Education teaching experience. The study did not reveal teacher characteristics that predicted levels of efficacy.

The link between teacher self-efficacy, teacher effectiveness and student academic performance has been determined by others, but not in the context of senior secondary physical education. Further investigation to understand the influences on students’ academic performance from the perspective of the student was required.

**Study Four:** Insights from senior secondary physical education students on teacher-related factors they perceive to influence academic achievement

Students as key stakeholders in this space should be included in the discussion of teacher effectiveness. Students clearly articulated their perception of the 'perfect' VCE Physical Education teacher as; caring, enthusiastic, knowledgeable (of subject matter), able to communicate clearly and accessible to students beyond the classroom. Teacher attitudes, attributes and student-teacher relationships were also found to be positive influences on student academic performance. Continuing the research to explore teacher beliefs, to gain further understanding of the teachers’ perspective, was considered an important aspect to pursue.

**Study Five:** Teachers’ perceptions of how they influence student academic performance in VCE Physical Education

With the previous findings from this thesis identifying the student perspective of the teacher-related characteristics perceived to influence academic achievement, it was pertinent to also explore teacher perceptions of how they influence student academic performance.

Teacher focus groups revealed a number of emergent themes, which were categorised based on a social-ecological model. Teacher-related factors that teachers perceived to influence student
academic performance included; content knowledge, expectations, passion, enthusiasm, pedagogical content knowledge and use of reflective practices to inform teaching. Furthermore, social level influences identified were positive student-teacher relationships and student access to the teacher outside of class time. The teacher perceptions of the key factors of effective teaching, in this context, draw some similarities with those identified by the students themselves.

**Overall Conclusions**

This PhD thesis establishes the prominence of senior secondary physical education courses for certification nationally and internationally, and provides evidence of the similar content and assessment practices inherent in these courses. Student-performance data revealed student performance varied by question type, cognitive process and knowledge of some content areas. To enable students to better understand content and to answer higher-order questions more effectively, and to improve performance on external assessment tasks, pre-service and in-service teachers need to develop effective teaching strategies. Teachers’ sense of efficacy was found to be high in the context of VCE Physical Education. Student and teacher perceptions of the teacher-related factors that influence academic performance in this context were found to be similar. Knowledge (of content and pedagogical approaches), connecting content to student experiences and the real-world, passion, enthusiasm, and positive student-teacher relationships were identified as important aspects of effective teaching. Additionally, both students and teachers acknowledged the importance of students having access to the teacher outside of class time as a key factor that influenced academic achievement. Further research should investigate the observed teaching practices of senior secondary physical education teachers to determine if what is delivered actually aligns with the intention of the curriculum and if how teachers deliver the curriculum exemplifies the identified teacher-related factors that influence student academic performance.
CHAPTER 1

Introduction
CHAPTER ONE: Introduction

1.1 Academic performance in senior secondary education

Maximising student academic performance in senior secondary education increases students’ opportunities for employment, training and further education [1, 2]. Greater accountability for schools and increased demand for places in higher education may contribute to an increasing focus on improving student academic performance. Much of the research conducted previously has explored factors that affect student academic performance during the compulsory years of education, specifically primary and lower secondary education. The end of compulsory education differs internationally, however it is often determined by age [2] and is generally between 14 and 18 years [3]. In Australia, depending on the state or territory of residence [4, 5], the age is between 16 - 18 years. In the United States of America (USA) and some European countries a qualification threshold exists to signify the end of compulsory education. Post-compulsory education can be defined as education undertaken beyond the compulsory years and is often completed at the senior secondary level. The term senior secondary will be used in this thesis to refer to education beyond the compulsory years. Senior secondary education prepares students for their future professional or educational career and is characterised by increased subject specialisation [6].

Previous research has identified a number of factors that influence student academic performance. The major sources of variance in student achievement have been found to be sixfold [7]; the student, home, the school, principals, peers and teachers. Other than the student themselves, the teacher is the strongest influence on student achievement; accounting for 30% of the variance in student achievement. Teacher-related factors are the greatest influence in student achievement over which teachers have some control, and the focus therefore needs to be on those factors which are modifiable [8]. Understanding what works in education is dependent on context. Therefore, it is important to determine the specific teacher-related factors that influence student academic achievement within a given context to optimise the influence of the teacher. This review
seeks to examine the current research examining teacher-related influences on student academic performance, specifically in the context of senior secondary physical education.

Little research has focused on the factors that affect student academic performance in senior secondary education. Academic performance can be defined in a number of ways; for the purpose of this research, the level of achievement demonstrated on assessment tasks for certification defines academic performance in senior secondary physical education. The assessment tasks used to determine if learning has occurred can be considered ‘high-stakes’, as the outcome has consequences for students (and other key stakeholders). Student performance is used to make decisions affecting access to further educational and employment opportunities. Research conducted by Ayres and colleagues (2004) in Australia, examined effective teaching of senior secondary certification courses (Higher School Certificate, (HSC)). They found that strategies and practices used by teachers who had students in the top 1% of the state of New South Wales, for their subject, established a classroom environment that encouraged deeper understanding rather than being exam driven. Teaching for understanding rather than teaching to the test was seen as an important influence on academic achievement, “It may be that a strong belief that the HSC should not be restrictive, and actively teaching for understanding rather than the test, is also a significant factor in successful HSC teaching.” (p.163) [9]. Teachers attributed success to their relationship with their students, their classroom practices, faculty cooperation and the students themselves [9]. While the broad context was senior secondary education, the study did not differentiate between subjects.

1.2 Senior secondary physical education

Physical education as a subject has been part of secondary school education curricula since the 1930’s [10] and examinable senior secondary courses were first introduced in Australia and England in the 1970’s [11]. Compulsory physical education has historically focussed on motor skill development and performance in physical activity. However, senior secondary physical education
is characterised as an academic discipline and draws on a number of sub-disciplines from the biophysical and socio-cultural fields [12, 13]. Senior secondary physical education is taught in a number of countries (for example Australia, Canada, Caribbean, New Zealand, South Africa, United Kingdom (UK) and the United States of America (USA)) and researchers have looked at senior secondary physical education within these local contexts (See for example in Scotland [14], New Zealand [15], Queensland and Victoria, Australia [16, 17]). Very few studies [18] have compared the different courses at the senior secondary level. A detailed review of the Canadian curriculum was conducted by Kilborn, Lorusso and Francis (2015) [19], and Hardman (2014) [20] reported on the state and status of physical education worldwide, yet the focus was not specifically on senior secondary physical education. The increasing popularity and ongoing discourse around the impact of the academicisation [21] of physical education highlights a need to identify teacher-related factors that may influence student academic performance in senior secondary physical education, to inform teacher training programs and professional learning for in-service teachers. In Victoria, Australia, the Victorian Certificate of Education (VCE) physical education course is undertaken in the final two years of secondary education and a students’ level of achievement is determined through a combination of internal and external assessment tasks. The purpose of these summative assessment tasks is to determine student levels of achievement in VCE Physical Education. However, to the researchers knowledge there has been no research to date conducted into factors that may influence student academic performance in senior secondary physical education in this context.

1.3 The notion of quality teaching

Seeking to understand influences on academic achievement begins with an understanding of quality teaching. Hattie states that “Excellence in teaching is the single most powerful influence on achievement” (p. 4) [7]. The importance of improving teacher quality (teacher excellence, expert teacher, accomplished teacher, teacher effectiveness) is seen in policy documents and governments, accrediting bodies and schools as they embrace the notion of quality teaching.
Acknowledging that quality teaching is imperative for student achievement, governments and educational accrediting bodies enact policies designed to improve teacher quality [22-24]. In the USA, the National Board for Professional Teaching Standards (NBPTS) acknowledge that quality teaching looks different depending on the subject matter and the developmental level of the students being taught. The Australian Institute for Teaching and School Leadership (AITSL) developed the National Professional Standards for Teachers [25] with the aim of improving teacher quality. The seven Standards cross three domains: Professional Knowledge, Professional Practice and Professional Engagement. Within each of these Standards, focus areas and descriptors exist that identify the components of quality teaching at four different stages in a teacher's career; Graduate, Proficient, Highly Accomplished and Lead Teacher level. These Standards focus on key elements of quality teaching:

1. Know students and how they learn
2. Know the content and how to teach it
3. Plan for and implement effective teaching and learning
4. Create and maintain supportive and safe learning environments
5. Assess, provide feedback and report on student learning
6. Engage in professional learning
7. Engage professionally with colleagues, parents/ carers and the community [25]

The AITSL Professional Standards for Teachers are generic statements that identify what is expected of teachers at various stages in their career, across all curriculum areas. How each standard is measured is not explicit nor is the criteria that constitute that the desired practices are met. It is unclear as to what impact teaching standards may have on pedagogical practice, professional learning and the overall improvement on teaching and learning [22]. The notion of quality teaching is difficult to define for the broad range of contexts found in schools [26]. What quality teaching looks like is generally different in every classroom, with every cohort of students in every subject at every year level. After decades of research, there is little consensus, and possibly more conjecture over what quality teaching looks like. There is no ‘one-size-fits-all’ definition.
Findings are inconsistent across curriculum areas, year levels and school settings, and while it is assumed that quality teaching is imperative to student academic performance, the concept of quality is often defined differently [26]. One framework for determining teacher quality includes teacher qualifications, characteristics, practices and effectiveness [27]. It is suggested that the differences seen in the literature on quality teaching can be associated with at least three teacher-related perspectives: i. teacher cognitive resources: ii. teacher performance and iii. teacher effect [26]. This kaleidoscope of ideas that contribute to an understanding of quality teaching perhaps helps to appreciate why the notion of quality is so broadly defined in policy documents and teaching standards. However, in the specific context of physical education, Penney, Brooke, Hay and Gillespie (2009) suggested that a “universal notion of quality may be neither appropriate nor helpful” (p.423) [28]. Therefore, it may be more appropriate to attempt to define quality teaching within a given context.

1.4 The importance of teacher effectiveness on academic performance

Qualities, characteristics and teaching practices that enhance student learning have been extensively researched to seek an understanding of what it is that constitutes quality teaching. Student academic performance, as argued by Cruickshank and Haefele (2001), is only one outcome of effective teaching [29]. However, at the senior secondary level, academic performance is highly regarded as a measurement of student success and may be used by a wide range of stakeholders, including students, parents, teachers, higher education institutions and employers to make decisions on the students future, such as entrance into higher education or the labour market [6]. Student study scores in VCE subjects are used to calculate an Australian Tertiary Admission Rank (ATAR), which is then used to determine opportunities for further education at a tertiary level. At the senior secondary level, it can therefore be justified that student academic performance is a reasonable indicator of teacher effectiveness.
Increases in student achievement have been attributed to teacher effectiveness [7, 30, 31]. There have been several reviews and meta-analyses that have attempted to find a suitable framework to investigate teacher effectiveness [32-36] both generally and specifically in physical education [37-40]. Effective teachers have been found to demonstrate better classroom management and to have utilised learner-centred approaches [41], placed greater emphasis on meaning versus memorisation, asked more higher-order (analysis) questions, used a broader range of instructional strategies, provided differentiated assignments, better organisation, higher expectations of their students and had fewer incidences of off-task behaviour [31].

It has been argued that a generic approach to teacher effectiveness is counter-intuitive and that there is evidence for differentiated effectiveness for different curriculum areas, student backgrounds and ability, students’ personal characteristics and different teacher roles such as pastoral and leadership [36]. Research on teacher and teaching effectiveness in specific curriculum areas has often focussed on literacy (reading & writing) and mathematics, perhaps due to the availability of standardised test results in these areas. It is unclear if understanding of effective teaching in one curriculum subject can be applied to other curriculum areas. A meta-analysis conducted by Donker et al. (2014), found that the strategies that were effective in improving academic performance differed across primary and secondary education in writing, science, mathematics and reading [33]. There is some evidence to suggest that teacher effectiveness within a single curriculum area may also differ as a result of the desired learning outcome [36]. For example, effective teaching of locomotive skills to Year 1 students in physical education is not likely to be the same as the effective teaching of acute physiological responses to physical activity to senior secondary physical education students. Effective teaching may differ depending on the content or skill being taught. Effective teachers may need to be able to draw on a range of teaching strategies that can be tailored to individual student needs that best allow students to achieve the desired learning outcomes.
Teacher and teaching effectiveness research has resulted in a number of identifiable characteristics of effective teachers and teaching. However, the limitation in compiling a list of generic effective teacher and teaching characteristics that have been shown to influence student academic performance is that there has been little consistency across the studies in terms of the methodology or frameworks used for assessing effectiveness [31, 42, 43]. These differences and limitations highlight the need for research that seeks to identify teacher-related factors that influence student academic performance specific to curriculum areas.

Despite the differences in the conceptualisation of teacher effectiveness, it is clear that teachers influence student learning. The size of this effect will vary, and logically, more effective teachers will have a greater positive effect on student outcomes than less effective teachers. In a meta-analysis of over 800 meta-analyses [42] the influences on student performance that had the greatest effect size were mostly (21 of the 30 positive effects) teacher-related.

### 1.5 Teacher-related factors influencing academic performance

Those factors over which the teacher has some control and that are more readily modified can be classified as teacher-related. Teacher-related factors that may affect the delivery of teaching and learning programs that influence student academic performance can be categorised using a social–ecological framework [44]. Examples of factors at each level are shown in Figure 1.1. Individual and social-level factors that influence teacher behaviour can contribute to student academic performance. Institutional (physical environment and policy/ organisational factors) influences are often beyond the control of the teacher and are more difficult for a teacher to modify. Attainment of excellence in the teaching of senior secondary literature in the Netherlands was reportedly hampered by external factors [23]. Similarly, perceived barriers to the delivery of a quality physical education program in secondary schools have been identified as institutional [45, 46].
Previous research has consistently demonstrated that the classroom-level and specifically what teachers know and what they do in the classroom, is more important than the school-level at influencing student learning [7, 35, 47]. The factor contributing to the largest source of variance (50%) in student academic performance are the students themselves; including their family background, socio-economic status, prior learning and motivation [8, 9, 35]. A study which examined student achievement in the final year of secondary education in Australia found that the class and teacher effects accounted for 59% of the residual variance in students’ achievement [48].

1.5.1 Educational learning theories

Teachers have clear perceptions of excellence [49], and in a study of Chinese middle school teachers, a high rate of correlation between perceptions of excellence and self-reported teaching practices were found [50]. However, in one study of senior secondary physical education teachers, self-reported teaching styles did not align with the observed teaching practices of the same teachers [51]. These findings suggest that there is a mismatch between teacher perception of what constitutes effective teaching and the reality or enactment of effective teaching. Educational theories can be used as a framework to explain and potentially understand effective teacher-related practices. Characteristics of effective teaching can not be classified exclusively into one theory or another; they are often integrated across different theories and incorporate elements from both direct instruction and constructivist approaches to contribute to successful student outcomes [35]. A myriad of teaching strategies have been found to have a positive influence (based on effect size (ES)) on student achievement, including Piagetian programs (ES=1.28), classroom discussion (ES=0.82), reciprocal teaching (ES=0.74), problem-solving teaching (ES=0.61), direct instruction (ES=0.59), peer tutoring (ES=0.55) and cooperative learning (ES=0.42) [8]. Effective teachers are able to identify the desired learning outcome and select the appropriate strategy for the context to ensure the outcomes are met.
Figure 1.1: Teacher-related factors influencing student academic performance based on a social-ecological model
Constructivism is grounded in the work of educational theorists Piaget, Vygotsky, Bruner and Dewey [52] and a constructivist approach to learning, which is often aligned with a student-centred approach. Constructivism relies on the students being actively engaged in tasks that require higher order thinking and reflective processes, and then applying their new understanding to novel situations [53]. A constructivist approach to learning is enhanced through social interactions, group work, cooperation and collaboration. It has been suggested that this approach to learning can be effective for developing higher-order thinking skills [35, 36, 54] and benefit high-ability students and those in the later stages of learning (formal operational stage of cognitive development) [55]. Student-centred learning styles have been shown to impact positively on various classroom practice characteristics [41].

There appears to be a conflict between research into learning, which supports a constructivist approach, and research into teaching, which suggests that direct instruction is the most effective method to elicit student achievement [56]. This is reinforced by Rowe (2006) [57] who identified constructivist theory as a learning theory and not a teaching theory. Rowe (2006) further suggests that as such, student-centred learning based in constructivist theory may not be effective in teaching, particularly in primary and junior secondary education [57]. Others argue [58] that authentic learning experiences enable students to connect what occurs in the classroom with their experiences in their lives. Teacher-directed approaches, underpinned by the theory of behaviourism [59], are classrooms where the teacher is in control of content and management of the class and have been shown to be effective in the acquisition of knowledge and skills [35, 57]. Yet there is insufficient evidence to suggest that students are then able to apply this understanding in novel or new situations. As the flow of information in direct instruction is one directional, with the teacher as the holder of all knowledge, that must be transmitted to the student to promote achievement. Each of these approaches to teaching and learning has merit in influencing student achievement and a number of studies have tried to identify the best way to teach and yet the findings have consistently shown that a teaching approach that incorporates a number of different
teaching styles is more effective [35, 60]. Furthermore, the selection of strategies should be determined by the teaching and learning context [33].

Instructional models for teaching physical education [61] provide a pedagogical approach that integrates curriculum, teaching strategy and assessment. Penney, Brooker, Hay and Gillespie (2009) suggest that curriculum, teaching strategy and assessment are not exclusive from how students learn [28]. Research into teaching approaches in physical education where the desired outcome is motor skill development and practical performance in movement contexts, has traditionally utilised teaching styles from Mosston and Ashworth’s Spectrum of Teaching Styles [51, 62-66]. At one end of the spectrum, teacher-centred approaches focus on reproducing knowledge and at the other, student-centred approaches are based on production of knowledge, where students are involved in the discovery and use of knowledge [60]. Research suggests that teachers perceived that they use many styles of teaching in their classes and believed the discovery styles of teaching to be effective, yet these styles were used less frequently by teachers [60]. Despite the strong emphasis on including student-centred (constructivist) instructional approaches in schools, teaching in compulsory physical education remain set at the teacher-centred end of the spectrum [51, 60, 65, 67]. Teachers prefer teacher-centred approaches as they can manage student and class time more effectively [68].

Teacher characteristics including gender, years of experience and level of qualification do not appear to predict teacher effectiveness [69]. Kulagina and Cothran (2003) found that teacher characteristics did not significantly influence teacher perceptions of the use of teaching styles [60]. In contrast, Atkopi and Karahan [67] found significant differences in teaching style preferences between male and female physical education teachers and Jaakkola and Watt (2011) found that gender, age, school level (primary, secondary and tertiary), teacher experience and the perception of their ability to use each teaching style, to be factors that affected the perceived use of different teaching styles [65]. Furthermore, senior secondary physical education teachers in Finland
reported higher use of student-centred styles and perceived these styles to be more beneficial for students. The inclusion style of teaching resulted in higher instructional time and lower activity time for students [63]. Providing students with student-centred practical experiential learning opportunities that integrate theoretical concepts is challenging for teachers of senior secondary physical education [70]. Pedagogical content knowledge for teaching theory is an important factor when considering influences on student academic performance in senior secondary physical education [71]. Discrepancies in pedagogical approach between teacher-reported use of different teaching styles and the actual styles used have been found in teachers integrating aspects of theoretical knowledge with practical performance in senior secondary physical education in Queensland (QLD), Australia [51]. It is unlikely that the objectives of the senior physical education syllabus in QLD [72] to include guided discovery, inquiry, cooperative learning and individualised instruction in the delivery of the senior secondary course are being met. The findings from SueSee and Edwards [51] cannot be transferred to other senior secondary physical education settings where student achievement is determined through written tasks, rather than practical performance in physical activity. Teachers’ perception and ability to use a variety of instructional strategies may be influenced by their sense of efficacy [73, 74].

1.5.2 Teacher sense of efficacy

Teacher efficacy has been linked to effective teaching and student achievement [73, 75-77]. Self-efficacy is an individual’s belief about their capabilities to carry out a particular course of action successfully [78] and more specifically, teacher efficacy is “the extent to which the teacher believes he or she has the capacity to affect student performance” (p.202) [74]. A teachers’ sense of efficacy reflects the confidence in their ability to overcome factors that could make learning difficult for a student. The Teachers’ Sense of Efficacy Scale (TSES) developed by Tschannen-Moran and Hoy (2001) [73] was designed to find a balance between specificity and generality, which allows for comparisons across contexts, levels and curriculum areas. The TSES considers teacher capabilities (e.g. I can craft good questions for students) and not global ability (e.g. I am a good
The TSES explores teacher beliefs about their capabilities in three areas: student engagement, instructional strategies and classroom management.

Early research into teacher efficacy suggested that there was a lack of evidence to support the link between teacher efficacy and student achievement [79]. In contrast, it has been suggested that teacher efficacy is the most important characteristic accounting for the differences in effectiveness of teachers [74]. More recently, Holzberger, Philipp and Kunter (2013) proposed that teachers’ self-efficacy is theoretically predicated to affect students’ level of performance [81]. Teachers with high self-efficacy beliefs have been found to show effective classroom management, deploy more innovative teaching methods, set higher learning goals for their students and to encourage student autonomy. There is a positive relationship between teacher efficacy and the characteristics of quality instruction [81]. If indeed these are characteristics of effective teaching practices in all curriculum areas, it therefore stands to reason that teachers with high self-efficacy beliefs are more effective teachers who will have a greater positive impact on student academic performance, and that teacher efficacy beliefs may be a determinant of positive educational outcomes for students.

Researchers agree that teacher efficacy is both context and content specific, is situation specific, and varies between and within teachers [82, 83]. A number of studies have examined the effect of variables such as gender, years of teaching experience, instructional quality, job satisfaction and stress on teacher efficacy [79, 81, 84, 85]. When looking at both teacher and school level predictors of teacher efficacy, Pas and colleagues (2012) found that teacher-related factors were better predictors for teacher efficacy than school-level factors [85]. Teacher efficacy appears to relate to the area of the curriculum being taught and the student cohort. Having a high sense of efficacy in teaching physical education in the compulsory years of education may not transfer to the same level of teacher efficacy in teaching senior secondary physical education. There has been little research on how teaching context influences teachers’ self-efficacy. Few studies have sought to determine subject-based teacher efficacy [86], or efficacy when teaching across different
year levels. Teachers in higher grade levels have reported lower teacher efficacy, [79] and primary teacher efficacy has been shown to decline in a teachers' first year of teaching [87]. This contradicts Chang and Engelhard (2016), who found that years of teaching experience did not affect levels of efficacy for teachers in primary, middle and high school settings [88]. What is understood is that teacher efficacy changes depending on the context in which teachers are teaching [89]. When determining teacher efficacy, it is important to consider the task and the context in which the teaching is performed.

While much research has been conducted to determine the link between teacher efficacy and teaching outcomes, little has been undertaken to provide insight into the relationship within the specific context of physical education [90], and none to the researchers knowledge has investigated senior secondary physical education to date. Pan et al. (2013) confirmed the positive relationship between teacher self-efficacy and teaching practices in health and physical education in primary school level physical education in Taiwan [91]. This is similar to a study conducted into the contributing factors of physical education teachers intentions to teach classes that had students engaged in high level physical activity for 50% of class time [92]. Both studies investigated teacher efficacy in practical-based classes, and its role in overcoming barriers to teaching physically active classes. It is unknown if these factors also relate to teaching theoretically based physical education at the senior secondary level.

Teacher–related factors influencing student academic performance appear to be context specific. What is not definitively known are the specific teacher-related factors that influence student academic performance and what it is that effective teachers do to maximise student academic performance within senior secondary physical education.
1.6 Teacher effectiveness and quality physical education

Quality teaching and teacher effectiveness have been researched previously [8, 30, 47, 48, 93, 94], and it is clear from research that teachers are the most influential school-based factor on student achievement. However, much of the previous research focuses on compulsory education, where programs focus on motor skill development and performance [45, 95-98]. To the researcher’s knowledge, no research has looked in isolation at senior secondary physical education. Therefore, it is unclear as to what constitutes quality or effective teaching in senior secondary physical education, and how the factors of a quality or effective senior secondary physical education teacher influence academic performance.

The United Nations Educational, Scientific and Cultural Organisation (UNESCO) defines quality physical education as the planned, progressive, inclusive learning experience that forms part of the curriculum in early years, primary and secondary education [99]. Barriers to the delivery of quality physical education in secondary schools have been identified as institutional, teacher- and student-related [38, 46, 60, 98]. Barriers to delivering a quality physical education program in primary education are often non-modifiable (beyond the control of the teacher). For example, non-specialists teaching physical education, lack of time, physical education being considered a low priority in a crowded curriculum, lack of facilities and resources and class sizes [45, 46, 100, 101]. These findings are supported by the conclusions drawn by Hardman (2014) in the final report of a world-wide survey of school physical education [20]. There are some similarities and some differences in the barriers to delivering quality physical education in primary and secondary education. However, it is more likely that in secondary school settings physical education is taught by a specialist teacher, whose training may allow them to overcome the perceived barriers more readily [46].

In his commentary on effective physical education teaching Dyson (2014) suggested that effectiveness relates to achievement of student learning outcomes and the term quality allows for
greater scope when considering the complex nature of (physical) education [39]. It has been argued that effective teaching in physical education can be measured through time on task [102], and that practice time results in learning (of motor skills). While the reverse may be true (without practice, learning of motor skills is unlikely), Rink (2013) suggests that practice is necessary but not sufficient for learning of motor skills [38]. A model in which time is central to student learning is Creemers’ (1994) comprehensive model of education effectiveness [96, 103]. Creemers and Kyriakides (2015) suggested that the influences on student achievement are multi-level: student level, classroom level, school level and context level [32]. At the student level, the relationship between time on task and opportunities taken are directly related to student achievement [32]. Teacher effectiveness in secondary practical physical education relates to student achievement of the desired learning objectives [39], and this has been closely associated with time, which is a measurable variable used for predicting student gain [45, 67, 77, 100, 104-106]. When comparing more and less effective teaching behaviours in secondary physical education, Behets (1997) identified five characteristics of effective teachers, four of which related to time: higher activity time, lower instructional time, more time spent observing students in activity, less time and attention spent on providing information for students [95]. While time practicing a motor skill does not guarantee the learning of the skill, it is unlikely for learning to occur if students are not provided with enough appropriate practice time. The fifth characteristic that is consistent across much of the research into effective teaching is feedback [38, 95, 104]. Effective physical education teachers provide more corrective feedback than less effective teachers.

The level of content knowledge, pedagogical knowledge, and what Shulman (1987) described as pedagogical content knowledge [107], (the combination of both content and pedagogical knowledge specific to the teaching context) required for effective teaching, has been disputed. To facilitate student learning, Ayvazo, Ward and Stuhr (2010) argued that a teacher must first have an in-depth understanding of the subject specific content [108]. Lack of content knowledge in physical education teachers has been associated with an inability to devise learning tasks that result in
meaningful outcomes for students [40]. Content knowledge was perceived by high ability students to be a characteristic of effective teachers [30, 36]. Yet Hattie (2003) argued that pedagogical content knowledge is more important than subject specific content knowledge [7]; that is the way in which knowledge is used in teaching situations to facilitate student learning. Pedagogical content knowledge in physical education is content and context specific [109] and You (2011) identified six components of pedagogical content knowledge (knowledge of physical education: curriculum, as a subject, assessment, teaching methods in, student learning of and instructional environments in physical education) required for excellent teaching in physical education [110].

Research has sought to determine the most effective pedagogical approaches to teaching physical education. In senior secondary physical education in Scotland, authentic learning tasks that exposed students to a board range of experiential learning opportunities are suggested to be beneficial to student learning [14, 70]. While little is known about the use and perceived influence of various teaching strategies on academic performance in senior secondary physical education, the current understanding is that effective teachers should use a range of different strategies; this finding is consistent with other curriculum areas that are classroom based [31, 33, 36].

Research into senior secondary physical education, and specifically in the VCE Physical Education context, is limited. That which has been conducted has focussed on the analysis and implementation of senior secondary physical education curriculum documentation [14, 17, 51, 111, 112], assessment [16, 113-115], inclusivity of students of all abilities [116] and perceptions of student ability [117, 118]. While there has been some criticism of the VCE Physical Education course [17, 119] the official curriculum document stipulates the content to be taught and the mode of assessment [120], yet how teachers deliver the course will be influenced by factors at the individual, social, physical environmental and policy/organisational level of the social ecological model. What remain unclear are the specific teacher-related factors that influence student academic performance in senior secondary physical education.
1.7 Aims

1.7.1 Rationale for the series of studies

The following chapters of this dissertation will review the literature associated with the current state and status of senior secondary physical education within the national and international context. Following on from this foundation, using both a quantitative and qualitative approach, a series of studies investigated the factors that influence academic performance in senior secondary physical education. The series of studies were mapped out prior to undertaking any research, however, as each study evolved, one informed the next. The review of international senior secondary physical education placed the context for the research to be undertaken in the international domain, providing evidence that the VCE PE course was not dissimilar to other courses for certification. The review also highlighted the extent to which external written examinations were used to determine student academic achievement and therefore provided a rationale for the analysis of examination data. The findings of the secondary data analysis provided insight into the academic performance of students based on content and cognitive processing of senior secondary physical education students. The findings of the data analysis informed the next phase of the research; understanding the influences on student academic performance. Teacher efficacy had previously been identified as an influence on student academic performance. However, in the specific context of senior secondary physical education, teacher efficacy was unknown. Therefore, the state-wide survey was developed. The survey revealed interesting data with respect to pedagogy that was then further investigated from the student and teacher perspective in focus groups and drawing annotation.

The primary aim of the research presented in this thesis was to identify teacher-related factors that influence academic performance in VCE Physical Education and to investigate teacher and student perceptions of effective teaching in senior secondary physical education.
1.7.2 Research aims

The sequence of studies aimed to:

i. establish the current status of enrolment in senior secondary physical education courses internationally and develop an understanding of the similarities and differences in course rationales, aims and objectives, content, learning outcomes and assessment practices.

ii. determine if student performance on the external assessment task (examination) for VCE Physical Education varied by Area of Study (content area) and investigate the relationship between student performance in each of the four Areas of Study examined and overall examination performance.

iii. identify the influence of question type (multiple-choice or short answer) and cognitive process (remember, understand, apply, analyse, evaluate and create) on students overall performance on the VCE Physical Education end-of-year external written examination.

iv. determine levels of self-efficacy in senior secondary VCE Physical Education teachers and investigate factors that may influence teacher self-efficacy in this context.

v. investigate student perceptions of the characteristics of the ‘perfect’ teacher of Units 3 and 4, VCE Physical Education.

vi. explore student perceptions of effective teaching practices in Units 3 and 4, VCE Physical Education.

vii. explore teacher perceptions of teaching and learning practices, which may influence student academic performance in Units 3 and 4, VCE Physical Education.
CHAPTER 2

An international review of senior secondary
(16-19 year olds) physical education courses
CHAPTER TWO: An international review of senior secondary (16-19 year olds) physical education courses

2.1 Preface

Given the specific context in which the research was to be conducted, a review of national and international senior secondary physical education courses was undertaken to accurately determine the current status of enrolment, content and assessment in senior secondary physical education courses for certification. The purpose of this document analysis was to provide data on the context in which the research was to be conducted, allowing data collected in subsequent studies to be contextualised. The findings of this review were in turn used to guide the following studies in this thesis, through the generation of survey and focus group questions. This chapter is based on a document analysis of 15 senior secondary physical education courses offered in Australia and internationally. The manuscript that this chapter is based on has been accepted for publication in The Curriculum Journal [121].

2.2 Introduction

Physical education as a subject has been part of the academic program in secondary schools world-wide since as early as the 1930s [10] and examinable physical education courses were first introduced in England and Australia in the 1970s [11]. New Zealand initiated physical education to the senior-secondary (year 12) certificate course in 1975, and then in 1989 into year 13 national qualification course [122]. Scotland followed closely with physical education appearing in senior secondary courses in the early 1990s [123]. Senior secondary education is defined in this context as the final two to three years (generally 16-18 year olds) of secondary education.

School physical education has been under the microscope for many years as it contends with issues and concerns of subject status, crowded curricula, curriculum time allocation, lack of resources and facilities and teacher qualification [20]. Senior secondary physical education courses have evolved over time to reflect the social, political and cultural values deemed
significant of the time [19], resulting in the accredited courses currently offered. For example, a number of researchers have reported on the rise of compulsory accredited awards in physical education within the curriculum framework for 14-19 year olds in the United Kingdom (UK) [21, 124, 125]. In the UK there are a number of awarding organisations that develop courses based on the framework for General Certificate of Education (GCE) Physical Education [126], yet there is little commentary on the Advanced (A) level national qualification. The GCE A level award is a senior secondary education course of study designed to develop deep content knowledge, skills and understanding of physical education for those students planning on further study in higher education [127]. In Australia, accredited courses for certification in senior secondary physical education were first introduced in 1975 [128] in Queensland (QLD). All states and territories in Australia offer an accredited senior secondary physical education course, the most recent inclusion being Physical Education Studies in the Western Australian Certificate of Education (WACE) in 2007 [113]. Much of the research has investigated the role of assessment in senior secondary physical education, particularly in Queensland, Australia [115, 129] and issues of gender and social construction surrounding ability [117, 118]. In a recent curricula analysis of Canadian physical education [19], the focus of the research was physical education curriculum in the compulsory years (Grades 1 – 9).

Curricula analysis is a suitable lens through which to investigate the knowledge and skills, learning objectives and tasks designed to assess learning to explore the current state and status of examinable physical education. The scope of this review was confined to courses where curricula documentation was available in English and encompassed courses with titles including physical education, exercise and sport science, kinesiology and human movement (the full inclusion criteria are explained in the method section). It is therefore the aim of this review to contribute to the international discussion on senior secondary physical education curricula and provide greater understanding of the similarities and differences in the stated course rationales, aims and objectives, content, learning outcomes and assessment practices.
Over a decade ago the state and status of physical education in schools was reported to be in a perilous position worldwide [101, 130], and these concerns, particularly in relation to policy and implementation of physical education, persist today [20, 131, 132]. However, the number of senior secondary accredited physical education courses globally is increasing [124, 133] and based on numbers of students studying senior secondary physical education, compared to other subjects, senior secondary physical education has experienced continued and rapid growth in popularity [21, 134]. The development of examination courses in physical education have contributed to the improved status and standing of physical education as an academic subject [135]. The growing popularity of examinable physical education does not alleviate all of the issues that surround the teaching of senior secondary physical education. The debate surrounding what is worthwhile knowledge in physical education, the status of physical education as an academic subject and the role of physical activity within senior secondary physical education [136] were identified over a decade ago. In more recent years, Green (2008) suggested that there are issues around gender, standards of attainment, teacher capability of teaching examinable physical education, the impact of examinations on curricula and the continuing discussion on the academicisation of physical education [21].

The emergence of physical education as an academic discipline in tertiary educational settings has resulted in the development of the subject at the senior secondary education level [71]. Physical education as an academic discipline [12] draws upon many sub-disciplines that can be categorised as either biophysical (functional anatomy, biomechanics, exercise physiology, motor control) or socio-cultural (sport and exercise psychology, pedagogy, sociology, history and philosophy of sport and physical activity). The content in senior secondary physical education for this review has been classified using the model presented by Abernethy et al. (2013) [13]. It is acknowledged that the academic discipline model fails to account for the importance of play, enjoyment and pleasure in physical education [137] and has been attributed to the demise of practical physical education
However, the integration of the sub-disciplinary fields identified in the Abernethy model can be viewed as evolutionary [13], with others [139] also previously calling for the sciences and social sciences to move toward a cross or multidisciplinary focus.

Knowledge development (in human movement) can be said to be influenced by research and scientific traditions [140] and tied to specific interest groups. The focus on developing knowledge to improve performance in movement skills has contributed to the scientisation of physical education [141]. The privileging of scientific knowledge and the academicisation [138] of physical education is reflected in senior secondary physical education curricula globally. With the emergence of examinable senior secondary physical education came criticism of theoretical knowledge overshadowing practical knowledge [142], and the production of teachers better suited to teaching senior secondary physical education [143]. The prediction made by Reid (1996) that the ways in which physical education would be conceived and taught have in essence occurred [142]. Senior secondary physical education does not, for the most part, focus on student participation in games, sports, physical activity and exercise but considers human movement within these contexts.

Little is known of the views of pre- and in-service teacher perceptions of examinable physical education. Initially, teachers may have had some resistance to the emergence and growth of examinable physical education and continue to face barriers when implementing new curricula [144, 145]. For recently qualified teachers examinable physical education is now the norm [138], yet recent findings suggest that completing examinable physical education as a high school student does not provide greater content knowledge or understanding in pre-service physical education teachers [125]. Inclusion of physical education at the senior secondary certification level demonstrates that it holds the same status as other subjects, contributing equally to the qualification and/or certification in senior secondary education. Rink and Mitchell [146] suggested that when senior secondary physical education is included in high-stakes assessment it “counts”, is accountable and student achievement is assessable. In contrast, physical education in Grades 11
and 12 is compulsory in Singapore, however the subject is not examinable. Physical education is not viewed as academically rigorous in Singapore and is perceived to be inferior to other examination subjects as it doesn't "match the perceived academic significance" (p.24) [147]. Although, more recently, a number of Singaporean schools are now offering GCE A Level curriculum and the International Baccalaureate [148], allowing access to a senior secondary physical education course that contributes to certification and/or qualification.

Curriculum, defined in this context as the knowledge and skills students are expected to learn, the learning objectives, and the tasks designed to assess learning, is in a constant state of flux [149]. Senior secondary physical education has seen numerous reviews and consultative processes that have resulted in the official curricula documents mandated for implementation in schools. This review aims to establish the current status of enrolment in senior secondary physical education courses internationally and develop a greater understanding of the similarities and unique differences in the rationales, aims and objectives, content, desired learning outcomes and assessment practices of accredited senior secondary physical education courses for certification, to allow continued dialogue and positing of the implications of senior secondary curricula on learning and teaching.

2.3 Method

A review of the student enrolment numbers, rationales, aim and objective statements, content and assessment practices of curricula documents produced by the accrediting or governing body responsible for accredited senior secondary physical education courses were conducted.

2.3.1 Inclusion criteria

Countries included in this review were those identified as native English speaking countries [150] and where curriculum documentation was available in English. The common language was selected to assist in the comparison of each of the senior secondary physical education courses.
Senior secondary physical education, for the purpose of this review, was used as an umbrella term to encompass all physical education, exercise and sport science, kinesiology and human movement courses offered that met the inclusion criteria. Grade or School Year level configurations vary slightly between countries. For the purpose of this review senior secondary education included the final two years of secondary/high school education (Grades/Year 11 and 12 or 13). In some instances, certification was achievable at different levels. For example, in New Zealand, students are able to achieve the National Certificates of Educational Achievement (NCEA) at Level 1, 2 or 3 depending on the difficulty of the standards achieved. Students generally complete Levels 2 and 3 in Years 12 and 13, their final two years of secondary education. A further award (Scholarship) recognises high performing students but does not contribute to the NCEA qualification [151]. Countries that offered an accredited course for certification in physical education at the senior secondary level were identified. Countries and courses that were not found to meet these criteria, including vocational programs and compulsory practical physical education courses required for credit toward a qualification threshold, were excluded from the review. For example, in the USA and in Canada’s 10 provinces, physical education is offered at the senior secondary level and students must gain the required number of credits in physical education for graduation. These courses were not reviewed, as they are compulsory courses that do not have an assessable component. In contrast, the province of Ontario offer Exercise Science as an optional accredited university preparation course in Grade 12 [152] that was included in this review.

Government departments of education and qualification authorities in each of the identified countries were accessed electronically and the relevant web sites were navigated to retrieve enrolment data, curriculum and assessment documentation. Countries used an array of terms to describe the curriculum documents that detailed the rationales, aim and objective statements, content and assessment practices of senior secondary physical education courses. These included terms such as course specifications (Scotland), syllabus (Caribbean, New South Wales (NSW) and QLD, Australia), course framework (Australian Capital Territory, ACT) and subject outline (South
Australia, SA). Additionally, student enrolment data were obtained for senior secondary physical education courses identified in the literature.

2.3.2 Data analysis

In sum, a total of 15 sets of senior secondary grade physical education curricula were retrieved. A document analysis [153] of the curricula was used to undertake a methodical review of the material to gain an understanding and develop empirical knowledge [154] of the rationale, aims and objectives, content and assessment strategies used in senior secondary physical education courses for certification internationally. The document analysis combines a content and thematic analysis of the data [153]. An iterative process of examination of the documents, reading and interpretation occurred. Data were compared and inspected to establish meaning so that patterns could be identified, text coded to appropriate themes and data organised into substantive categories. The data were then arranged into major themes: i. course structure, ii. rationales, aims and objectives, iii. content and iv. assessment. From this point, similarities and differences were identified in the documents to identify patterns in the data. Subject content was categorised using Abernethy et al. (2013) conceptualisation of the structure of knowledge in the discipline of human movement [13]. Within this model, content was classified as biophysical (including functional anatomy, biomechanics, exercise physiology, motor control) or sociocultural (including sport and exercise psychology, pedagogical, sociological, historical, philosophical, political and cultural aspects of physical activity). Courses that had an explicit intention to deliver content in an integrated manner had the content classified across both or all sub-disciplines. Units of study that encompassed the skills, strategies and techniques that enable individuals to participate in physical activity or play sport effectively were categorised as ‘performance in physical activity’. These units included topics such as ball games, athletics, dance, gymnastics and adventure/outdoor recreation activities.
2.4 Results

2.4.1 Student enrolment in senior secondary courses

The number of students electing to undertake senior secondary physical education (Table 2.1) is increasing in four of the six Australian states and territories, New Zealand and Scotland where the subject is a familiar part of senior secondary accredited courses for certification. Specifically, in Victoria, Australia, enrolments in senior secondary physical education increased by 33% between 2004-2014. While drawing on a much smaller cohort of senior secondary students, the number of candidates who undertook Advanced Higher Physical Education in Scotland between 2010 and 2014 [155] increased by 53% (Table 2.1). New Zealand has seen a 25% increase in student uptake in physical education at Level 3, (final year) of the NCEA. Limited student enrolment data (2012-2014) for Botswana General Certificate of Secondary Education (BGCSE) Physical Education showed a small (8%) increase in student numbers [156]. Enrolment data was not publically available for courses offered in Western Australia, Ontario, Canada, Caribbean and South Africa.

2.4.2 Rationale, aims and objectives of senior secondary physical education courses

Each course reviewed provided an overall rationale statement for physical education in the senior secondary context. From the constant comparative analysis, it was apparent that despite some differences in the articulation of the rationale, the overarching premise for the inclusion of a senior secondary course for certification in physical education was for students to examine the interrelationships between physiological, biomechanical, psychological, motor development and sociocultural factors affecting performance and participation in physical activity. Courses in the Caribbean, NSW and Western Australia (WA), Australia and New Zealand included a
TABLE 2.1: Total number of candidates undertaking senior secondary physical education in the exit year, 2004-2014

<table>
<thead>
<tr>
<th>Year</th>
<th>ACTBSSS Exercise Science&lt;sup&gt;a&lt;/sup&gt;</th>
<th>HSC PDHPE&lt;sup&gt;b&lt;/sup&gt;</th>
<th>QCE PE&lt;sup&gt;c&lt;/sup&gt;</th>
<th>SACE Physical Education&lt;sup&gt;d&lt;/sup&gt;</th>
<th>TCE Sports Science&lt;sup&gt;e&lt;/sup&gt;</th>
<th>VCE PE&lt;sup&gt;f&lt;/sup&gt;</th>
<th>NCEA&lt;sup&gt;g&lt;/sup&gt;</th>
<th>SQA Advanced Higher Physical Education&lt;sup&gt;h&lt;/sup&gt;</th>
<th>GCE A-level Physical Education&lt;sup&gt;i&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>505</td>
<td>14396</td>
<td>11404</td>
<td>2256</td>
<td>525</td>
<td>10220</td>
<td>4807</td>
<td>162</td>
<td>13198</td>
</tr>
<tr>
<td>2013</td>
<td>411</td>
<td>13887</td>
<td>10888</td>
<td>2180</td>
<td>564</td>
<td>9819</td>
<td>4704</td>
<td>144</td>
<td>15013</td>
</tr>
<tr>
<td>2012</td>
<td>499</td>
<td>13307</td>
<td>11192</td>
<td>2274</td>
<td>531</td>
<td>9456</td>
<td>4383</td>
<td>121</td>
<td>17135</td>
</tr>
<tr>
<td>2011</td>
<td>422</td>
<td>14283</td>
<td>11243</td>
<td>2439</td>
<td>584</td>
<td>10091</td>
<td>4057</td>
<td>112</td>
<td>19607</td>
</tr>
<tr>
<td>2010</td>
<td>454</td>
<td>13497</td>
<td>11308</td>
<td>2878</td>
<td>559</td>
<td>10140</td>
<td>3998</td>
<td>106</td>
<td>21304</td>
</tr>
<tr>
<td>2009</td>
<td>390</td>
<td>12726</td>
<td>10733</td>
<td>2865</td>
<td>567</td>
<td>9594</td>
<td>3831</td>
<td>21609</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>393</td>
<td>12871</td>
<td>10475</td>
<td>2969</td>
<td>9657</td>
<td></td>
<td></td>
<td>22344</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>374</td>
<td>12409</td>
<td>10544</td>
<td>2976</td>
<td>8989</td>
<td></td>
<td></td>
<td>21527</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>353</td>
<td>11936</td>
<td>10055</td>
<td>3056</td>
<td>8651</td>
<td></td>
<td></td>
<td>21533</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>318</td>
<td>10944</td>
<td>9576</td>
<td>2811</td>
<td>8328</td>
<td></td>
<td></td>
<td>19759</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>10453</td>
<td>9344</td>
<td>2738</td>
<td>7704</td>
<td></td>
<td></td>
<td></td>
<td>19234</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- PE (Physical Education);
- ACTBSSS (Australian Capital Territory Board of Senior Secondary Studies) [157];
- BOSNSW (Board of Studies, NSW) [158];
- QCE (Queensland Certificate of Education) [159];
- SACE (South Australian Certificate of Education) [160];
- TCE (Tasmanian Certificate of Education) [161];
- VCE (Victorian Certificate of Education) [162];
- NCEA (National Certificate of Educational Achievement) [163];
- SQA (Scottish Qualifications Authority) [155];
- GCE (General Certificate of Education), A-level (Advanced level) [164].
rationalisation on the importance of cultural, social, emotional, intellectual, physical and spiritual development of students. Distinct differences were seen in the rationale for senior secondary physical education in Scotland where the development of the students’ movement and performance skills was the context for the application of knowledge and understanding of the factors that impact on performance.

Overarching educational learning outcomes in addition to developing subject specific knowledge and skills were evident in the aims and objectives of each of the courses reviewed. The aims and objectives were categorised as knowledge and understanding of content, development of higher-order thinking skills (such as the ability to analyse and evaluate), critical and creative thinking skills (including problem solving skills), research and investigative skills, affective outcomes (including interpersonal skills such as leadership, communication and cooperation), information and communication technology (ICT) skills, development of lifelong health and well-being and performance in physical skills. The diversity and breadth of the aims and objectives of senior secondary physical education courses are shown in Table 2.2.

2.4.3 Senior secondary physical education course structure

The review of the curriculum documents focussed explicitly on enrolment, content and assessment. A brief overview of the structure of the senior secondary courses in each of the countries provided contextual information for the review; however, further exploration of the structure of the course specifications was not possible within the scope of this review.

Senior secondary physical education courses reviewed could be undertaken in one or two years (Table 2.3). The only course where the first year of study is a prerequisite for the second year is Personal Development, Health and Physical Education (PDHPE) undertaken in NSW, Australia. Sport and Exercise Science (South Africa) and Introductory Kinesiology (Ontario, Canada) are one-year courses, offered in the final or exit year of secondary education. The International
Baccalaureate is a two-year course but students must complete both years. The units of study in some courses are designed to be stand-alone (for example VCE Physical Education, Scottish Qualifications Authority (SQA) Physical Education) and the sequencing of units is often determined by local conditions, including teacher discretion.

The awarding body may stipulate the required teaching hours for senior secondary physical education courses for certification. For some courses (for example VCE Physical Education, Tasmanian Certificate of Education (TCE) Sports Science, Caribbean Secondary Education Certificate (CSEC) Physical Education and Sport), the recommended time allocation to deliver units of study is provided. The International Baccalaureate stipulate in the course guide the required number of teaching hours for each component of the syllabus [165]. Other senior secondary physical education courses stipulate the number of hours needed to deliver a unit of work, the percentage of course time that should be allocated or the equivalent number of credits [126, 166, 167].

2.4.4 Content of senior secondary physical education courses

Each of the courses reviewed organised content under descriptive headings that grouped like or associated concepts. For example, each of the courses reviewed included 'energy systems' within their units. In some courses this content was covered in an exercise physiology unit (Western Australian Certificate of Education (WACE) Physical Education Studies), in others a unit on health and fitness (Botswana General Certificate of Secondary Education (BGCSE) Physical Education) or factors impacting on performance (SQA Physical Education). Analysis of the content within each of the courses enabled the units to be classified based on content. The approach to the grouping of concepts differed slightly between countries but essentially the content covered in each of the senior secondary physical education courses addressed the biophysical, sociocultural and/or performance elements of human movement. Table 2.3 summarises the content covered in each of the senior secondary physical education courses reviewed.
2.4.5 Assessment practices in exit year of senior secondary physical education courses

A review of the assessment tasks used in senior secondary physical education courses for certification revealed that student achievement is determined through a variety of internally set (school-based) and externally set tasks. A summary of the assessment practices and relative weightings of the internal and external assessment tasks used in the final (exit) year of the course are shown in Table 2.4. Most courses used a combination of internal and external assessment with the exception of ACT and QLD, Australia, NCEA Level 3, New Zealand and Ontario, Canada where 100% of the assessment is school-based. In contrast, the New Zealand Scholarship, a monetary reward for high achieving students in their final year of secondary education, is the only award where student academic achievement is determined entirely from an externally assessed task. Scholarship is assessed on the same curriculum levels as NCEA Level 3, however, the required standard of performance is more sophisticated. Students are expected to demonstrate high-level critical thinking, abstraction and generalisation, and to integrate, synthesis and apply knowledge, skills, understanding and ideas to complex situations with separate assessment required of the students [168].

Internal assessment task requirements differ across all senior secondary physical education courses reviewed. The guidance provided by governing bodies of each curricula usually stipulate the type of assessment tasks, the weightings for each task or outcome and provide advice on compulsory tasks. Practical tasks such as practical laboratories, oral presentations and physical activity tasks were often identified as internal assessment tasks. Practical tasks differ from personal physical performance but may involve collection, analysis and evaluation of data from involvement in a physical activity, sport or exercise.

A point of variation between senior secondary physical education courses internationally is the assessment of student performance of physical movement skills. A number of courses across different countries assess students' performance of a physical activity or movement skill (Table
2.4). The weighting of the physical performance-based assessment component varies between 30 and 60% (Table 2.4).

Externally set written examinations were used in 10 of the 15 courses reviewed (Table 2.4). Written examinations across the courses reviewed had similar formats; assessing students through a series of multiple-choice questions, short answer and extended responses. Questions used a variety of stimulus material including images and data presented in tables and graphs. Examination questions were often set within a sporting or physical activity setting, often with a local context. Other external assessment tasks included a project (Scotland) and a report (New Zealand, Scholarship Award). Both the senior secondary physical education courses in Western Australia and the Caribbean Islands assess students' physical performance in selected activities through an external practical exam. Assessment of physical performance involved the demonstration of proficiency in sport specific skills and conditioned performance in a competitive (game play) situation. For example, in WACE Physical Education Studies, students perform a series of drills followed by a modified game.
### TABLE 2.2: Comparison of course aims and objectives in senior secondary physical education courses for certification

<table>
<thead>
<tr>
<th>Country</th>
<th>Course</th>
<th>Knowledge and understanding of content</th>
<th>Contribution to individual and social health and well-being</th>
<th>Development of movement skills</th>
<th>Affective outcomes</th>
<th>Development of critical and creative thinking skills</th>
<th>Development of higher-order thinking skills</th>
<th>Development of research and investigative skills</th>
<th>Development of ICT skills</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Australia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian Capital Territory</td>
<td>ACTBSSS Exercise Science&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>New South Wales</td>
<td>HSC Personal Development, Health and Physical Education&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Queensland</td>
<td>QCE Physical Education&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>South Australia and Northern Territory&lt;sup&gt;a&lt;/sup&gt;</td>
<td>SACE/NTCET Physical Education&lt;sup&gt;d&lt;/sup&gt;</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Tasmania</td>
<td>TCE Sports Science&lt;sup&gt;e&lt;/sup&gt;</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Victoria</td>
<td>VCE Physical Education&lt;sup&gt;f&lt;/sup&gt;</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Western Australia</td>
<td>WACE Physical Education Studies&lt;sup&gt;g&lt;/sup&gt;</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Botswana</td>
<td>BGCSE Physical Education&lt;sup&gt;h&lt;/sup&gt;</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
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</tr>
<tr>
<td>Canada</td>
<td>Introductory Kinesiology&lt;sup&gt;i&lt;/sup&gt;</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Ontario</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caribbean</td>
<td>CSEC Physical Education and Sport&lt;sup&gt;j&lt;/sup&gt;</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>New Zealand</td>
<td>NCEA Level 2 and 3 (including Scholarship) Physical Education&lt;sup&gt;k&lt;/sup&gt;</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>South Africa</td>
<td>NSC Sport and Exercise Science&lt;sup&lt;l&lt;/sup&gt;</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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</table>
United Kingdom

<table>
<thead>
<tr>
<th>England and Wales</th>
<th>GCE AS and A Level Physical Education</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>No</th>
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<td>Scotland</td>
<td>SQA Advanced Higher Physical Education</td>
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<td>Body systems</td>
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<td>Factors affecting equity and access at the individual, interpersonal, institutional, structural and cultural level</td>
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<td>Fitness (1/2)</td>
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<td>Performance enhancement and recovery practices (2/2)</td>
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<td>Monitoring and promotion of physical activity (2/2)</td>
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<td>Performance enhancement and recovery practices (2/2)</td>
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<td>Physically active lifestyles (1/2)</td>
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<td>Ball games (1/2 and 2/2)</td>
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<td><strong>Optional units</strong>&lt;br&gt;- Dance&lt;br&gt;- Gymnastics&lt;br&gt;- Martial arts/combative sports&lt;br&gt;- Swimming&lt;br&gt;- Track and field/athletics</td>
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<td><strong>Option A (1/2 and 2/2)</strong>&lt;br&gt;- Dance&lt;br&gt;- Gymnastics&lt;br&gt;- Martial arts/combative sports&lt;br&gt;- Swimming&lt;br&gt;- Track and field/athletics</td>
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<td><strong>Option B (1/2 and 2/2)</strong>&lt;br&gt;- Badminton&lt;br&gt;- Golf&lt;br&gt;- Squash&lt;br&gt;- Table tennis&lt;br&gt;- Tennis</td>
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<td><strong>Option C (1/2 and 2/2)</strong>&lt;br&gt;- Basketball&lt;br&gt;- Cricket&lt;br&gt;- Football&lt;br&gt;- Hockey&lt;br&gt;- Netball&lt;br&gt;- Rugby&lt;br&gt;- Volleyball&lt;br&gt;- Softball/baseball</td>
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<td>NCEA Level 2 and 3 (including Scholarship) Physical Education</td>
<td><strong>Movement concepts and motor skills (1/2 and 2/2)</strong>&lt;br&gt;- Personal health and physical development (1/2 and 2/2)</td>
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<td><strong>Healthy communities and environments (1/2 and 2/2)</strong>&lt;br&gt;- Movement concepts and motor skills (1/2 and 2/2)&lt;br&gt;- Personal health and physical development (1/2 and 2/2)&lt;br&gt;- Relationships with other people (1/2 and 2/2)</td>
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<td>NSC Sport and Exercise Science</td>
<td><strong>Anatomical and biomechanical principles (1/1)</strong>&lt;br&gt;- Physical growth and motor development (1/1)&lt;br&gt;- Sport and exercise physiology (1/1)</td>
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<td><strong>Psycho-social and ethical considerations (1/1)</strong></td>
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<td><strong>Applied anatomy and exercise physiology (1/2 and 2/2)</strong>&lt;br&gt;- Biomechanical movement (1/2 and 2/2)&lt;br&gt;- Skill acquisition (1/2 and 2/2)&lt;br&gt;- The role of technology in physical activity and sport (1/2 and 2/2)</td>
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<td>England and Wales</td>
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<td><strong>Sport psychology (1/2 and 2/2)</strong>&lt;br&gt;- Sport and society (1/2 and 2/2)</td>
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<td>SQA Advanced Higher Physical Education</td>
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<td><strong>Factors impacting on performance (1/2 and 2/2)</strong>&lt;br&gt;- Mental, emotional, social and physical factors</td>
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<td><strong>Performance skills (1/2 and 2/2)</strong></td>
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International Baccalaureate Sports, Exercise and Health Science – Diploma Program

### Core (1/2 and 2/2)
- Anatomy
- Energy systems
- Exercise physiology
- Measurement and evaluation of human performance
- Movement analysis
- Skill in sport

### Optional units (1/2 and 2/2)
- Nutrition for sport, exercise and health
- Optimising physiological performance
- Physical activity and health

### Optional units (1/2 and 2/2)
- Psychology of sport

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Notes: The Victorian Certificate of Education (VCE) is offered in Victoria, Australia and also in parts of South Africa, China, Saudi Arabia and Bahrain, Timor Leste and Vanuatu (VCAA, 2015); Scholarship is an assessment that provides recognition and monetary award for top students in the final year of secondary education in New Zealand. Students elect to enter Scholarship and approximately 3% achieve the award [179]; General Certificate of Education (GCE) Physical Education is offered England, Wales and in a number of countries world-wide through British-International schools and private providers.
### TABLE 2.4. Comparison of internal and external assessment weightings in the final (exit) year of senior secondary physical education courses

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<th>Country</th>
<th>Certification Course</th>
<th>Internal assessment</th>
<th>External assessment</th>
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<td><strong>Australia</strong></td>
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<tr>
<td>Australian Capital Territory</td>
<td>ACTBSSS Exercise Science&lt;sup&gt;a&lt;/sup&gt;</td>
<td>50-80% written tasks</td>
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<td>20-50% practical tasks*</td>
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<tr>
<td>New South Wales</td>
<td>HSC Personal Development Health and Physical Education&lt;sup&gt;b&lt;/sup&gt;</td>
<td>50% variety of tasks (3 – 5) with no more than 50% weighting to be allocated to tests and examinations</td>
<td>50% written examination</td>
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<tr>
<td>Queensland</td>
<td>QCE Physical Education&lt;sup&gt;c&lt;/sup&gt;</td>
<td>100% written tasks, research tasks, physical performance#</td>
<td>n/a</td>
</tr>
<tr>
<td>South Australia and Northern Territory&lt;sup&gt;a&lt;/sup&gt;</td>
<td>SACE/NTCET Physical Education&lt;sup&gt;d&lt;/sup&gt;</td>
<td>50% physical performance</td>
<td>30% written examination</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20% folio</td>
<td></td>
</tr>
<tr>
<td>Tasmania</td>
<td>TCE Sports Science&lt;sup&gt;e&lt;/sup&gt;</td>
<td>58% practical and written tasks</td>
<td>42% written examination</td>
</tr>
<tr>
<td>Victoria</td>
<td>VCE Physical Education&lt;sup&gt;f&lt;/sup&gt;</td>
<td>50% practical and written tasks</td>
<td>50% written examination</td>
</tr>
<tr>
<td>Western Australia</td>
<td>WACE Physical Education Studies&lt;sup&gt;g&lt;/sup&gt;</td>
<td>15% physical performance</td>
<td>15% physical performance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>35% written tasks</td>
<td>35% written examination</td>
</tr>
<tr>
<td>Botswana</td>
<td>BGCSE Physical Education&lt;sup&gt;h&lt;/sup&gt;</td>
<td>50% physical performance</td>
<td>40% written examination</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10% written task</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ontario</td>
<td>Introductory Kinesiology</td>
<td>100% tasks vary</td>
<td>n/a</td>
</tr>
<tr>
<td>Caribbean Islands</td>
<td>CSEC Physical Education and Sport&lt;sup&gt;i&lt;/sup&gt;</td>
<td>45% practical skills</td>
<td>30% written examination</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10% class project</td>
<td>15% physical performance</td>
</tr>
<tr>
<td>New Zealand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NCEA Level 3 Physical Education&lt;sup&gt;j&lt;/sup&gt;</td>
<td>100% practical and written tasks</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>Scholarship – Physical Education</td>
<td>n/a</td>
<td>100% report</td>
</tr>
<tr>
<td>South Africa</td>
<td>NSC Sport and Exercise Science&lt;sup&gt;k&lt;/sup&gt;</td>
<td>25% practical tasks</td>
<td>75% written examination</td>
</tr>
</tbody>
</table>

<sup>a</sup> Science<sup>a</sup> with 50-80% written tasks and 20-50% practical tasks<sup>a</sup>.

<sup>b</sup> HSC Personal Development Health and Physical Education<sup>b</sup> with 50% variety of tasks (3 – 5) with no more than 50% weighting to be allocated to tests and examinations.

<sup>c</sup> QCE Physical Education<sup>c</sup> with 100% written tasks, research tasks, physical performance#.

<sup>d</sup> SACE/NTCET Physical Education<sup>d</sup> with 50% physical performance and 20% folio.

<sup>e</sup> TCE Sports Science<sup>e</sup> with 58% practical and written tasks.

<sup>f</sup> VCE Physical Education<sup>f</sup> with 50% practical and written tasks.

<sup>g</sup> WACE Physical Education Studies<sup>g</sup> with 15% physical performance and 35% written tasks.

<sup>h</sup> BGCSE Physical Education<sup>h</sup> with 50% physical performance and 10% written task.

<sup>i</sup> CSEC Physical Education and Sport<sup>i</sup> with 45% practical skills and 10% class project.

<sup>j</sup> NCEA Level 3 Physical Education<sup>j</sup> with 100% practical and written tasks.

<sup>k</sup> NSC Sport and Exercise Science<sup>k</sup> with 25% practical tasks.
United Kingdom

England
GCE A Level Physical Education
30-50% physical performance
50-70% written examination

Wales

Scotland
SQA Advanced Higher Physical Education
30% physical performance
70% project

International Baccalaureate
Sports, Exercise and Health Science – Diploma Program
24% practical tasks
76% written examinations

*practical tasks include laboratory and investigative tasks, case studies, oral reports, debates, seminars and field trips
*physical performance tasks include application of motor skills in the performance of physical activities and a student's physical response to the demands of the physical activity undertaken

ACTBSSS – Australian Capital Territory Board of Senior Secondary Studies, [169];
QCE- Queensland Certificate of Education, [72];
SACE – South Australian Certificate of Education, [171], NTCET - Northern Territory Certificate of Education and Training;
TCE - Tasmanian Certificate of Education, [172];
VCE – Victorian Certificate of Education, [120];
WACE – Western Australian Certificate of Education, [173];
BGCSE – Botswana General Certificate of Secondary Education, [174];
Ontario Ministry of Education [152];
CSEC – Caribbean Secondary Education Certificate, [175];
NCEA – National Certificate of Educational Achievement, [166];
NSC – National Senior Certificate, [176];
GCE – General Certificate of Education, [126];
SQA – Scottish Qualifications Authority, [167];
Northern Territory adopts the SACE Physical Education course

2.5 Discussion

The findings of this review suggest that there are more similarities in the aims, objectives and rationales, content and assessment practices prescribed in official curricula documents than differences in senior secondary courses internationally. The similarities identified in the courses reviewed may be a result of policy borrowing which can occur when there is a shared educational agenda [180]. Kilborn, Lorusso and Francis (2015) suggest that the analysis of curricula documents can provide an interesting lens through which to view social, political and cultural values [19]. The results of the curricula analysis suggest that, in the countries reviewed, senior secondary physical education maintains an equal status with mainstream academic subjects in courses for certification and is, in terms of student uptake, in a healthy state. In Scotland, England, and some Australian states, the development of senior secondary physical education programs for certification are well established [18]. Most recently, GCE A-level Physical Education was reviewed and reaccredited for implementation in 2016 and similarly in Victoria, Australia, the VCE Physical Education course underwent review in 2015 and a revised curriculum is due for implementation in
2017-18. Additionally, New Zealand introduced assessed senior secondary physical education over 30 years ago [15], with the most recent changes to the assessment of the Scholarship award implemented in 2015. Other recent developments have seen the introduction of Physical Education Studies in the WACE (2008), Sports, Exercise and Health Science to the International Baccalaureate Diploma Program in 2012, and Physical Education and Sport to the CSEC in 2012 in the Caribbean Islands.

2.5.1 Student enrolment in senior secondary physical education

Student enrolments in senior secondary physical education represent continued growth of the subject in the ACT, NSW, QLD and Victoria, Australia and New Zealand. This trend is consistent with the healthy and steadily increasing [181] number of candidates who undertook Advanced Higher Physical Education in Scotland between 2010 and 2014 [155]. Further evidence of the inclusion of physical education in senior secondary courses for certification is seen in the International Baccalaureate (IB). Sports, Exercise and Health Science (SEHS) was offered at the Standard level in the IB for the first time in 2012, with the first examinations held in 2014 [165]. Student enrolment in the IB Sports, Exercise and Health Science course increased from 864 to 1424 students in the second year of implementation [182]. Student uptake of the SEHS standard course, delivered in schools world-wide, has been the impetus for the development of the Higher level course, which is due to be offered for the first time in 2017. In contrast, A-level Physical Education in England and Wales experienced rapid and sustained growth from its inception in 1985 through to 2008 [21]. However, as with some states in Australia (South Australia and Tasmania) which have experienced small decreases in student numbers, student numbers in A-level Physical Education have declined (Table 2.1). Green (2008) has previously suggested that a contributing factor to this issue may be that attainment of the top (A* and A) grades in physical education is more difficult for students than in other subjects [21]. A decrease in the number of students undertaking physical education in their final year of secondary schooling in British Columbia, Canada, has also been attributed to difficulty in achieving high marks [183]. It is beyond
the scope of this review to identify student reasons for subject selection in senior secondary education, however from the limited previous research into influences on students’ subject selection; gender, enjoyment, expectation for success and university entrance requirements are reported to be important influences [184-186]. It may be of interest for future research to identify influences on students’ selection of physical education in senior secondary education.

2.5.2 Rationale, aims and objectives of senior secondary physical education courses

This review revealed expansive aims and objectives (Table 2.2) of the senior secondary physical education courses, some of which go beyond those achievable through mastery of subject-specific content knowledge. These findings suggest that, from a curricula policy perspective, there is a consensus of what outcomes (and knowledge) are valued in senior secondary physical education courses and agreement on the educational objectives that are important. However, similar to previous discourse surrounding the role physical education plays in education [128, 143, 187, 188], the question raised may well be, are we trying to do too much? While there may be consensus of the learning objectives in senior secondary physical education, the extent of the desired outcomes may place senior secondary physical education in a similar position as compulsory physical education, where by the expectations for student learning have resulted in what Kulinna (2008) calls a muddled mission for the subject [189]. Cognitive skills including higher-order thinking, critical and creative thinking, problem solving, decision-making, analysis and evaluation are assessed within the context of physical education. Further to these are the physical performance based movement skills and affective outcomes including communication, cooperation and other interpersonal skills. Additionally, physical education is to contribute to the lifelong health and well being of individuals and communities in eight of the courses reviewed. Physical education has been entrusted with the responsibility of developing motor skills and sport skills, social development of students and more recently in addressing public health problems [190]. The adoption of contemporary education objectives may be an astute political move [191], however, it does raise questions regarding the role of senior secondary physical education. Subject
specialisation is a feature of senior secondary education [6], yet the desired learning outcomes reach beyond subject specific knowledge and skills. The physical education syllabus in QLD, Australia, expects students to develop attitudes and values, and state that this objective is expected to be developed through the teaching and learning program offered to students. How and if these attributes are assessed in senior secondary physical education is not clear in the documentation reviewed. This raises a conflict between the stated aims and objectives of the course and the content and assessment.

The implication for teachers of senior secondary physical education is that beyond a thorough knowledge of subject matter, combined with the pedagogical content knowledge, teachers also need to be equipped with strategies to develop students affective, critical, creative, Higher-order thinking, investigative and ICT skills. Preparation of pre-service teachers to teach senior secondary physical education effectively must include opportunities such as teaching placements that enable them to teach and observe senior secondary classes, combined with a thorough understanding of subject specific content and pedagogical content knowledge.

The common rationale for senior secondary physical education was to understand the interrelationships between biomechanical, physiological, psychological, sociological and motor development factors that influence movement. On paper at least, senior secondary courses for the most part, are integrating knowledge to deliver a multidisciplinary approach to physical education. The integration of concepts was most clearly seen in the courses prescribed in New Zealand and Scotland. In New Zealand, content is delivered across four strands that integrate biophysical and sociocultural concepts. The enactment of this evolving curriculum continues to challenge teachers to deliver a meaningful physical education curriculum through a critical pedagogical approach [112]. In Scotland the mental, emotional, social and physical factors affecting performance are integrated and examined within the same unit. The TCE Sports Science (Tasmania, Australia) curriculum document states that interrelationships exist between topics, and students are required to identify and explain these complex relationships. The synthesis of content across sub-disciplines
and the extent to which the study can be interdisciplinary can be seen as an indicator of the maturation of the discipline [13]. The use of the term interrelationships in curricula documents demonstrated that decision makers and curriculum writers see interdisciplinary study as a desirable direction for physical education to take [13, 192]. However, it is the implementation of the curriculum that reflects the ways in which an interdisciplinary approach is being achieved.

The course rationale’s state the basis for the course, and provide broad overarching statements regarding the integration of theory with participation in practical activities. A small number of course documents (see for example those from New Zealand, QLD, Australia and Scotland), provide teachers with suggestions on how student learning should occur. Implementing a critical pedagogy in a practical subject, as suggested in the New Zealand curriculum, is challenging for teachers [112]. Previous research has shown that stipulating how to deliver curriculum does not always results in the desired outcome [51] and that teachers perceptions of curricula enactment may not align with what is occurring in the classroom. Further research that investigates how teachers enact official curriculum documents may provide further insights about the ability of teachers to put policy into practice.

The emphasis on the integration of theoretical understanding and practice to explore the biophysical and sociocultural interrelationships [13] between concepts to improve performance in physical activity, sport or exercise is represented in many of the curricula documents analysed. For example, the VCE Physical Education curriculum document suggests that the study “enables the integration of theoretical knowledge with practical application” [120]. Similarly, the NCS Sport and Exercise Science course states that an understanding of the human body during physical activity is essential [176]. This is dissimilar to an early review of the senior secondary syllabus in QLD, Australia, where the language of the curriculum document was said to have perpetuated the dichotomy, doing little to integrate the theoretical knowledge with the practical skills [193]. The reality, in New Zealand as reported by Bowes (2010), [15] and in senior high schools in the UK [143], is that the senior secondary physical education courses are dominated by theory-based
lessons. Favouring theoretical work over physical performance based practical learning has been seen as a way for senior secondary physical education to be validated [112]. The findings of this review show that senior secondary courses primarily determine student achievement through written tasks that require application of theoretical concepts that demonstrate knowledge of how to improve and enhance performance in physical activity. However, the use of movement as a prevailing medium for learning in senior secondary physical education [194] cannot be discarded, regardless of whether it is a directly assessable component of the course or not. These differences in practical versus physical performance-based components of senior secondary physical education may well signal a divide between those who hold on to the notion of a physically educated person being highly skilled and highly competent in motor skills and those who accept the status quo of examinable physical education in the senior years. The prevalence of written assessment tasks in senior secondary physical education suggests that performance in practical physical activities (knowing how), does not hold the same educative worth as propositional or theoretical knowledge [142].

All courses for certification described aims and objectives, assessment tasks and content that integrated practical tasks. The intent of the senior secondary physical education curricula is for learning to occur through practical activities, including but not limited to, movement experiences based on physical performance. However, some curricula explicitly state the learning through movement expectations; for example the QLD senior syllabus states that in physical education “physical activity serves as both a source of content and data and the medium for learning” (p.1) [72]. This is in direct contrast to the Sports Science course offered in Tasmania that states that it is a theoretical course [172].

The ability of teachers to interpret curriculum documents and deliver meaningful learning experiences for students at this level may be problematic. Teachers of the Higher Still Physical Education course in Scotland (this course preceded the Advanced Higher course reviewed here),
responded to the demands of examinable senior physical education courses in one of three distinct ways:

1. Assessment pressures determined methodology and quality of student learning experiences (a dichotomous theory/practical split)
2. Teaching and assessment practice was narrowly focussed on rote-learning prescriptive assessment answers
3. Physical performance-led teaching environments, where feedback was effectively built into teaching and learning, and students were highly motivated and engaged [114]

Importantly it was students from this third group who completed assessment in the manner intended by the Higher Still Physical Education curriculum, achieving high standards; suggesting that when curricula is interpreted correctly, teaching and learning programs are developed that allow for meaningful learning to occur, with accurate and authentic assessment possible.

2.5.3 Content in senior secondary physical education

The growth of examinable physical education has lead some to question how physical education is defined [15]. Although it may be difficult to define physical education [192, 195], this review recognises physical education as an academic discipline [12]. Henry (1964) drew criticism that defining physical education in this way would be detrimental to the future of the subject as the body of knowledge of the discipline is not the subject matter taught in school [196]. Curricula documents suggested that the composition of the field of study in physical education at the senior secondary level included “certain portions of such diverse fields as anatomy, physics and physiology, cultural anthropology, history and sociology, as well as psychology” (p.14) [197]. All courses reviewed contained aspects of both the biophysical and sociocultural foundations of physical education. Social construction of curricula and the valuing of one form of knowledge over another suggests that the content included (or not) in curricula documents may reflect the distribution of power-relations [149] and what is valued by some is in fact what Ennis (1997) called the dreaded
curriculum; a curriculum that is ridiculed or feared by a particular group or individual [198]. What is currently embedded in senior secondary education is what Reid (1996) unfavourably described as the new orthodoxy, where theoretical knowledge informs and underpins the physical performance element and provides the basis for educational credibility in physical education [142].

Science-based, physical performance (training, workloads, intensity etc.) orientated discourse has long been privileged over participation (equality, involvement, enjoyment, social justice etc.) in physical education [139], particularly in senior secondary courses. This was evident in a majority of the courses analysed in this review; biophysical content was emphasised in core units. Not surprisingly, courses that have adopted the Exercise Science designation (see ACT, Tasmania, South Africa and the IB) include limited sociocultural aspects, often in the optional units offered. Notably, units of study, with the exception of the courses offered in New Zealand, were generally silos of discipline-based knowledge, with little indication of how the complex relationships between the topics were to be interrelated. The connections to be made were not found in the review of content conducted.

Curriculum construction requires a compromise between competing interests [149], yet the value placed in biophysical knowledge [190] and the trend of the scientisation and academicisation of physical education has shown no signs of changing. The quest for legitimacy in academic status has seen many elements of a traditional physical education program removed from senior secondary curricula. Games, sport, athletics, dance and gymnastics for example, appear only in the curricula of the BGCSE and CSEC Physical Education and Sport courses. The Caribbean Examinations Council specifically stated that the course places heavy weighting on practical work and authentic experiences [199]. Much research in physical education has focussed on the authentic assessment of students [114, 194, 200, 201], yet the interrelationships highlighted in the course rationales are rarely seen in the assessment tasks.
2.5.4 Assessment in senior secondary physical education

The notion that (sport) performance aspects of physical education are academically unpalatable [195] may provide some explanation for the demise of physical performance-based assessment in senior secondary physical education. Although six of the curricula assess the physical performance of students, assessment in performance based subjects has been reported to be fraught with a number of issues including teacher perceptions of student ability [117, 202] and the misappropriation of the criteria and standards in official curricula documents [115]. For these reasons, some caution must be taken with internal assessment in high-stakes contexts. In New Zealand (excluding Scholarship Award), QLD, Australia (amidst recommendations for an external assessment task in all final year subjects [203]), ACT, Australia and Ontario, Canada, all assessment is internally set and assessed. A combination of internal and external assessment tasks in the exit year is a more common approach (Table 2.4). Assessment can be viewed as a process that can promote student learning [204], and while the weighting of internal to external assessment may differ, this combination of assessment is thought to promote fairness and assess a wider range of student outcomes [205, 206]. Teacher developed assessment tasks allowing for flexibility in task design are thought to better match the content taught in class. Continuous formative assessment may provide a clearer picture of student achievement than summative assessment conducted at only one point in time [6]. Internal assessment allows greater exploration of areas which cannot be easily assessed in an external written examination [207]. However, some evidence suggests that teacher-based assessment tasks focus on low order thinking skills to a much greater extent than those tasks developed by external accreditation bodies [208]. Moderation of school-based internal assessment is used to determine comparability across schools. For example in the ACT, Australia, moderation of internal assessment tasks occurs through a consensus-based peer-review as well as statistical moderation [169]. However, in Victoria, Australia, student performances in the internal assessment tasks are moderated against their performance in the external assessment task (examination).
Schools and teachers develop internal assessment tasks that utilise the techniques stipulated by the governing body. Authentic assessment tasks are characterised by the production rather than reproduction of knowledge [114] and should be based in movement, integrate concepts and contexts in real-world settings [204]. Policy-makers and curriculum writers have embraced this notion with the range and scope of assessment tasks utilised in senior secondary physical education. Teachers in New Zealand select the most appropriate assessment for the context, learners and focus area [166]. Most of the courses reviewed provided scope within the internal assessment of senior secondary physical education to use a variety of assessment tasks that may include practical tasks that were not physical performance-based, as well as written responses, to assess student understanding of key concepts. The degree to which teacher constructed tasks are authentic is a further line of inquiry beyond the scope of this review.

It has been reported that assessment of practical learning is marginalised and does not legitimise physical education as a senior subject the same way theoretical assessment does [15]. In New Zealand, the written examination previously undertaken by Scholarship students has been replaced with an externally assessed report. The proposed change of assessment mode was based on the rationale that examinations are constrained by curriculum and that to set a fair and valid examination in Scholarship physical education is challenging as the learning contexts are diverse [209]. In contrast, the original examination format was lauded as well-advanced from traditional physical education assessments such as fitness test scores and decontextualised motor skill tests [15] and reported to reward students who were able to recount and critically evaluate embodied experiences in physical education [15].

Assessments commonly require students to demonstrate knowledge, understanding and application of the key concepts through written tasks. Thorburn (2007) suggests that once again this is a quest for academic recognition, as high-stakes assessment can be a mechanism for the valuing of a subject or aspects of a subject [18, 210]. Historically, the practical nature of physical education has proved problematic with an increase in the use of high-stakes examinations as an
assessment tool; making an integrated teaching and learning approach to the curricula more difficult to implement [14]. Physical performance is assessed in only six of the 15 courses reviewed. The academicisation and professionalisation of physical education has been perceived by some as the demise of practical physical education [138] by substituting it for theoretical or academic work. The analysis of assessment tasks utilised in the senior secondary physical education courses reviewed indicated that written tasks and particularly written examinations were prevalent (Table 2.4). Examinations provide reliable information on student performance, however, there are concerns over the impact that examination for assessment has on the quality of learning experiences for students [211]. High-stakes assessment of senior secondary physical education courses provides accountability. However, it has been suggested that it is also a strong driver of teaching content and can serve to narrow the curriculum when teachers feel obligated to teach to assessment requirements [15]. This can result in a lack of breadth and depth of learning for students and an over reliance on teacher-centered approaches to transmit knowledge, thus limiting student experiences through practical learning. Examinations also fail to consider the connections between different areas of content, limiting students ability to integrate concepts, often assessing student knowledge in silos [211]. Focused exam-driven teaching practices have been found to be valued by upper secondary students preparing for final examinations [212]. However, even in the context of high-stakes examinations, effective teachers of senior students reported that promoting interest in and understanding of the subject was important [9].

Assessment can influence how (the process) [129] content is taught, and therefore alignment of the assessment tasks with the aims and objectives of senior secondary physical education is essential. The alignment of curriculum, pedagogy and assessment is paramount to a quality physical education program [28, 204]. An integrated approach to the delivery of a senior secondary physical education course may be problematic when assessment of physical performance is separate to the assessment of theoretical concepts in physical education. In all courses where there is a physical performance assessment requirement (New Zealand, England, Scotland, Western Australia and South Australia), physical performance is assessed independently of the
assessment of other areas of the course. The integration of assessment of theoretical concepts with practical learning tasks may require a written reflection by the student on their involvement in physical activity to demonstrate understanding. The use of technology to record the student’s participation in the activity could be used to enable students to view the footage during an assessment task to provide a context for a written response. Through participation in tasks that provide opportunities to experience, observe and reflect on performance, students may begin to connect and integrate the theoretical and practical aspects of the course, as intended by the curricula documents.

Findings from this review identified the current curriculum and assessment practices of senior secondary physical education courses nationally and internationally. Further research is now needed to investigate the pedagogical approaches utilised by practising teachers to ascertain the degree to which the alignment of these three key factors (curriculum, pedagogy and assessment) is occurring in schools.

Senior secondary physical education courses are, on paper at least, capable of developing a broad and diverse range of student learning outcomes. If teachers are able to deliver the senior secondary physical education courses reviewed as intended, and achieve the non-subject specific aims, is difficult to ascertain and certainly beyond the scope of this review. In the countries reviewed, with similar curricula at the senior secondary level, the issues surrounding the transferring of curriculum policy into meaningful student learning that extends knowledge and understanding through a physical learning experience and which is supported by accurate and authentic assessment continues to be a major challenge [18, 116].

A document analysis provides a purely theoretical perspective of senior secondary physical education. It has enabled the identification of commonalities and differences in the aims, objectives and rationales, content and assessment. A limitation of a theoretical approach is that the lived experiences of the teachers and students for which the documents are intended cannot be
captured. This review has identified the current state and status of senior secondary physical education through the analysis of curriculum documentation and provides a context for further research. An understanding of how teachers implement and deliver prescribed curricula effectively to enhance student academic achievement is worthy of further exploration in the context of senior secondary physical education.

2.6 Conclusion

This review confirmed the rapid growth of senior secondary physical education and its place in accredited courses for certification. Senior secondary physical education is holding its own amongst other academic subject, perhaps to the detriment of the quantity of opportunities for student participation in physical activity in many of the courses reviewed. From the analysis of course aims and objectives, the expected outcomes for students of senior secondary physical education ranged from subject specific knowledge and skills through to an array of additional general educational objectives including affective outcomes, critical, creative, Higher-order thinking, research and ICT skills. There is consistency in the rationale of the theoretical foundation of physical education at the senior level, with an intended focus on the complex interrelationships between the biophysical and sociocultural factors influencing physical performance and participation. The alignment of the intended rationale with the prescribed content is not clearly evident in all the courses reviewed, with much of the content prescribed in stand-alone units. Assessment tasks varied between each of the courses reviewed. However, most used a combination of internal and external assessment, with the external component most commonly an end-of-year written examination; highlighting that propositional knowledge is favoured in senior secondary physical education. It is clear that senior secondary physical education is underpinned by a different theoretical premise than that of compulsory physical education and, as such, what constitutes effective teaching in senior secondary may be different to that of compulsory physical education. Future research could now focus on investigating if the intent of curricula documentation translates to how teachers interpret and deliver senior secondary physical
education in the classroom or gymnasium, and the implications this has for learning and teaching in senior secondary physical education.

Further research in the specific context of senior secondary physical education is needed to develop greater understanding of the degree to which curricula documentation is aligned with current teaching practice and how content, assessment tasks and teaching strategies align to maximise the learning outcomes for students. The review of international senior secondary physical education courses revealed the extensive use of written tasks for assessment, particularly the use of external written examinations. VCE Physical Education utilises an external examination to partially determine student academic performance. When considering the factors that influence student academic performance in this context, it is imperative to consider the examination itself. Content of examinable senior secondary physical education courses privileges theoretical concepts, and this is reflected in the content, question types and cognitive outcomes contained in the examination. Exploration of student performance on the external examination based on the theoretical content may provide some insight into the relationship between academic performance and content knowledge. The following two chapters investigate student performance on the exam based on the content examined (Chapter 3), the type of question used and the cognitive processing requirements of the question (Chapter 4).
CHAPTER 3

Student performance in high-stakes examinations based on content area in VCE Physical Education
CHAPTER THREE: Student performance in high-stakes examinations based on content area in VCE Physical Education

3.1 Preface

Prior to investigating factors that influence student academic performance in VCE Physical Education it was essential to first establish how students were actually performing in this context, and if the composition (content examined) and the structure (question type and cognitive level) of the assessment task influenced student performance. The external written examination in VCE Physical Education is the common assessment task completed by all students in their final year of secondary education and examination data is collected by the Victorian Curriculum and Assessment Authority (VCAA). A secondary data analysis was conducted on the 2011 and 2012 VCE Physical Education examination data to identify the influence of content (Chapter 3) and question type and cognitive level (Chapter 4) on student performance in the external written examination in VCE Physical Education. This knowledge informed the design of questions used to explore teacher perspectives of influences on student academic performance. Chapter 3 is based on a paper published in the peer-reviewed journal Physical Education and Sport Pedagogy (Appendix A) [213].

3.2 Introduction

Senior secondary physical education curricula have continued to evolve since the introduction of physical education into senior secondary courses for certification some 30 years ago [11, 21]. Curriculum is defined here as the academic content, student learning objectives (key knowledge and skills expected of students) and the assessments used to evaluate student learning. Curriculum is influenced by social, political and educational developments [214]; and curriculum change in the context of senior secondary physical education is essential to ensure content is contemporary, student learning outcomes maximised and assessment practices are valid for determining certification of students. Achievement of learning outcomes is reflected in student academic performance in senior secondary education and can determine access to further
educational or employment opportunities. Greater accountability for schools and increased demand for places in higher education may contribute to an increasing focus on improving student academic achievement. The (un)intended consequences for schools of student performance in high-stakes assessment have been discussed in detail elsewhere [215-218]. The role that student performance data, specifically examination data, can play in informing teaching practice [219] and improving teacher effectiveness which in turn may increase student achievement [7, 220] has been previously established. However, in the context of VCE Physical Education the role examination data can play in informing teaching practice is unknown.

The alignment of curriculum, pedagogy and assessment in the context of senior secondary physical education can be explored based on the framework presented by Penney, Brooker, Hay and Gillespie (2009) [28]. This framework allows for issues associated with each dimension (curriculum, pedagogy, assessment) and the influence they have on each other to be considered. Knowledge of the historical influences on the development of senior secondary physical education courses enhances our understanding of the curriculum as it evolves, and the context in which it operates can help in understanding potential changes to content and assessment that are needed [221-223].

Traditionally, physical education has been a physical performance based subject (for example, development of motor skills and physical fitness). However, with the emergence of senior secondary courses for certification, course content has privileged theoretical concepts over physical performance and participation, which is reflected in the assessment of cognitive outcomes of courses internationally. Courses in all states and territories in Australia, Botswana, Ontario, Canada, Caribbean Islands, England, New Zealand, South Africa, and Scotland and in countries that offer the International Baccalaureates Sports, Exercise and Health Science program, assess cognitive outcomes. Six of these courses assess performance in physical activity. Historically, the structure of senior secondary physical education courses for certification reflected the ethos of
senior secondary education providing physical education with an equal status to other academic subjects [134].

The conceptual framework proposed by Arnold [224] has shaped curriculum development in senior secondary physical education [225]. With the intent of curricula engaging student learning through, in, and about movement, as suggested by Arnold (1979) [224], international senior secondary physical education courses for certification have an underlying rationale of integrating physical performance with theoretical concepts. The intention of Arnold’s framework was not for the three dimensions to be mutually exclusive, however, difficulty in successfully implementing curricula documents based on the framework suggest that it is not well understood [51, 225, 226]. Learning and teaching tasks that integrate theoretical concepts with practical experiences that also meet assessment requirements that primarily persist in determining student academic performance through written assessment tasks is challenging for teachers [18, 123]. Written examination questions may well engage with only the third aspect of Arnold’s framework; that of examining knowledge about movement. Scenario based examination questions may be effective in identify student knowledge attained through or in movement when questions require students to draw on knowledge gained through practical experiences.

The cognitive demand of examination questions need to align with the cognitive demand of the environment for which the task is preparing the student if it is to be an authentic task [227]. As discussed by Thorburn and Collins (2006), the pursuit for authentic achievement (and assessment) in senior secondary physical education involves experiential learning [114]. Using a student-centred approach, experiential learning places experience at the centre of the learning process [228] and is well positioned to integrate practical and theoretical knowledge. Based on constructivist theory, experiential learning is situated to engage students in a process designed to enhance learning [229]. In Western Australia, where practical performance is examined externally, the content areas are dichotomously examined [113], suggesting that authentic assessment where practical and theoretical knowledge is integrated [230] is difficult to achieve.
Questions may be raised about written examinations in senior secondary physical education not providing students with authentic assessment. Yet the assessment of theoretical content is regarded as an appropriate gauge of student knowledge, particularly in high-stakes assessments [6, 203, 231]. The construction of authenticity in high-stakes assessment must include higher-order thinking, specific content knowledge and emulation of real-world activities [200]. However, there is inherent danger when assessment tasks are dressed up to appear authentic. The expectations for students must be clear and link to the nature of the content knowledge [114, 200].

Previous research in the context of senior secondary physical education has explored the extent to which the intent of curriculum documents is enacted by teachers [17, 112, 116, 144]. Many aspects of assessment, including teacher perceptions of student ability [117, 118, 202], use of standards based assessment [115], authentic assessment in performance based subjects [16, 204, 230] and the integration of curriculum, pedagogy and assessment, specifically in a Scottish context have been explored [14, 18, 70, 114, 194, 232]. The aim of this study was therefore to investigate student performance in high-stakes assessment practices in the context of VCE Physical Education.

3.2.1 Curriculum development in senior secondary physical education

Senior secondary curricula in Australian states and territories are reviewed for reaccredited on a cyclic basis. Amongst other ongoing reviews, Victoria (Australia), New Zealand, Scotland and England have reviewed and made changes to their senior secondary physical education curriculum in recent years. There is disparity seen in a number of senior secondary physical education courses where the teaching and learning is intended, and may well occur in a practical performance context, but assessment, particularly high-stakes assessment, requires written evidence of student learning. The review and consultation process undertaken by each of the countries stated previously have resulted in changes to the assessment components of the course
with little change (if any) to the content to be delivered. Through this consultation process, the General Certificate of Education (GCE), Advanced Subsidiary (AS) level, and Advanced (A) level Physical Education courses offered in England, Wales and in a number of international schools, has maintained an external written examination (70%). The remaining 30% of the total marks available is allocated to non-examination formats. The current Higher and Advanced Higher Physical Education offered in Scotland shifted from a course underpinned by a practical experiential rationale to a course which aims for students to research, critically analyse and evaluate factors that underpin and impact on performance [18]. Similar to GCE AS and A-Level Physical Education, the current Scottish course maintains a physical performance component of assessment (30%), however, the examination has been replaced with a project designed to assess students’ ability to integrate and apply skills, knowledge and understanding of performance skills and factors impacting on performance [177].

The change in assessment in Scotland is comparable to the change in assessment in the Scholarship Award in New Zealand, where candidates previously completed a written examination which had been considered “well-advanced from some traditional physical education assessments” (Bowes [15]. Assessment in the Scholarship Award is now conducted through an evidence-based report on a topic selected from the physical education curriculum that demonstrates high-level critical thinking, abstraction and generalisation that integrates, synthesises and applies knowledge, skills, understanding and ideas to complex situations. These developments across senior secondary courses internationally demonstrate changing approaches to the task but rarely the modality of assessment. Students in senior secondary physical education typically require the ability to demonstrate knowledge and skills of the content stipulated in official curricula documents through written assessment tasks.

Since the inception of senior secondary examinable physical education in Victoria, Australia, in the early 1980s, the course has evolved through a number of cyclic reviews, consistent with the Victorian Curriculum and Assessment Authority (VCAA) policy (the VCAA is an independent
authority responsible for the development of courses, curriculum and assessment products and services at the senior-secondary level of education in Victoria, Australia). The most recent of these reviews was undertaken in 2015, resulting in revisions to the curriculum documentation due for implementation in 2017-2018. Historically, senior secondary physical education in Victoria emphasised propositional knowledge at the expense of physical activity participation and performance [136], ensuring the course established and maintained academic credibility. This is not dissimilar to other courses internationally that required examinable senior secondary physical education courses to be framed theoretically [233]. The introduction of the Victorian Certificate of Education program in 1991 aimed to situate the biophysical understandings alongside sociocultural understandings of physical education. While maintaining some biophysical content knowledge, the VCE Physical Education course was at the time, considered innovatory for its inclusion of content situated firmly in the sociocultural realm [136].

The introduction of the VCE program in 1991 aimed to situate the biophysical understandings alongside the sociocultural understandings of physical education. While maintaining some biophysical content knowledge, the VCE Physical Education course was at the time, considered innovatory for its inclusion of content situated firmly in the sociocultural realm [136]. As reflected in previous commentary of senior secondary physical education in Victoria, [17], the intent of the original (1991) VCE course was to integrate the biophysical with the sociocultural and to marry the relationship between physical activity and theoretical knowledge through the tasks undertaken by students. This intent was not dissimilar to the revised VCE Physical Education course (2011): “The study enables the integration of theoretical knowledge with practical application through participation in physical activities.” (VCAA, 2010, p.7). Concerns surrounding the integration of theoretical and practical knowledge have been previously documented [17, 18, 230, 232, 234] and continue to be problematic in teaching and assessing practical based subjects. Despite the debate surrounding what is worthwhile knowledge in senior secondary physical education and the place of physical activity in examinable physical education, courses that emphasise theoretical knowledge
over performance in physical activity, sport and exercise continue to have high student enrolments in Victoria, Australia (VCAA 2003; 2013).

3.2.2 VCE Physical Education course content

The current senior secondary physical education course (2011–2016) offered at the senior secondary level, in Victoria, Australia, comprises four units of study, equating to 50 hours of classroom teaching (or one semester) and is structured to be completed over a two-year period, usually the final two years of senior secondary education (years 11 and 12). Students’ level of achievement in the exit year (year 12; Units 3 and 4) is determined through a series of internal (50%) and external (50%) assessment tasks. The internal tasks are set and assessed by the classroom teacher. The external task is an externally set and marked end-of-year examination. The external examination serves a duplicate purpose, contributing to a student’s level of achievement in VCE and acting as a tool against which the internal tasks can be moderated. The examination is set and assessed by a panel appointed by the VCAA and questions are a representative sample of the course content drawn from the four Areas of Study in Units 3 & 4. Students are assessed on their understanding and application of the key knowledge and skills, as stated in the official curriculum document [120], that underpin the outcomes in Units 3 and 4. The respective weighting of each of the four Areas of Study are shown in Table 3.1. The format of the examination is determined by the VCAA and currently comprises 15 multiple-choice questions (worth one mark each) and short answer questions (105 marks), a total of 120 marks. Questions on the examination are designed to assess student ability to analyse, apply, compare and contrast, describe, design, evaluate, explain, identify, justify, observe, participate in, perform and report across each Area of Study. Examination items may be scenario based and/or refer to a variety of stimulus material such as tabulated data, graphs or images, and questions may have multiple parts that increase in cognitive demand. A full version of the 2011 and 2012 examination papers may be accessed on the VCAA website [235].
TABLE 3.1: Content in Units 3 and 4 VCE Physical Education and respective examination weighting

<table>
<thead>
<tr>
<th>Unit</th>
<th>Content covered in each Area of Study</th>
<th>Exam weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 3</td>
<td>Physical activity participation and physiological performance</td>
<td>50%</td>
</tr>
<tr>
<td>Area of Study 1 (20%)</td>
<td>Monitoring and promotion of physical activity</td>
<td>Subjective and objective methods for assessing physical activity and sedentary levels.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Advantages and limitations of each method to determine the most appropriate measure for a given setting.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Components of the social-ecological model.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Government and non-government strategies aimed at increasing physical activity within the population.</td>
</tr>
<tr>
<td>Area of Study 2 (30%)</td>
<td>Physiological responses to physical activity</td>
<td>Systems and mechanisms associated with the energy required for human movement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cardiovascular, respiratory and muscular systems and the roles of each in supplying oxygen and energy to the working muscles.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Energy production via the three energy systems and the associated fuels used for activities of varying intensity and duration.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Factors that contribute to fatigue and recovery strategies used to return to pre-exercise conditions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Energy system usage during physical activity.</td>
</tr>
<tr>
<td>Unit 4</td>
<td>Enhancing performance</td>
<td>50%</td>
</tr>
<tr>
<td>Area of Study 1 (30%)</td>
<td>Planning, implementing and evaluating a training program</td>
<td>Components of fitness and assessment of fitness from a physiological perspective.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Training principles and methods.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activity analysis to determine the fitness requirements of a selected sport or physical activity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assessment of fitness.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Training program design and evaluation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chronic adaptations to the cardiovascular, respiratory and muscular systems.</td>
</tr>
<tr>
<td>Area of Study 2 (20%)</td>
<td>Performance enhancement and recovery practices</td>
<td>Nutritional, physiological and psychological strategies used to enhance performance.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal and illegal substances and methods of performance enhancement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anti-doping codes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strategies used to promote recovery, including nutritional, physiological and psychological practices.</td>
</tr>
</tbody>
</table>

Previous research [17, 18, 114, 234] has identified issues in senior secondary physical education that suggest the misalignment of curriculum, pedagogy and assessment. The purpose of this study was to determine whether student performance on the external assessment task (examination)
varied by Area of Study (content area). Additionally, the study investigated whether there was a relationship between student performance in each of the four Areas of Study examined and overall examination performance. Within the broader context of the alignment of curriculum, assessment and pedagogy, the findings of the secondary data analyses are considered and discussed. The implications the findings may have on the teaching of VCE Physical Education in the future, the training of pre-service physical education teachers and the professional development opportunities provided to in-service (practicing) teachers are discussed.

3.3 Method

A secondary data analysis was performed using the 2011 and 2012 VCE Physical Education examination data obtained, with permission, from the VCAA. Secondary data analysis by definition uses data collected previously for a purpose other than the current investigation [236]. The VCAA is the holder of all data on student achievement in senior secondary education across the government, catholic and independent school sectors [237]. The data analysed in this study is not publically available and while the University College Human Ethics Advisory Committee (CHEAN) determined that this study was exempt from review (Appendix C), permission was sought and provided by the VCAA for access to, and use of data. The population for this study were all students who undertook the external examination for Units 3 and 4 VCE Physical Education in Victoria, Australia, and internationally. The total number of students in 2011 was 9323 (male=5212, female=4111) and in 2012, 8781 (male=5011, female=3770) students. Students who had a derived examination score (students who were ill or affected by other personal circumstances at the time of a VCE external assessment and whose result was unlikely to be a fair or accurate indication of their learning or achievement in the study were awarded a derived examination score [238]) and were removed from the data set prior to analyses (2011 n=211, 2012 n=212). The VCAA provided state level student enrolment data by school sector (government and non-government schools) and de-identified student level examination data from 2011 and 2012. De-identified student data included student scores for each item (question or question part) on the VCE Physical Education
examination, total examination score and student study score (a combined score of each graded assessment in Unit 3 and 4 Physical Education that compares student performance with all other students in the cohort [239]) for 2011 and 2012.

Initial analyses of the 2011 and 2012 VCE Physical Education examinations were conducted to classify and categorise each item based on the Area of Study from which the key knowledge and/or skill being assessed was from. Based on the content area being assessed by an examination item, each question or question part was categorised as either Unit 3, Area of Study 1 or 2 or Unit 4, Area of Study 1 or 2 [120]. Examination items that were based on assessing student knowledge and skills related to the content in each of the four Areas of Study (Table 3.1) were categorised accordingly. Classifying individual examination items allowed for questions with multiple parts that drew on content from multiple Areas of Study to be categorised in different Areas of Study.

Examination assessors are appointed by the VCAA and are provided with a confidential assessor training manual and marking guide. All assessors must have experience in teaching VCE Physical Education, Units 3 and 4, and attend a full day of training where assessors are given detailed and clear instructions on how each question in the examination should be interpreted and marked. These processes are designed to ensure clear, consistent and independent application of the marking guide [222]. Two assessors, independent to each other and to the student, mark student examinations in VCE Physical Education and the final examination score is the combined total score from both assessors (total possible marks 240) and if necessary, discrepancy marking by an additional assessor, without knowledge of the previous assessments is completed [240]. To allow for comparison of student performance in each Area of Study, the content area scores were transformed to the equivalent of total exam score by calculating the weighted score of each content area: (student score for Area of Study/total possible marks for Area of Study) x 240 (total examination mark) = weighted score. The grade (Ungraded (UG) to A+) cut points used were
taken from the score ranges provided by the VCAA in the grade distributions for each year [224, 225], which were based on a bell curve.

3.3.1 Statistical analysis

Data management and statistical analyses were performed using IBM SPSS version 22.0 (SPSS Inc., Chicago, IL, USA) and STATA version 14.0 (StataCorp LP, College Station, TX, USA). Means and standard deviations (SD) for discrete and continuous data were calculated, and categorical variables were presented as percentages. Regression analyses were also performed to establish the relationship between student cohort size and examination scores. An independent sample t-test was used to compare the examination scores and each Area of Study scores across years 2011 and 2012. One-way ANOVA analyses were performed to assess the differences of each content area score between examination grades from UG to A+.

3.4 Results

There was a positive correlation between VCE Physical Education student cohort size in a school and examination score in 2011 (r=0.29, 95% CI=0.25-0.34, p<0.001) and 2012 (r=0.34, 95% CI=0.29-0.39, p<0.001). For every increment of 10 students in the cohort, examination scores increased by 2.9 marks in 2011 and 3.4 marks in 2012.

Student performance on the external examination in VCE Physical Education differed across both years (2011 and 2012) and across Areas of Study within each of the years analysed. The mean (SD) examination scores for each content area in VCE PE for 2011 and 2012 can be seen in Table 3.2. Student scores in the monitoring and promotion of physical activity and the planning, implementing and evaluating a training program Areas of Study have decreased significantly in 2012 compared to 2011. However, scores in the performance enhancement and recovery practices Area of Study increased in 2012 compared to 2011. No significant differences were
found for the Area of Study physiological responses to physical activity between 2011 and 2012 (Table 3.2).

**TABLE 3.2:** Mean (SD) scores of each Area of Study in the 2011-2012 VCE Physical Education examinations

<table>
<thead>
<tr>
<th>Content area</th>
<th>2011</th>
<th>2012</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring and promotion of physical activity</td>
<td>29.68 (10.30)</td>
<td>23.11 (9.47)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Physiological responses to physical activity</td>
<td>29.99 (11.98)</td>
<td>30.22 (12.25)</td>
<td>0.210</td>
</tr>
<tr>
<td>Planning, implementing and evaluating a training program</td>
<td>36.82 (17.39)</td>
<td>31.30 (14.07)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Performance enhancement and recovery practices</td>
<td>17.96 (8.18)</td>
<td>24.01 (8.39)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

SD: Standard deviation; *p* values are based on two samples independent t-test

In 2011, mean examination scores in the monitoring and promotion of physical activity and physiological responses to physical activity Areas of Study were significantly higher than total examination mean scores. However, with the Areas of Study planning, implementing and evaluating a training program and performance enhancement and recovery practices, examination scores were significantly lower than total examination mean scores in the same year. In 2012, scores from all Areas of Study except planning, implementing and evaluating a training program were significantly higher than overall examination mean scores (Table 3.3).

The mean (SD) examination scores for each content area across each grade (UG to A+) in VCE Physical Education for 2011 and 2012 are presented in Table 3.4 and 3.5 respectively. In 2011, the mean scores for planning, implementing and evaluating a training program in grades E to B+ were significantly lower than in each of the other content areas. In 2012, the mean scores for planning, implementing and evaluating a training program in grades E to A+ were significantly lower than in each of the other content areas.
TABLE 3.3: Mean (SD) score of each Area of Study and mean examination score in the 2011-2012 VCE Physical Education examinations

<table>
<thead>
<tr>
<th>Content area</th>
<th>2011 Mean* (SD)</th>
<th>2012 Mean* (SD)</th>
<th>p value</th>
<th>2011 Mean§ (SD)</th>
<th>2012 Mean§ (SD)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring and promotion of physical activity</td>
<td>125.16 (45.95)</td>
<td>146.60 (49.75)</td>
<td>&lt;0.001</td>
<td>117.85 (41.93)</td>
<td>121.19 (47.69)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Physiological responses to physical activity</td>
<td>125.16 (45.95)</td>
<td>136.07 (54.20)</td>
<td>&lt;0.001</td>
<td>117.85 (41.93)</td>
<td>123.10 (47.77)</td>
<td>0.210</td>
</tr>
<tr>
<td>Planning, implementing and evaluating a training program</td>
<td>125.16 (45.95)</td>
<td>110.99 (48.58)</td>
<td>&lt;0.001</td>
<td>117.85 (41.93)</td>
<td>107.17 (46.80)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Performance enhancement and recovery practices</td>
<td>125.16 (45.95)</td>
<td>115.41 (47.71)</td>
<td>&lt;0.001</td>
<td>117.85 (41.93)</td>
<td>123.38 (41.27)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*Exam score; §The content area scores were transformed to the equivalent of total exam score by using weighting factor of each content area; SD: Standard deviation; p values are based on two samples independent t-test

TABLE 3.4: Mean (SD) score of each Area of Study across each grade (UG to A+) of examination score in 2011

<table>
<thead>
<tr>
<th>Content area</th>
<th>UG (0-11) Mean</th>
<th>E-E+ (12-42) Mean</th>
<th>D-D+ (43-86) Mean</th>
<th>C-C+ (87-132) Mean</th>
<th>B-B+ (133-167) Mean</th>
<th>A-A+ (168-240) Mean</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring and promotion of physical activity</td>
<td>5.77 (6.56)</td>
<td>39.44 (24.12)</td>
<td>91.55 (31.45)</td>
<td>138.12 (28.89)</td>
<td>170.38 (23.71)</td>
<td>198.58 (18.91)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Physiological responses to physical activity</td>
<td>6.30 (6.42)</td>
<td>30.62 (18.75)</td>
<td>70.89 (26.43)</td>
<td>121.16 (27.31)</td>
<td>164.94 (21.72)</td>
<td>199.10 (18.05)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Planning, implementing and evaluating a training program</td>
<td>7.56 (4.23)</td>
<td>26.90 (10.23)</td>
<td>53.25 (16.32)</td>
<td>92.33 (19.96)</td>
<td>134.71 (18.23)</td>
<td>175.08 (18.65)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Performance enhancement and recovery practices</td>
<td>11.82 (7.66)</td>
<td>31.29 (15.46)</td>
<td>62.49 (23.86)</td>
<td>101.12 (26.63)</td>
<td>137.21 (24.69)</td>
<td>171.50 (24.38)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

SD: Standard deviation; p values are based on one-way ANOVA; UG, Ungraded (students received UG when awarded less than 12 marks out of a possible 240 on the examination)
### TABLE 3.5: Mean (SD) score of each Area of Study across each grade (UG to A+) of examination score in 2012

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring and promotion of physical activity</td>
<td>6.93 (7.76)</td>
<td>34.47 (18.24)</td>
<td>72.17 (26.25)</td>
<td>110.43 (27.27)</td>
<td>143.30 (26.37)</td>
<td>175.13 (24.50)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Physiological responses to physical activity</td>
<td>14.14 (7.37)</td>
<td>33.42 (16.03)</td>
<td>68.84 (21.60)</td>
<td>111.36 (22.07)</td>
<td>147.13 (19.62)</td>
<td>181.37 (19.90)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Planning, implementing and evaluating a training program</td>
<td>7.03 (5.91)</td>
<td>28.31 (13.03)</td>
<td>56.53 (17.72)</td>
<td>91.30 (20.45)</td>
<td>127.97 (20.37)</td>
<td>169.61 (22.71)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Performance enhancement and recovery practices</td>
<td>14.13 (9.53)</td>
<td>47.09 (20.08)</td>
<td>81.98 (22.20)</td>
<td>113.37 (23.36)</td>
<td>142.14 (20.87)</td>
<td>171.06 (21.78)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

SD, Standard deviation; p values are based on one-way ANOVA; UG, Ungraded (students received UG when awarded less than 15 marks out of a possible 240 on the examination)

### 3.5 Discussion

Student performance in the 2011 and 2012 VCE Physical Education external examination differed each year based on the size of the student cohort within a school undertaking VCE Physical Education and the Area of Study examined. Students performed better in questions relating to content in Unit 3, Area of Study 1 (monitoring and promotion of physical activity) and 2 (physiological responses to physical activity) in 2011 and 2012 and also in Unit 4 Area of Study 2 (performance enhancement and recovery practices) in 2012. Examination performances in these Areas of Study were significantly (Table 3.2) higher than the overall examination mean score. Student performance on questions relating to content from Unit 4, Area of Study 1 (planning, implementing and evaluating a training program) in both the 2011 and 2012 examination revealed that students had difficulty answering questions that required them to draw on key knowledge and key skills relating to the planning, implementation and evaluation of a training program. This was consistently seen across all grades, E through A+ (Tables 3.3 and 3.4), demonstrating that both
low and high performing students experienced similar difficulties in this content area. Analysis of student data for the remaining years of accreditation (2013 – 2017) of the course is warranted to investigate if the findings of this study are replicated in subsequent years for the same curriculum.

It has been previously suggested by Pollitt et al. (1996) that difficulties with answering examination questions fall into three categories: i. subject or content difficulty (an area of study which may be more or less difficult), ii. process difficulty (cognitive processes that may be more or less difficult) and iii. question difficulty (wording and/or structure of question) [134]. The cognitive processes required to answer examination questions vary, with multiple levels of cognitive processing required in all four content areas. Question difficulty, based on the structure and wording of the question, is likely to be consistent across examination questions. Therefore, when comparing student performance across the four Areas of Study in VCE Physical Education, the differences in student performance based on the area of study examined suggest that topic or content difficulty may account for the findings of this study. The prescribed intention of the curriculum for Unit 4, Area of Study 1 is that students perform an activity analysis to determine the fitness requirements of a selected sport. Students then conduct the appropriate fitness tests to determine their individual strengths and weaknesses before designing, implementing and evaluating a training program to enhance and maintain identified fitness components. The findings of this secondary data analysis suggest that students' level of attainment in this area was lower than in other Areas of Study, and students had greater difficulty demonstrating understanding of this content area in the examination. This may be due to a lack of familiarity with the content or the abstractness of the idea [134]. Subsequent research investigating the student perspective may provide insight to the reasons pertaining to student attainment levels in this Area of Study.

It has been suggested [241] that in high-stakes assessment, teachers train students to answer specific types of questions. Qualification authorities in both Scotland and Victoria, Australia, have commented on the detrimental impact to student academic performance of prescribed or generic
answers to assessment items on examinations. Such answers demonstrate only a superficial awareness of content and often fail to link the knowledge and understanding to the context in which the question is asked. This may provide some explanation for the depth of knowledge demonstrated by students in senior secondary physical education examinations. Student learning has been shown to increase with exposure to multiple experiential learning strategies [242]. In physical education, students need opportunities to perform or participate in a variety of pertinent movement contexts. Then, by creating learning environments that afford students the opportunity to apply and adapt their knowledge in practical settings, students’ ability to draw on relevant practical experiences and apply their knowledge in written examinations may improve.

Student examination performance on items that required students to draw on the key knowledge and key skills outlined in Unit 4, Area of Study 1: planning, implementing and evaluating a training program, were significantly lower than the overall examination mean (Table 3.3). The advice for teachers published by the VCAA [120] provides examples of suitable activities that reflect the rationale of an integrated approach to teaching VCE Physical Education. The content in this Area of Study includes: factors affecting fitness components, assessment of fitness, training principles and methods and chronic adaptations to training. Suggested learning activities include: students performing an activity analysis, performing a series of fitness tests and participating in a variety of training methods [164]. Learning ‘in’ movement refers to outcomes associated with this content area; such as appraising the physical capabilities and requirements of an activity [17]. For example, students may determine the fitness components and energy system requirements for basketball through participation in, and analysis of, a game of basketball. In an examination, students then demonstrate an ability to draw on this experience to apply an understanding of the data collected to determine the fitness components in a new or novel context.

For teachers, Shulman [107] stated that content knowledge is the first source of knowledge as a base for teaching. Recent findings from Iserbyt, Ward and Li (2017), suggest that improving (specialised) content knowledge impacts on teachers pedagogical content knowledge and student
performance [243]. Further research in this context is warranted to explore the possible relationship between teachers’ (lack of) content knowledge and (lack of) pedagogical content knowledge and the difficulty students were found to have with assessment of the content associated with planning, implementing and evaluating a training program. In a study of pre-service physical education teachers, Herold and Waring (2016) found that content knowledge impacted on teaching confidence [244]. In depth content knowledge was beneficial in implementing approaches that met the learning needs of students. Expertise and/or confidence to teach with unfamiliar methodologies such as experiential learning may limit the ability of students to gain the knowledge required to successfully address questions on an examination relating to practical experiences. Further opportunities are required for the development of content knowledge, particularly around planning, implementing and evaluating a training program for both pre-service and in-service teachers, and of pedagogical practices that allow teachers to create a learning environment where students can develop an understanding of the interaction between theory and practice.

Senior secondary awards for certification both in Australia and internationally are characterised by a theoretical core with the physical movement experiences traditionally seen in compulsory physical education less apparent in senior secondary courses (see for example A-level Physical Education (UK) [245], Physical Education Studies (Western Australia) [173], Sports, Exercise and Health Science (International Baccalaureate) [165]). Previous research suggests that students of teachers who are able to effectively teach through experiential learning in senior secondary physical education have greater academic achievement [18, 246]. In a Scottish context, Thorburn and Collins (2006), suggest that teaching senior secondary physical education is challenging and the ability of teachers to teach through movement contexts and achieve high levels of student attainment is limited [14]. The process of learning from experience is ubiquitous [229], and much can be learnt through experience [247], yet task selection that engages and enhances learning must also align with the curriculum and assessment.
Students of VCE Physical Education have previously reported the perceived importance of a teacher’s ability to connect theoretical concepts to real-life examples and to relate concepts to student experiences as an influence on their learning [248]. Authentic learning tasks may allow students to integrate new ideas with old, creating knowledge and developing problem solving and decision-making skills. The merging of propositional and practical knowledge is implied in official documentation; however, with the use of written assessment tasks that don’t assess practical performance, there appears to be a misalignment of intent with reality. Curriculum documents, assessment requirements, texts and the context of senior secondary physical education, as suggested by Brown and Penney [234], construct the reality of what teachers do in the classroom. While it is beyond the scope of the statistical analyses performed in this study, further research exploring the pedagogical approaches employed by teachers of senior secondary physical education and the extent to which the approaches adopted align with the curriculum and assessment task is warranted.

The secondary data analysis was conducted on student examination data from the first two years of implementation of the revised VCE Physical Education course [120]. It is important to note that student data was collected from two different student cohorts: those completing VCE Physical Education in 2011 and those in 2012. The external examination for VCE Physical Education is written and developed by a panel appointed by the VCAA each year, and while the examinable content is underpinned by the key knowledge and skills stipulated in the official curriculum document, the questions vary from year to year. The results of this study reported on student performance in 2011 and 2012. Further analyses of subsequent years data may provide further evidence that supports the findings of this study, or identify further variations in student performance based on Area of Study.

The findings of the secondary data analysis indicate that student examination performance does vary between Areas of Study and across both years (2011 and 2012); high and low achieving students had difficulty in responding to examination items that assessed content from Unit 4, Area
of Study 1 (planning, implementing and evaluating a training program). A limitation of the secondary data analyses performed is that the findings do not explain the reasons for the poorer performance on examination items relating to Unit 4, Area of Study 1. It is unclear whether these findings reflect students’ lack of ability to draw on practical experiences in written assessment tasks, or a lack of exposure to learning contexts where they have had an opportunity to learn in and through the movement experiences. The intent of the curriculum does not necessarily mean that the course content is delivered as intended. Further research is warranted to investigate approaches to learning and teaching across the different Areas of Study (topic or content areas) to determine if learning is integrated in, through as well as about movement. Similar analyses comparing student achievement in different aspects of the senior secondary physical education course in Scotland [114] found that student achievement was greater in the performance component of the course when compared to the analysis and investigation of the performance component in the course; both were assessed through a written examination. These results, together with the findings of this study, suggest that if the intended integration of theoretical and practical knowledge is to be realised in assessment, appropriate professional learning for both in-service and pre-service teachers may be required. The use of external written examinations in senior secondary physical education is quite widespread, and future research in different local contexts may provide further insight into variations in student performance in high-stakes assessment tasks. This issue may also need to be addressed with pre-service teachers and teacher training courses. Explicit development of effective pedagogical practices that focus on teaching in, through and about movement, in the context of senior secondary physical education of pre-service teachers, may allow for greater student achievement on written tasks that assess content situated firmly in the practical realm.

3.6 Conclusion

The secondary data analyses performed revealed that student performance on the external assessment task (examination) of VCE Physical Education varied by the Area of Study (content)
being assessed. Student performance was significantly lower than the overall examination mean in Unit 4, Area of Study 1 (planning, implementing and evaluating a training program) in both 2011 and 2012. Additionally, in 2011, student level of attainment in Unit 4, Area of Study 2 (performance enhancement and recovery practices), was also below the examination mean. The practical performance-based nature of the Area of Study relating to planning, implementing and evaluating a training program suggests that content may be best delivered through an experiential or practical based pedagogy. Classroom based theoretical strategies may not provide students with the valuable practical experiences from which they can reflect upon in responding to examination questions. Pedagogical strategies utilised by teachers need to allow for the intended learning outcomes of the curriculum in senior secondary physical education. Further research in the context of VCE Physical Education is needed to explore how teachers create effective experiential, practical, applied learning contexts that implement the intended integration of theoretical and practical concepts stipulated in the curriculum documentation, to determine if that leads to successful student performance on written examinations (assessments).
CHAPTER 4

Investigating the influence of question type and cognitive process on academic performance in VCE Physical Education: a secondary data analysis
CHAPTER FOUR: Investigating the influence of question type and cognitive process on academic performance in VCE Physical Education: a secondary data analysis

4.1 Introduction

Student performance on examination questions based on the cognitive demand of the question may provide information on the influence of the learning and teaching that students experience has on their academic success, as determined by the external VCE Physical Education examination. This study investigated student examination performance based on question type and the required cognitive process of the question.

The competing demands of education systems that require assessment tasks to allow for comparison of students between teachers and schools, and standards-referenced internal assessment tasks, is an ongoing dilemma. While there are suggestions that assessment in education is moving from a culture of testing and examination to a culture of assessment for learning [249-252], there is evidence that in senior secondary courses for certification, external examinations are a commonly utilised tool for determining student academic achievement [3, 6, 253]. Advocates of formative assessment practices in physical education [201, 210, 254] suggest that formative assessment supports learning, yet in a study of 1454 upper secondary physical education students in Norway, assessment for learning was found to be negatively associated with student grades [255]. Assessment of, for, or as learning in the field of education, has a fundamental purpose to determine student proficiency at a point in time [256]. However, Taras (2005) argued that the purpose of the assessment will affect the parameters of the task [257], and will determine what is taught and how it is taught [258]. Teachers can use assessment data in general, and specifically examination data, to inform both curriculum and instruction based on what Wiggins and McTighe (2005) called ‘backwards’ design [259].
Despite some criticism of psychometric testing for assessment in secondary school education [249, 260-262], testing and examinations provide accountability for schools [263] and a standardised measure of skills, knowledge and educational achievement. Examinations are generally summative assessment tools of learning and provide a summary of student capabilities at the end of a unit of study or school completion. It has been suggested that summative assessment requires the reliability (of grades) to take precedence over the validity of the task, [257] and that both context and curriculum influence the content validity of assessment [255]. Reliability of external assessment allows the results to be compared from one school to another. This is an important factor as the VCAA's purpose for conducting external examinations is to collect evidence of student performance and rank all students in the VCE Physical Education cohort for a given year [240]. Student results are used to calculate an Australian Tertiary Admission Rank (ATAR). As discussed in Chapter 3, assessment in VCE Physical Education comprises internally set tasks (formative) and an externally set and assessed written examination (summative). Internal tasks are used to determine a students' level of achievement of the stipulated outcomes for Units 3 and 4 of VCE Physical Education but also provide students with feedback regarding their progress. The external examination assesses all outcomes in Units 3 and 4 of VCE Physical Education and the key knowledge and skills that underpin the outcomes [120]. The examination has two sections: Section A: Multiple-choice questions and Section B: Short answer questions. All examination questions are compulsory for all students. The examination may include a variety of stimulus material and/or short scenarios that students must refer to when answering the question. Learning outcomes in the curriculum document are often framed in terms of “subject matter content and a description of what is to be done with or to the content” (p.213) [264]. In VCE Physical Education, the key skills (what is to be done with or to the content) include (but are not limited to) the ability to describe, participate in, perform, observe, analyse, report on, explain, compare and contrast, evaluate, apply, identify, justify and design [120]. Alignment of the desired learning outcomes with assessment strengthens the connection between the course objectives, instructional activities and assessment [265, 266].
Bloom’s revised taxonomy [267] of educational objectives is widely recognised and familiar to many educators. The generic nature of the taxonomy is applicable across a wide range of subjects and is easy to apply to a range of question types due to its simple structure [258]. Bloom’s taxonomy can be used to both develop and categorise examination questions based on the cognitive process required to answer the question. An analysis of examination questions based on categories within the cognitive domains demonstrates breadth (or lack of) of the examination items across the categories [264]. In the early work of Bloom, Krathwohl and Masia (1956), tests and examinations were found to focus on and emphasise assessment of knowledge and comprehension (in the revised taxonomy these terms were replaced with remember and understand) [268]. Assessment, for the most part didn’t align with the educational objectives, which were often more complex skills [268]. Those processes at the higher end of the hierarchy are considered to be the most important goals of education [200, 264, 269] and are often emphasised in senior secondary physical education objectives. However, when Piaget’s (1969) stages of cognitive development are considered [55], senior secondary students may not necessarily be capable of completing tasks that require higher-order thinking as they may not have reached the formal operational stage [52]. Finding the correct balance of lower and higher-order questions in examinations for certification is imperative [258, 270]. Higher-order thinking skills have been associated with increasingly higher levels of achievement [252] and may be used to differentiate levels of student achievement [271]. In addition to the principles of developing assessment tasks, assessment of higher-order thinking skills should also include stimulus material (something for students to think about), novel material (something students haven’t seen before) and the task must manage the cognitive complexity and difficulty level of the task separately [272].

Assessment can influence which elements of subject knowledge are valued more strongly than either curriculum or pedagogy [273] when considering the three dimensions (curriculum, pedagogy and assessment) of quality physical education [28]. Assessment of senior secondary physical education is a contentious issue [11, 16], yet research in this context has been limited, particularly in VCE Physical Education. Thorburn and Collins (2006) looked extensively at the senior
secondary physical education course in Scotland and have made comparisons to the equivalent course in Queensland, Australia [14, 18, 114]. The ongoing issues of assessment in a performance-based subject have received some attention [230], as has the use of criteria and standards based assessment in senior secondary physical education [115, 117, 118, 202]. Educationally, developing higher-order thinking skills in students is important [200, 269]. The capacity of a written assessment task to assess student ability is dependent upon the questions within the examination. A good examination has a combination of multiple-choice and short answer questions that have the correct balance of questions that assess various levels of cognitive difficulty [258, 274] which can then be used to discriminate between students level of performance.

High-stakes testing has been associated with teachers teaching to the test and the narrowing of curriculum [216, 241]. Even in assessment tasks that are intended to assess higher-order thinking skills, Harlen (2005) suggested that students can be trained to pass [241]. The reported impact of content contraction is that it leads to an increase in teacher-centred pedagogy and knowledge fragmentation (teaching content in small, isolated pieces without making any connection with other content) [216]. Challenging this notion are findings from a study of senior secondary education in NSW, Australia [9] and a metasynthesis of studies investigating the effect of high-stakes testing on curriculum where content integration, subject matter expansion and student-centred pedagogy were evident in the subjects of social studies and language arts [216]. These findings provided some evidence that both subject matter and the teacher can influence curriculum narrowing or expansion, as well as the type of assessment task.

This secondary data analysis was undertaken to identify the influence of question type (multiple-choice or short answer) and cognitive process (remember, understand, apply, analyse, evaluate and create) on students’ overall performance on the end-of-year, external written examination in VCE Physical Education. This research sought to determine the influence of question type on overall examination performance. Furthermore, underpinned by Bloom’s revised taxonomy [267]
this study aimed to determine if student performance in questions that required different cognitive skills can predict overall student examination performance.

4.2 Method

Secondary data analyses were performed using the 2011 and 2012 VCE Physical Education examination data obtained, with permission, from the VCAA, as previously explained in Chapter 3. The total number of students in 2011 and 2012 were \( n=9323 \) (male=5212, female=4111) and \( n=8781 \) (male=5011, female=3770) respectively.

The examination papers were evaluated and questions were categorised by type and cognitive level. Questions were categorised as either multiple-choice (n=15 questions) or short answer (n=11 questions, 2011, and n=14 questions, 2012). Each question was also categorised by cognitive process, (remember, understand, apply, analyse, evaluate, create) six hierarchical levels increasing in complexity, based on Bloom’s revised taxonomy [267]. Two researchers conducted an initial analysis, both with experience in writing VCE Physical Education examination papers for the VCAA. Using the structure of the cognitive process dimension of the revised taxonomy [267] as a theoretical framework, each question was categorised into one of the six cognitive process dimensions:

- Remember – retrieving relevant knowledge from long-term memory
- Understand – determining the meaning of instructional messages, including oral, written and graphic communication
- Apply – carrying out or using a procedure in a given situation
- Analyse – breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structured or purpose
- Evaluate – making judgements based on criteria and standards
- Create – putting elements together to form a novel, coherent whole or make an original product
Two researchers categorised the examination questions independently. Discrepancies between the question classifications were identified, discussed and a consensus reached. The process verb (for example, identify, explain, evaluate) and the assessment of the intended cognitive level is the focus of this paper, and was therefore the main source of information to determine the cognitive process required of the question. In classifying questions to a specific cognitive process, the verb used in the question stem did not always provide a full picture of the questions intent. Almerico and Baker (2004) identified these as conflicting verbs, where the same verb is used to describe cognitive processing at different levels [275]. To ensure the context in which the question was asked was considered, the whole question stem was reviewed and the focus and perspective [276] of the question were considered.

To allow for comparison of student performance in each section of the examination (multiple-choice and short answer) and for the questions categorised in each cognitive process domain, scores were transformed to the equivalent of total examination score by calculating the weighted score of each question type and cognitive process. As examination questions often contained several parts, the number of marks available for each cognitive level across the examination were summed and weighted with respect to the total marks available on the examination paper. For example, for the multiple-choice questions: (student score for multiple-choice/total possible marks for multiple-choice) x 240 (total examination mark) = weighted score. As mentioned previously, the grade (Ungraded (UG) to A+) cut points used were taken from the score ranges provided by the VCAA in the grade distributions for each year [277, 278].

4.2.1 Statistical analysis

Data management and statistical analyses were performed using IBM SPSS version 22.0 (SPSS Inc., Chicago, IL, USA) and STATA version 14.0 (StataCorp LP, College Station, TX, USA). Means and standard deviations (SD) for discrete and continuous data were calculated, and categorical variables were presented as percentages. Paired t-tests were used to compare student
performance on multiple-choice questions, short answer questions and overall examination performance in both years (2011 and 2012). Correlation analyses were performed to determine the relationship between multiple-choice, short answer and overall examination performance. Linear regression analyses were conducted to determine the predictive value of student performance on questions in each of the six cognitive levels and overall examination scores. One-way ANOVA analyses with Bonferroni correction were conducted to assess the difference between student performance on question cognitive level and examination grades (UG – A+).

4.3 Results

The percentage of marks available in both multiple-choice and short answer questions, categorised by the cognitive processes in Bloom’s revised taxonomy [267] are presented in Table 4.1.

**TABLE 4.1:** Percentage of marks available on the VCE Physical Education examination by question type (multiple-choice and short answer) and cognitive process (2011 and 2012)

<table>
<thead>
<tr>
<th>Cognitive process</th>
<th>2011 Percentage of total marks</th>
<th>2012 Percentage of total marks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Multiple-choice</td>
<td>Short answer</td>
</tr>
<tr>
<td>Remember</td>
<td>4.2</td>
<td>17.5</td>
</tr>
<tr>
<td>Understand</td>
<td>3.3</td>
<td>14.2</td>
</tr>
<tr>
<td>Apply</td>
<td>3.3</td>
<td>25.0</td>
</tr>
<tr>
<td>Analyse</td>
<td>1.7</td>
<td>12.5</td>
</tr>
<tr>
<td>Evaluate</td>
<td>0</td>
<td>16.7</td>
</tr>
<tr>
<td>Create</td>
<td>0</td>
<td>1.7</td>
</tr>
</tbody>
</table>

*Bloom’s revised taxonomy [267]*

Student performance was significantly better on multiple-choice questions than short answer questions in both years, and in the multiple-choice compared with the examination overall in both years (Table 4.2).
TABLE 4.2: Mean score for each type of question on the VCE Physical Education examination in 2011 and 2012

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>95% CI</td>
</tr>
<tr>
<td>Multiple-choice</td>
<td>171.49 (42.71)</td>
<td>(170.61, 172.36)</td>
</tr>
<tr>
<td>questions*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short answer</td>
<td>118.54 (48.10)</td>
<td>(117.55, 119.53)</td>
</tr>
<tr>
<td>questions*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Examination total</td>
<td>125.16 (45.95)</td>
<td>(124.22, 126.11)</td>
</tr>
</tbody>
</table>

*The multiple-choice and short answer section of the exam were transformed to the equivalent of total exam score by using weighted factor of each section of the exam; SD, Standard deviation; 95% Confidence Interval (CI); p values are based on paired t-test for each year separately; #p < 0.001 between multiple-choice and short answer; ^p < 0.001 between short answer and examination total; \( p < 0.001 \) between multiple-choice and examination total

Student performance on multiple-choice type questions in the 2011 VCE Physical Education examination was strongly correlated with short answer performance \((r=0.69; \ p<0.01)\). Additionally, short answer performance was a stronger predictor of overall exam performance \((r=1.00; \ p<0.01)\) than multiple-choice performance \((r=0.75; \ p<0.01)\). Similar results were found in 2012 (Figure 4.1).

Linear regression established the predictive value of student performance on questions in each of the six cognitive levels to overall examination performance. In 2011 and 2012, student performance on questions classified as ‘create’ were very poor predictors of overall examination performance. In addition to create, ‘remember’ was also a poor predictor of overall examination performance in 2012. (Table 4.3).
FIGURE 4.1. Correlation matrix of examination total, multiple-choice and short answer questions in the VCE Physical Education examination.
### TABLE 4.3: Predictors of overall examination performance based on question cognitive process requirements

<table>
<thead>
<tr>
<th>Cognitive process</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β coefficient (95% CI)</td>
<td>β coefficient (95% CI)</td>
</tr>
<tr>
<td>Remember</td>
<td>0.84 (0.834, 0.849)*</td>
<td>0.50 (0.488, 0.514)*</td>
</tr>
<tr>
<td>Understand</td>
<td>0.83 (0.819, 0.835)*</td>
<td>0.90 (0.893, 0.911)*</td>
</tr>
<tr>
<td>Apply</td>
<td>0.83 (0.828, 0.838)*</td>
<td>0.82 (0.817, 0.829)*</td>
</tr>
<tr>
<td>Analyse</td>
<td>0.85 (0.838, 0.856)*</td>
<td>0.89 (0.876, 0.896)*</td>
</tr>
<tr>
<td>Evaluate</td>
<td>0.87 (0.859, 0.878)*</td>
<td>0.82 (0.812, 0.824)*</td>
</tr>
<tr>
<td>Create</td>
<td>0.29 (0.275, 0.298)*</td>
<td>0.24 (0.231, 0.251)*</td>
</tr>
</tbody>
</table>

*p < 0.001

A one-way ANOVA found that the mean number of marks achieved by students in each of the cognitive categories (remember, understand, apply, analyse, evaluate, create) were significantly different (*p < 0.001*) between each grade (UG – A+) in both 2011 and 2012 (Table 4.4). In both 2011 and 2012, as students achieved higher overall grades (UG – A+), the number of marks achieved in each category of cognitive level increased.

In 2011, students achieving an overall examination grade of D – A+ were able to access more marks in questions that required them to remember and analyse when compared to all other cognitive levels (Table 4.4). Low performing students (UG) were unable to achieve significantly more marks in questions that required them to remember, however, they performed better on questions that required them to demonstrate understanding in 2011 (Table 4.4). Additionally, high performing students (B-A+) in 2011 accessed fewer marks in higher-order thinking questions (evaluate and create) compared to each of the other cognitive levels (Table 4.4).
<table>
<thead>
<tr>
<th>Cognitive Process</th>
<th>Examination Grade (mark range)</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total (240 marks)</td>
<td>p-value</td>
<td>Total (240 marks)</td>
</tr>
<tr>
<td>Remember</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-11 marks</td>
<td>8.08(7.40)</td>
<td></td>
<td>57.78(36.78)</td>
</tr>
<tr>
<td>12-42 marks</td>
<td>40.35(17.00)</td>
<td></td>
<td>75.71(38.23)</td>
</tr>
<tr>
<td>D-D+</td>
<td>82.37(23.33)</td>
<td></td>
<td>87.46(38.36)</td>
</tr>
<tr>
<td>C-C+</td>
<td>130.51(25.22)</td>
<td></td>
<td>104.20(40.52)</td>
</tr>
<tr>
<td>B-B+</td>
<td>170.65(20.69)</td>
<td></td>
<td>135.08(43.71)</td>
</tr>
<tr>
<td>A-A+</td>
<td>201.74(17.59)</td>
<td></td>
<td>178.97(41.98)</td>
</tr>
<tr>
<td></td>
<td>143.44(50.85)</td>
<td>&lt;0.001</td>
<td>122.95(53.16)</td>
</tr>
<tr>
<td>Understand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-11 marks</td>
<td>12.86(1.20)</td>
<td></td>
<td>15.64(12.78)</td>
</tr>
<tr>
<td>12-42 marks</td>
<td>35.39(17.85)</td>
<td></td>
<td>40.58(16.91)</td>
</tr>
<tr>
<td>D-D+</td>
<td>63.96(23.10)</td>
<td></td>
<td>75.15(19.53)</td>
</tr>
<tr>
<td>C-C+</td>
<td>103.94(25.79)</td>
<td></td>
<td>108.78(20.99)</td>
</tr>
<tr>
<td>B-B+</td>
<td>145.36(25.32)</td>
<td></td>
<td>138.27(19.90)</td>
</tr>
<tr>
<td>A-A+</td>
<td>181.81(23.04)</td>
<td></td>
<td>170.72(21.56)</td>
</tr>
<tr>
<td></td>
<td>121.03(50.22)</td>
<td>&lt;0.001</td>
<td>119.34(42.12)</td>
</tr>
<tr>
<td>Apply</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-11 marks</td>
<td>8.24(6.62)</td>
<td></td>
<td>5.25(7.19)</td>
</tr>
<tr>
<td>12-42 marks</td>
<td>24.60(12.31)</td>
<td></td>
<td>28.75(14.74)</td>
</tr>
<tr>
<td>D-D+</td>
<td>55.90(19.59)</td>
<td></td>
<td>68.97(20.24)</td>
</tr>
<tr>
<td>C-C+</td>
<td>100.26(22.15)</td>
<td></td>
<td>113.41(20.74)</td>
</tr>
<tr>
<td>B-B+</td>
<td>144.71(20.44)</td>
<td></td>
<td>149.90(18.53)</td>
</tr>
<tr>
<td>A-A+</td>
<td>187.01(19.12)</td>
<td></td>
<td>182.08(18.36)</td>
</tr>
<tr>
<td></td>
<td>118.92(52.63)</td>
<td>&lt;0.001</td>
<td>124.36(48.12)</td>
</tr>
<tr>
<td>Analyse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-11 marks</td>
<td>8.82(13.83)</td>
<td></td>
<td>9.63(8.62)</td>
</tr>
<tr>
<td>12-42 marks</td>
<td>40.67(20.78)</td>
<td></td>
<td>38.13(17.16)</td>
</tr>
<tr>
<td>D-D+</td>
<td>81.26(25.06)</td>
<td></td>
<td>66.85(20.98)</td>
</tr>
<tr>
<td>C-C+</td>
<td>123.61(26.04)</td>
<td></td>
<td>95.91 (20.08)</td>
</tr>
<tr>
<td>B-B+</td>
<td>158.59(24.33)</td>
<td></td>
<td>134.08(19.21)</td>
</tr>
<tr>
<td>A-A+</td>
<td>189.47(22.92)</td>
<td></td>
<td>174.18(22.56)</td>
</tr>
<tr>
<td></td>
<td>135.40(48.26)</td>
<td>&lt;0.001</td>
<td>110.80(48.62)</td>
</tr>
<tr>
<td>Evaluate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-11 marks</td>
<td>0.50(1.73)</td>
<td></td>
<td>3.92(4.17)</td>
</tr>
<tr>
<td>12-42 marks</td>
<td>18.79(16.58)</td>
<td></td>
<td>24.88(12.90)</td>
</tr>
<tr>
<td>D-D+</td>
<td>57.41(25.19)</td>
<td></td>
<td>55.96(18.18)</td>
</tr>
<tr>
<td>C-C+</td>
<td>129.44(23.74)</td>
<td></td>
<td>95.91 (20.08)</td>
</tr>
<tr>
<td>B-B+</td>
<td>161.47(24.14)</td>
<td></td>
<td>134.08(19.21)</td>
</tr>
<tr>
<td>A-A+</td>
<td>108.46(46.65)</td>
<td></td>
<td>174.18(22.56)</td>
</tr>
<tr>
<td></td>
<td>108.46(46.65)</td>
<td>&lt;0.001</td>
<td>110.80(48.62)</td>
</tr>
<tr>
<td>Create</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-11 marks</td>
<td>0(0)</td>
<td></td>
<td>6.67(20.58)</td>
</tr>
<tr>
<td>12-42 marks</td>
<td>27.75(49.83)</td>
<td></td>
<td>66.39(75.05)</td>
</tr>
<tr>
<td>D-D+</td>
<td>74.95(69.60)</td>
<td></td>
<td>118.98(82.98)</td>
</tr>
<tr>
<td>C-C+</td>
<td>110.38(69.00)</td>
<td></td>
<td>154.42(79.80)</td>
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<tr>
<td>B-B+</td>
<td>134.85(66.84)</td>
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<td>182.55(68.03)</td>
</tr>
<tr>
<td>A-A+</td>
<td>159.27(63.69)</td>
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<td>206.49(53.14)</td>
</tr>
<tr>
<td></td>
<td>117.08(74.78)</td>
<td>&lt;0.001</td>
<td>161.17(81.33)</td>
</tr>
</tbody>
</table>

Note: Total score possible on the VCE Physical Education examination is 240 marks
In 2012, low performing students (UG – D+), were able to achieve greater marks in categories ‘remember’ and ‘understand’ when compared to ‘apply, analyse and evaluate’ (Table 4.4). All students achieving an overall examination grade of D – A+ achieved more marks in questions categorised as create in 2012 (Table 4.4). High performing students (B – A+), achieved marks across all questions in 2012, regardless of the cognitive demand of the question (Table 4.4).

4.4 Discussion

The secondary data analysis identified differences in student performance on the 2011 and 2012 VCE Physical Education examinations based on question type and cognitive level. The initial analysis (categorised based on required cognitive processing) of the VCE Physical Education examination identified questions that assessed each of the six cognitive levels of Bloom’s taxonomy (Table 4.1). While it is unclear what the correct balance of higher-order to lower order questions might be, both examinations provided a range of questions across all cognitive levels. Similar to the findings of this study, which revealed questions at the create level made up 1.7% (2011) and 2.5% (2012), previous studies conducted on tertiary level examinations also identified that only a few questions, less than 2%, examined students ability to ‘create’ [258, 279]. None of the multiple-choice questions were categorised as requiring students to perform cognitive processes at the higher end of Bloom’s revised taxonomy [267].

To ensure assessment practices are coherent with the rationale of the study design (curriculum), examination questions must provide students with the opportunity to demonstrate the desired learning outcome. VCE Physical Education rationale includes the examination of biological, physiological, psychological, social and cultural influences on performance and participation in physical activity and focuses on the interrelationship between motor learning and psychological, biomechanical, physiological and sociological factors that influence physical performances, and participation in physical activity. There are opportunities for students to apply theoretical concepts and reflect critically on factors that affect all levels of performance and participation [120].
Multiple-choice questions have been previously linked to lower order thinking skills that require knowledge and recall [280]. Multiple-choice items can be written to utilise more complex cognitive processes; however, this was not evident in the 2011 or 2012 VCE Physical Education examinations. This finding has implications for examination development in the future. Well-constructed multiple-choice questions can assess beyond remembering and recalling of factual information and assess higher-order thinking skills including analysis and application [281, 282].

A potential consequence of multiple-choice questions only assessing lower order thinking skills are that the assessment does not support the rationale for the subject. The questions may ‘examine’ the theoretical concepts and allow students to apply knowledge, however, in isolation these questions don’t allow for integration and critical reflection. Furthermore, the approach students take to exam preparation and the strategies employed to answer examination questions impacts on the type of learning undertaken. Teacher constructed multiple choice questions have been shown to be written at a higher cognitive level than test-bank generated items [281] and can be used as a formative learning tool for students.

Question type may influence the approach (deep or surface learning) students take to their learning of content knowledge [280, 283]. Student perception of the requirements of the question, based on type, may influence the nature of learning that is undertaken. Student responses to examination questions that were not specific to the context of the question were not awarded full marks by the examiner [235]. Representing rote learning, generic answers that students recalled, utilised a surface learning approach. Application of knowledge to a specific context demonstrates greater understanding and deeper learning. Rote learning, remembering factual information, utilises different learning approaches compared to deep learning, which is characterised by learning with understanding [284, 285]. This is further supported by Harlen (2005), who suggests that familiarity with the test, and teachers training students how to pass represents increases in test scores but not necessarily an increase in student understanding [241]. This may account for
the findings of this study; students are able to reproduce the knowledge needed to answer the multiple-choice questions. It is possible that the multiple-choice items did not provide students with the opportunity to demonstrate higher-order abilities. There has previously been some concern of the overuse of multiple-choice questions to measure lower order thinking skills such as remember [286]. In reviewing guidelines for writing multiple-choice questions, Haladyna, Downing and Rodriguez (2002) suggested that while teachers may focus on developing more complex thinking skills in the classroom, the ability to construct multiple-choice test items that assess higher-order thinking is lacking [286]. The production of knowledge needed to answer questions based on novel or previously unseen contexts, requires higher cognitive processing [287]. Assessment items must test complex cognitive functioning if the task is intended to determine student ability to perform the higher order thinking outlined in the course rationale. The short answer questions on the 2011 and 2012 VCE Physical Education examinations proved to be more difficult for students compared to the multiple-choice questions.

Educationally, developing higher-order thinking skills is important for all students, both low and high achieving [200, 269]. Marzano (1988) suggested that thinking skills should be taught interconnected with content knowledge [288]. It was hypothesised that low achieving students (UG – D+) would be able to access more marks in questions that required low order processing (remember and understand). This was the case in 2012, with the exception of the ‘create’ questions. However, in 2011, this was not clearly evident, and low performing students were able to access a greater number of marks on questions that required them to demonstrate skills in remembering, understanding and analysing. The expected relationship between student attainment of marks and question complexity was not evident in the findings of this study. This may be a reflection on the student cohort or the examination questions, or a combination of both. Poor question development may have contributed to students lack of ability to access marks in questions that required students to demonstrate higher-order thinking skills. High performing students didn’t necessarily perform better on questions requiring high order processing, and low performing students didn’t necessarily attain more marks in questions designed to assess low
order thinking processes. In VCE Physical Education, students are expected to analyse data, evaluate initiatives, strategies, systems and programs associated with physical activity, sport and exercise. These process verbs used in the study design, [120], the official curriculum document for teaching VCE Physical Education, illustrate the expected learning outcomes for students. Bloom’s taxonomy classifies ‘remember’ and ‘understand’ as lower order cognitive processes and ‘apply, analyse, evaluate and create’ as higher-order [258, 269, 270].

The desired outcomes of VCE Physical Education are, by definition, higher-order thinking skills. The extent to which a student achieves the desired outcome is determined through a series of internally set and assessed formative assessment tasks, and an externally set and assessed written examination. Given the relatively low weighting of questions categorised as ‘create’ in both 2011 (1.7%) and 2012 (2.5%) it is unclear from the findings of this study if student performance on examination questions that require high cognitive processing (create) are weak or strong indicators of overall examination performance. Demonstrating higher-order cognitive skills including ‘create’ on a written examination can be difficult and Jones, Harland, Reid and Bartlett (2009) suggest that assessment of higher-order skills such as ‘evaluation’ and ‘creativity’ should be assessed through alternative tasks [258]. Internal assessment tasks in VCE Physical Education, such as a data analysis, critically reflective folio or laboratory report [164] may well be better placed to assess students’ higher-order cognitive thinking skills. Future research is warranted to establish the degree to which internal assessment tasks in senior secondary physical education are authentic; characterised by the production rather than reproduction of knowledge, are based in movement and integrate concepts and contexts in real-world settings [114, 204].

Teachers of VCE Physical Education must ensure that learning and assessment tasks are designed to engage students in higher-order cognitive processing. Tasks designed for students to develop higher-order thinking skills have been closely associated with deep learning strategies [287]. Teachers can assist students in developing thinking skills through tasks that relate new information to established knowledge, making connections between content and the real world
and/or students lived experiences, and by looking at content from different perspectives in order to make sense of the big picture [285]. In VCE Physical Education questions that require students to make connections between ideas and identify relationships between variables provide opportunities to think logically and work through problems systematically as required by students in the formal operation stage [55]. For example, based on knowledge of characteristics of energy systems, the teacher may ask students to articulate the relationship between intensity and duration of exercise and why a 400m race cannot be run at the same pace as a 100m race.

Authentic assessment involves the integration of theoretical and practical components that students are able to understand and make sense of [230, 280]. Previous studies involving the development of higher-order thinking skills in secondary science students have been shown to benefit high and low academic achieving students [269]. Development of knowledge is important, as students are expected in an examination to demonstrate their capability to use their understanding of their knowledge to solve more complex problems. Results of a meta-analysis exploring factors of effective teaching suggests that to achieve learning outcomes associated with acquiring knowledge and skills, direct instructional models of teaching may be more effective, but when the learning outcome is related to higher-order cognitive processing, a more constructivist approach was found to be effective, particularly with older students [35]. The implications of the findings from this study on effective teaching practices for improving academic achievement in VCE Physical Education would suggest, that regardless of the cohort of students, (low or high achieving), teachers must use deep learning strategies that integrate theoretical and practical knowledge to prepare and assist students to understand and make sense of the material. Students will then be able to use higher-order processes to demonstrate knowledge and understanding in unfamiliar contexts and increasingly complex questions. Student assessment data can be used to inform the development of instructional strategies [259]. Findings from this study also suggest that a greater emphasis on teaching thinking skills cohesively linked to the examinable content is required to improve student performance on the external examination. Teacher education programs and professional learning opportunities for in-service and pre-service teachers may need
to focus on developing effective questioning skills that engage students in higher-order cognitive thinking processes. A classroom culture where skilful questioning allows students to develop higher-order thinking skills, and an examination that allows students to demonstrate these skills, may well be reflected in higher academic performance in high stakes assessment for all students.

4.5 Limitations

The findings of this secondary data analysis shed some light on student performance on the external examination in VCE Physical Education. However, the data comprised of two different student cohorts, completing two different examinations in two separate years, and therefore comparisons between student performances across two years cannot be made. The analyses of two years data did, however, provide a richer context for the discussion of student performance on questions based on type and required level of cognitive processing. Further, the examinations in both years had relatively few marks available for questions categorised as ‘create’. This is not unusual in examinations, however, the small number of available marks may account for this category being a poor predictor of overall student performance.

4.6 Conclusion

Findings from the secondary data analysis of student examination scores from the VCE Physical Education examination in 2011 and 2012 found that students performed significantly better on the multiple-choice type questions when compared to the short answer type questions. However, performance on multiple-choice type questions was a poorer predictor of overall examination score than performance on short answer questions. The VCE Physical Education examination papers have a balance between low- and higher-order questions; with a range of questions assessing each of the cognitive levels in both 2011 and 2012. Examiners must continue to develop effective questions that allow students to demonstrate higher-order thinking skills, particularly in multiple-choice questions. Further analysis revealed that low achieving students (UG – D) were not necessarily achieving more marks in questions that required low-order processing when compared
to higher-order, but are performing well below the examination mean across all questions. High performing students (B+ – A+) were performing above the examination mean for all questions. Research suggests that deep learning strategies are more effective in developing the higher cognitive processes students require to perform successfully on examinations. The findings of this study may provide valuable insights for providers of pre-service teacher training and for the professional development of in-service teachers, to ensure that appropriate learning strategies are utilised in the teaching of VCE Physical Education to assist students in developing the skills assessed through the external examination. Teaching strategies need to align with course objectives and assessment practices to ensure students are provided with tasks that enable the development of the required higher-order thinking skills, to excel on examinations that are designed to assess these skills. The findings of this research should inform future development of senior secondary examinations in both the context in which the research was conducted (VCE Physical Education), and in other senior secondary physical education courses internationally.

The analysis of examination data to determine influences on student academic performance resulted in a number of recommendations for teachers to consider in the teaching of VCE Physical Education. Teaching of content associated with the planning, implementing and evaluating a training program may well require further investigation to identify reasons for the significantly lower student performance on these examination questions and the development of learning tasks to develop higher order thinking skills in students. The influence of the teacher on student academic performance provides a further avenue for research. The teacher, and their sense of efficacy, have been identified as an influence on student academic achievement and therefore is an important influence to consider in the specific context of senior secondary physical education. The earlier findings of this thesis established that the teacher-related factors that may influence student academic performance are likely to be context specific, and therefore, determining the levels of efficacy of VCE Physical Education teachers is warranted.
CHAPTER 5

Exploring context specific teacher efficacy in

VCE Physical Education teachers
CHAPTER FIVE: Exploring context specific teacher efficacy in VCE Physical Education teachers

5.1 Preface

After establishing the influence of content, question type and cognitive level on student performance in VCE Physical Education, understanding the role of the teacher on student performance was explored. Given that teacher efficacy has been linked to teacher effectiveness and academic achievement, an investigation of levels of efficacy in VCE Physical Education teachers was considered important. Previous research established that teacher efficacy is context specific; therefore, this study aimed to determine efficacy levels of VCE Physical Education teachers and the teacher-related factors that may influence efficacy levels in this context. The following chapter is based on a manuscript that has been submitted for publication and is currently under peer-review.

5.2 Introduction

For over 40 years, educational research has explored the construct of self-efficacy and the influence of a teacher’s sense of self-efficacy on the effectiveness of their teaching. Based on a social cognitive theory framework [289], self-efficacy can be defined as an individual’s belief about their capabilities to carry out a particular course of action successfully [78]. Social cognitive theory suggests that behaviour, cognition, other personal factors and the environment influence each other through interactions [78, 290]. Specifically, teacher efficacy has been defined as the “teacher’s belief in his or her capability to organise and execute courses of action required to successfully accomplish a specific teaching task in a particular context” (p.233) [74]. The full extent of the variables that affect self-efficacy in teaching are still unknown. The reciprocal relationship between the school context (environment) and teacher self-efficacy (personal factors) has been the subject of much research, and a clear finding is that teacher efficacy is context specific. A teacher may feel efficacious for teaching a particular topic to a specific year level or group of students, yet placed in a different setting, teaching different content to different students, a
teacher’s level of efficacy may increase or decrease. Interest in context specific teacher efficacy has led some researchers to develop or modify instruments to measure teacher efficacy in different curriculum areas (see for example Riggs and Enochs (1990) [86], Humphries et al. (2012) [291] and Martin and Kulinna (2003) [90]). However, extensive research by Tschannen-Moran and Hoy (2001) [73] led to the development of the Teachers’ Sense of Efficacy Scale (TSES). This instrument was seen as superior to previous instruments because of its ability to capture a broad range of effective teacher capabilities that can be compared across contexts, year levels and subject areas [73]. However, there has been limited research into the influence of these different teaching contexts on teacher efficacy. Studies that have looked at self-efficacy of teachers teaching across different year levels have found that teachers of younger students have higher levels of self-efficacy than teachers of older students [89].

Teaching experience has been shown to have some influence on self-efficacy; however the findings are not consistent. Klassen and Chiu (2010) found a nonlinear relationship between years of teaching experience and teacher efficacy [79]. These findings suggest that teacher self-efficacy increased throughout teachers’ early and mid-careers, but then declined in later stages. In contrast, Pas, Bradshaw and Hershfeldt (2012) and Wolters and Daugherty (2007) found that efficacy levels increased with years of teaching experience [85, 89]. A limitation of the Wolters and Daugherty (2007) study was the sensitivity of the scale used for years of experience (e.g. 11+ years); smaller increments would have allowed for greater differentiation of the self-efficacy levels of experienced teachers [89]. Subsequent research should take into consideration changes that may occur in teacher self-efficacy throughout the career span.

Much research has been done to identify teacher characteristics related to self-efficacy. Teachers’ sense of self-efficacy has been associated with teacher-related factors such as enthusiasm, persistence, commitment, organisation and planning, classroom management, caring, student-centred learning and willingness and openness to new and innovative teaching methods [73, 87, 292]. A teacher’s sense of efficacy has been shown to influence instructional practices and
teaching behaviours [293]. The reciprocal relationship [78, 290] between teacher behaviour, the personal (sense of efficacy) and environmental factors (school context) cannot be underestimated. The relationship between school context in senior secondary physical education, including class size, school sector, facilities and resources, teacher behaviour in the classroom, including pedagogical decisions, and teacher efficacy has implications on student academic performance. Student outcomes including achievement, motivation and a student's own sense of efficacy have been attributed to teacher self-efficacy [75-77], and teacher efficacy has been shown to be a determinant of effective teaching [34].

More effective teachers have greater academic learning expectations and outcomes for their students [7, 93]; they value classroom management because it allows greater focus on student learning [41, 215]. While early evidence of the impact of teacher efficacy on student achievement was not clear cut [77, 83], more recent studies confirmed teacher efficacy has a positive influence on student achievement [34, 75]. Understanding the influences on teachers’ sense of efficacy in the context of VCE Physical Education may provide insight into the construct of effective teaching in senior secondary physical education.

Determining teacher efficacy amongst physical education teachers, and specifically senior secondary teachers, is under represented in teacher efficacy research. As discussed earlier, teacher self-efficacy is context specific, yet the level of specificity is unclear. Previous work has shown that chemistry teaching efficacy can be distinguished from science teaching efficacy in science teachers [74]. There has been some work done in the area of teacher efficacy in practical physical education, confirming the positive influence of teacher self-efficacy on teaching practice [90-92, 291]. Pan et al. (2013) suggested that for physical education teachers, self-efficacy is related to preparation, content, teaching strategy and evaluation [91]. However, the findings were based on practical physical education in primary school teachers, and as reported by Wolters and Daugherty (2007), primary school teachers were inclined to report higher levels of efficacy than teachers of higher academic levels [89]. The body of work focussed on physical education
teachers’ ability to teach practical physical education classes with high levels of physical activity [90, 92, 291]; to the researcher’s knowledge, teacher self-efficacy in the context of senior secondary physical education has not previously been considered. Identifying factors that influence student academic achievement may increase teacher effectiveness in high-stakes senior secondary physical education courses, where student academic performance may contribute to the attainment of certification. The aim of this study was, therefore, to determine levels of self-efficacy in VCE Physical Education teachers, and to investigate factors that may influence teacher self-efficacy in this context to gain an insight into teacher-related factors that affect student academic achievement.

5.3 Method

5.3.1 Survey development

The survey included questions for teachers on demographic and descriptive information: i. about you, ii. about your school, iii. about your teaching as well as teacher self-efficacy. The survey items were based on a review of the literature associated with characteristics of effective teaching and the impact this had on student academic performance [9, 30, 31, 42, 93, 215, 292]. The survey asked participants to report on years of teaching experience and specifically VCE teaching experience, class size, access to and use of facilities. Further, factors that related specifically to the delivery of Units 3 and 4 VCE Physical Education were investigated, including teaching pedagogies, use of practical activities and professional learning undertaken by the teacher.

The final item on the survey that participants responded to was the short form Teachers’ Sense of Efficacy Scale (TSES) [73]. The 12-item form has been validated and found to be a reliable tool ($\alpha = 0.90$ in original study [73], $\alpha = 0.85$ in this study) for measuring teacher efficacy in a variety of settings [79, 89, 294]. Participants responded to the 12 items on a 9-point Likert-type scale, anchored by 1 (nothing) and 9 (a great deal). It is hypothesised that the 12 items on the TSES measure three factors relating to a teacher’s belief in their capability to: i. manage student
behaviour (eg. ‘How much can you do to control disruptive behaviour in the classroom?’), ii. use of effective instructional strategies (eg. ‘How well can you implement alternative strategies in your classroom?’) and iii. engagement of students in their learning (eg. How much can you do to get students to believe they can do well in schoolwork?’). However, the authors [73] suggested conducting a factor analysis to determine how participants in each study respond to the questions.

Pilot testing of the survey established good face and content validity of the survey instrument. The survey was administered to a sample (n=10) of individuals with diverse expertise and experience in VCE Physical Education, including a State Curriculum manager for Health and Physical Education (from the VCAA), examination panel members for VCE Physical Education and experienced teachers of Units 3 and 4 VCE Physical Education. Analysis of the results from the pilot testing revealed that all questions performed as intended. Pilot testing also revealed the need to revise a small number of questions to improve the clarity of these questions. The revised survey (Appendix D) was then tested for reliability.

Test-retest reliability methodology involved current or recent teachers (n=51) of VCE Physical Education completing the same version of the survey twice, at two different time points $M=9.9$ days ($SD=7.3$) apart. The sample size was estimated by determining an intraclass correlation coefficient (ICC) of 0.80 with a 95% confidence interval (CI) width of 0.2 [295, 296]. Data were checked for assumptions of linearity and homoscedasticity. Pearson’s correlation were calculated for all survey items (continuous data). The survey performed well in terms of test re-test analyses. Pearson’s correlation co-efficient for survey items ranged from $r = 1$ to $r = 0.53$ (large, Cohen (1988)) significant at the 0.01 level (2-tailed). With the exception of five question items which demonstrated a small (0.10 – 0.29) to medium (0.30 – 0.49) correlation strength [297]. The three question items demonstrating a medium strength correlation were retained in the final survey instrument. Two survey items that had a small co-efficient ($r < 0.30$), were not significant and were removed from the data set prior to analysis.
5.3.2 Recruitment

Teachers were invited to participate in the study through physical education professional network websites and newsletters at the end of the 2013 academic year. Further recruitment followed at the beginning of the 2014 academic year. This time period was to allow for teachers to reflect on the previous years’ teaching of VCE Physical Education. A link to the survey was provided on the website and by clicking the link participants were taken to the survey, presented with information that complied with the university human ethics approval (Appendix C) followed by a ‘consent to participate’ question. In total, 154 respondents attempted the survey between November 2013 and March 2014. A small number of respondents (n=8) were removed due to limited responses (less than four questions answered). The remaining 146 were included in the analysis, with a total of 117 participants answering all questions. There are approximately 450 providers of VCE Physical Education, however the total number of teachers delivering VCE Physical Education through each provider is unknown and as such it is not possible to determine the exact response rate.

5.3.3 Statistical analysis

Descriptive data of teacher-related factors are presented as means, standards deviations and frequencies for each survey item. Principal component factor analysis, with varimax rotation, of the Teachers’ Sense of Efficacy Scale (TSES) was conducted on the 12 items to determine how the VCE Physical Education teachers responded to the questions. Internal consistency of the TSES was determined through the calculation of Cronbach’s alpha. A paired samples t-test was then conducted to compare the difference between the extracted factors. Further analyses of the data (Kruskal-Wallis test) were performed to determine the relationship between teacher self-efficacy and years of teaching experience, and VCE Physical Education teaching experience. The non-parametric test was used as the data sample violated the assumption of normality required for parametric tests. Post-hoc analyses of teacher-related factors (confidence to teach content, perceived student engagement with content, teaching strategies used) and context-based factors
(class size, access to resources and facilities) were conducted to determine the relationship between these factors and teacher self-efficacy.

5.4 Results

Teaching experience, VCE Physical Education teaching experience, school context and teaching pedagogy preferences are presented in Table 5.1. Teachers surveyed taught at least one other VCE subject (41%), with Health and Human Development the most common (23%).

TABLE 5.1: Characteristics of the VCE Physical Education teacher, teaching context and teaching pedagogy

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean (SD)</th>
<th>Percentage of total population (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teacher</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching experience (years)</td>
<td>13.37 (8.63)</td>
<td>N/A</td>
</tr>
<tr>
<td>VCE PE teaching experience (years)</td>
<td>6.53 (6.16)</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Context</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School sector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government/state</td>
<td></td>
<td>49</td>
</tr>
<tr>
<td>Independent/private</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Catholic</td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>School campus type</td>
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<td></td>
</tr>
<tr>
<td>Years 7 – 12</td>
<td></td>
<td>64</td>
</tr>
<tr>
<td>Years 10 – 12</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Class size (number of students)</td>
<td>18 (5.47)</td>
<td>N/A</td>
</tr>
<tr>
<td>Subject specific professional learning (hours per year)</td>
<td>13.55 (12.57)</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Teaching pedagogy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student-centred (hours/year)</td>
<td>45.09 (19.00)</td>
<td>N/A</td>
</tr>
<tr>
<td>Teacher-centred (hours/year)</td>
<td>53.17 (18.53)</td>
<td>N/A</td>
</tr>
<tr>
<td>Practical activities (hours per Unit)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;10 hours per unit</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>7-9 hours per unit</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>4-6 hours per unit</td>
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<td>28</td>
</tr>
<tr>
<td>1-3 hours per unit</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>0 hours per unit</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

\(aF\) is the foundation or first year of primary education; \(b\)Primary and secondary school campus; \(c\)Secondary school campus; \(d\)Senior secondary school campus; \(e\)Teaching pedagogy based on Metzler's instructional models for teaching physical education [61]; \(^1\)Inquiry based learning, Peer teaching, Cooperative learning, Personalised system for instruction; \(^2\)Direct instruction; \(^3\)Unit is 50 hours of classroom instruction; VCE: Victorian Certificate of Education; N/A: Not applicable
The majority of schools had either one (50%) or two (34.5%) VCE Physical Education classes with an average class size of 18 (SD=5.47) students. Teachers were quite (35%) or very (54%) confident in their teaching of the content in VCE Physical Education and perceived that their students were engaged (42%) or highly engaged (38%) in their learning. Teachers reported using a variety of practical activities in their teaching of VCE Physical Education including games and sports, fitness testing, activity analysis, laboratory tasks, training methods and recreational and lifestyle activities. Furthermore, teachers used visual aids, role-plays and simulations in their teaching. The VCE Physical Education teachers surveyed reported access to a large range of facilities and resources to assist in their teaching (Figure 5.1), and utilised non-school based facilities (73.1%) such as local parks, pools, gymnasiums and universities to contribute to the delivery of VCE Physical Education to students.

5.4.1 Teacher sense of efficacy

Initial factor analyses of the TSES for VCE Physical Education teachers found that the 12 items loaded to four factors (Table 5.2) with Eigenvalues greater than one (Table 5.3). These four factors accounted for 71% of the variance in the participants’ scores. However, the exploratory analysis indicated that there was some confusion around the loading of one item (item 11). This is similar to Klassen and Chui (2010) who found that this item did not load as expected [79]. The item is different to the other items in that it asks teachers to reflect on the influence they may have on assisting families to help their children do well at school, the only perception of ability that is beyond the classroom. Reducing the data to a three factor solution resulted in the same three factor loading demonstrated in the original study [73] and confirmed the three factor model (Table 5.4) as preferable to a one factor model (63% of the total variance, Table 5.5) as reported in subsequent studies [79, 89, 294]. The three factors were identified as efficacy in classroom management, student engagement and instructional strategies.
TABLE 5.2: Initial factor analyses of the Teachers’ Sense of Efficacy Scale rotated component matrix

<table>
<thead>
<tr>
<th>Item number from TSES*</th>
<th>TSES Question</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>How much can you do to control disruptive behaviour in the classroom?</td>
<td>0.635</td>
<td>0.085</td>
<td>0.257</td>
<td>0.061</td>
</tr>
<tr>
<td>6</td>
<td>How much can you do to get your students to follow classroom rules?</td>
<td>0.827</td>
<td>0.158</td>
<td>0.080</td>
<td>0.244</td>
</tr>
<tr>
<td>7</td>
<td>How much can you do to calm a student who is disruptive or noisy?</td>
<td>0.836</td>
<td>0.165</td>
<td>0.064</td>
<td>0.070</td>
</tr>
<tr>
<td>8</td>
<td>How well can you establish a classroom management system with each group of students?</td>
<td>0.807</td>
<td>0.215</td>
<td>0.199</td>
<td>0.126</td>
</tr>
<tr>
<td>2</td>
<td>How much can you do to motivate students who show low interest in schoolwork?</td>
<td>0.149</td>
<td>0.786</td>
<td>0.181</td>
<td>0.052</td>
</tr>
<tr>
<td>3</td>
<td>How much can you do to get students to believe they can do well in school work</td>
<td>0.100</td>
<td>0.836</td>
<td>0.179</td>
<td>0.175</td>
</tr>
<tr>
<td>4</td>
<td>How much can you do to help your students’ value learning?</td>
<td>0.288</td>
<td>0.786</td>
<td>0.029</td>
<td>0.108</td>
</tr>
<tr>
<td>9</td>
<td>How much can you use a variety of assessment strategies?</td>
<td>0.207</td>
<td>-0.094</td>
<td>0.679</td>
<td>0.420</td>
</tr>
<tr>
<td>11</td>
<td>How much can you assist families in helping their children do well in school?</td>
<td>0.094</td>
<td>0.367</td>
<td>0.778</td>
<td>-0.119</td>
</tr>
<tr>
<td>12</td>
<td>How well can you implement alternative strategies in your classroom?</td>
<td>0.318</td>
<td>0.231</td>
<td>0.698</td>
<td>0.254</td>
</tr>
<tr>
<td>10</td>
<td>To what extent can you provide an alternative explanation or example when students are confused?</td>
<td>0.248</td>
<td>0.188</td>
<td>0.291</td>
<td>0.725</td>
</tr>
<tr>
<td>5</td>
<td>To what extent can you craft good questions for your students?</td>
<td>0.100</td>
<td>0.126</td>
<td>0.018</td>
<td>0.884</td>
</tr>
</tbody>
</table>

*TSES Teachers’ Sense of Efficacy Scale (short form) [73]; Extraction Method: Principal Component Analysis; Rotation converged in 5 iterations.

TABLE 5.3: Initial factor loadings of the Teachers’ Sense of Efficacy Scale

<table>
<thead>
<tr>
<th></th>
<th>Eigenvalues</th>
<th>Percentage (%) of Variance</th>
<th>Cumulative % of variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1</td>
<td>4.83</td>
<td>40.23</td>
<td>40.23</td>
</tr>
<tr>
<td>Factor 2</td>
<td>1.47</td>
<td>12.22</td>
<td>52.45</td>
</tr>
<tr>
<td>Factor 3</td>
<td>1.27</td>
<td>10.58</td>
<td>63.03</td>
</tr>
<tr>
<td>Factor 4</td>
<td>1.01</td>
<td>8.44</td>
<td>71.48</td>
</tr>
</tbody>
</table>
### TABLE 5.4: Three factor solution analyses of the Teachers’ Sense of Efficacy Scale rotated component matrix

<table>
<thead>
<tr>
<th>Item number from TSES*</th>
<th>TSES Question</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor 1 - Classroom management sub-scale</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>How much can you do to control disruptive behaviour in the classroom?</td>
<td>0.630</td>
<td>0.134</td>
<td>0.208</td>
</tr>
<tr>
<td>6</td>
<td>How much can you do to get your students to follow classroom rules?</td>
<td>0.826</td>
<td>0.145</td>
<td>0.244</td>
</tr>
<tr>
<td>7</td>
<td>How much can you do to calm a student who is disruptive or noisy?</td>
<td>0.837</td>
<td>0.159</td>
<td>0.095</td>
</tr>
<tr>
<td>8</td>
<td>How well can you establish a classroom management system with each group of students?</td>
<td>0.806</td>
<td>0.238</td>
<td>0.214</td>
</tr>
<tr>
<td><strong>Factor 2 –Student engagement sub-scale</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>How much can you do to motivate students who show low interest in schoolwork?</td>
<td>0.161</td>
<td>0.798</td>
<td>0.073</td>
</tr>
<tr>
<td>3</td>
<td>How much can you do to get students to believe they can do well in school work</td>
<td>0.112</td>
<td>0.839</td>
<td>0.164</td>
</tr>
<tr>
<td>4</td>
<td>How much can you do to help your students’ value learning?</td>
<td>0.302</td>
<td>0.754</td>
<td>0.030</td>
</tr>
<tr>
<td>11</td>
<td>How much can you assist families in helping their children do well in school?</td>
<td>0.087</td>
<td>0.558</td>
<td>0.336</td>
</tr>
<tr>
<td><strong>Factor 3 - Instructional strategies sub-scale</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>To what extent can you craft good questions for your students?</td>
<td>0.094</td>
<td>0.066</td>
<td>0.702</td>
</tr>
<tr>
<td>9</td>
<td>How much can you use a variety of assessment strategies?</td>
<td>0.187</td>
<td>0.050</td>
<td>0.754</td>
</tr>
<tr>
<td>10</td>
<td>To what extent can you provide an alternative explanation or example when students are confused?</td>
<td>0.239</td>
<td>0.202</td>
<td>0.736</td>
</tr>
<tr>
<td>12</td>
<td>How well can you implement alternative strategies in your classroom?</td>
<td>0.306</td>
<td>0.378</td>
<td>0.602</td>
</tr>
</tbody>
</table>

*TSES Teachers’ Sense of Efficacy Scale (short form) [73]; Extraction Method: Principal Component Analysis; Rotation converged in 4 iterations.

### TABLE 5.5: Factor loadings of the Teachers’ Sense of Efficacy Scale

<table>
<thead>
<tr>
<th>Factor</th>
<th>Eigenvalues</th>
<th>Percentage (%) of Variance</th>
<th>Cumulative % of variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1</td>
<td>4.83</td>
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</tr>
<tr>
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<td>12.22</td>
<td>52.45</td>
</tr>
<tr>
<td>Factor 3</td>
<td>1.27</td>
<td>10.58</td>
<td>63.03</td>
</tr>
</tbody>
</table>

Table 5.6 presents means, standard deviations and reliability coefficients for the TSES scale overall and for each of the subscales.
TABLE 5.6: Means, standard deviations and reliability coefficients for Teachers’ Sense of Efficacy Scale subscales and total scores

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Number of items</th>
<th>Mean</th>
<th>SD</th>
<th>Cronbach’s alpha (α)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1 - Classroom management</td>
<td>4</td>
<td>8.04</td>
<td>0.85</td>
<td>0.83</td>
</tr>
<tr>
<td>Factor 2 - Student engagement</td>
<td>4</td>
<td>6.70</td>
<td>1.02</td>
<td>0.76</td>
</tr>
<tr>
<td>Factor 3 - Instructional strategies</td>
<td>4</td>
<td>7.34</td>
<td>0.90</td>
<td>0.74</td>
</tr>
<tr>
<td>TSES* (overall)</td>
<td>12</td>
<td>7.36</td>
<td>0.74</td>
<td>0.85</td>
</tr>
</tbody>
</table>

*TSES Teachers’ Sense of Efficacy Scale (short form) [73]; The scale for each item ranged from 0–9 [73]

Table 5.7 reports the paired samples t-test of VCE Physical Education teachers’ self-efficacy. There was a significant difference between teachers classroom management and student engagement self-efficacy ($t(116)=14.59$, $p<.0001$ (two tailed)), as well as classroom management and instructional strategies ($t(116) = 8.70$, $p<.0001$ (two tailed)) self-efficacy. Teacher self-efficacy in student engagement was significantly lower than self-efficacy in instructional strategies ($t(116) = -6.82$, $p<0.001$ (two tailed)). There was no difference in teacher self-efficacy based on years of teaching experience or VCE Physical Education teaching experience.

TABLE 5.7: Comparison of Teachers’ Sense of Efficacy Scale subscales

<table>
<thead>
<tr>
<th>Teachers’ Sense of Efficacy Scale subscales</th>
<th>Mean</th>
<th>Std. deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>tdf</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1 Classroom management – Student engagement</td>
<td>1.34</td>
<td>0.99</td>
<td>0.09</td>
<td>1.16 – 1.52</td>
<td>14.59</td>
<td>116 &lt;0.001</td>
</tr>
<tr>
<td>Pair 2 Classroom management – Instructional strategies</td>
<td>0.70</td>
<td>0.87</td>
<td>0.08</td>
<td>0.54 – 0.86</td>
<td>8.70</td>
<td>116 &lt;0.001</td>
</tr>
<tr>
<td>Pair 3 Student engagement – Instructional strategies</td>
<td>-0.64</td>
<td>1.02</td>
<td>0.09</td>
<td>-0.83 – -0.45</td>
<td>-6.82</td>
<td>116 &lt;0.001</td>
</tr>
</tbody>
</table>
Figure 5.1: VCE Physical Education teacher reported access to, and use of available facilities and resources.
Pearson product-moment correlation (2-tailed) found a small \((r = 0.10, [297])\) but significant relationship between teacher self-efficacy (as measured by the TSES) and access to resources and facilities \((r=0.28, p<0.01)\) and a medium \((r = 0.30, [297])\) relationship between teacher self-efficacy and confidence to teach content \((r=0.46, p<0.01)\) and perceived student engagement with content \((r=0.39, p<0.01)\). There were no correlations between teacher self-efficacy and teaching strategies used (teacher-centred and student-centred) or class sizes.

5.5 Discussion

This study aimed to determine levels of self-efficacy in senior secondary teachers of VCE Physical Education, and to investigate factors that may influence teacher self-efficacy in this context. In the context of senior secondary physical education, teachers' sense of self-efficacy as measured by the TSES does not change based on years of teaching experience, aligning with the findings of previous work in different contexts [88]. Contributing to the body of knowledge that calls for more context specific analysis of teachers' sense of efficacy [83], this study also found that teachers' sense of efficacy is invariant in terms of VCE Physical Education teaching experience. While these findings are not consistent with that of Klassen and Chui (2010), [79] and Wolters and Daugherty (2007) [89], who both found that teacher efficacy changes with years of teaching experience, it has been hypothesised that self-efficacy beliefs, once established, remain constant [78]. In a small study \((n=29)\) of pre-service teachers, efficacy was shown to change over three time points (beginning of teacher preparation course, at the end of teacher preparation course and after the first year of teaching [87]). The culmination of the research conducted so far suggests that teacher efficacy is established by the time teachers have reached the end of their first year of in-service teaching. Of interest, however, is that both in the current study and in previous research [79, 89], teacher levels of efficacy for student engagement were significantly lower than for classroom management and instructional strategies.
Self-efficacy is a multidimensional construct [298] and the three dimensions identified in the TSES were confirmed for VCE Physical Education teachers in the current study. Teachers reported higher levels of self-efficacy in classroom management when compared to other studies that utilised the same measurement tool in different contexts [73, 79, 89]. Due to the multidimensional nature of self-efficacy, it is not unexpected to find different levels of efficacy in different dimensions. The findings of this study are not dissimilar to previous work [82, 85, 89] that also demonstrated different levels of efficacy for various dimensions of teaching in primary and secondary school teachers, across different subject areas (including mathematics, science, English, art and social studies). Findings from this study may be partially explained by the specific context in which the instrument was used. Students in senior secondary education courses for certification may present fewer management issues for teachers when compared to other year levels. Drawing on findings of studies that utilised the same instrument, high school (years 10, 11 and 12) teachers (n=92) in America reported lower levels of self-efficacy in each of the three factors when compared to the findings of this study [89]. In the study by Wolters and Daugherty [89], teacher efficacy for student engagement was higher for teachers of primary school children when compared to teachers of high school students. Student engagement can be seen when students are attentive, curious, interested and passionate about their learning and teachers share that enthusiasm [299]. Student engagement results in motivation to learn yet teacher efficacy for student engagement has been shown to be consistently lower than efficacy for classroom management and instructional strategies [79, 89].

Student engagement is critical to student academic success [300, 301]. Specifically in senior secondary physical education, Thorburn (2008), suggested that providing authentic learning experiences for students that link lived experiences with the (theoretical) content knowledge is crucial to academic achievement [194]. Authentic experiences in senior secondary physical education involves providing real-world applications and learning in and through movement as well as about movement [224]. The integration of practical learning experiences in a course where student learning and academic success are determined through written assessment tasks has
been shown to be problematic for teachers in Australia [230], New Zealand [112] and Scotland [14, 18]. Findings from this study suggest that physical education teachers’ level of efficacy to engage students was lower than efficacy levels in the areas of classroom management and instructional strategies. Engagement for senior secondary physical education students may occur through practical learning experiences and may well be an area that requires further development. Teachers of senior secondary physical education are constrained by a mandated curriculum, and an external assessment task, however, pedagogical decisions are teacher based. Teachers reported feeling efficacious in their instructional strategies, however, student engagement when teachers select the approach may not be occurring. Student involvement in the decision-making process relating to the context of learning increases student engagement with the task [299]. In senior secondary physical education, student engagement may increase when students are included in the decisions based on activity choice and development of learning tasks where students select the type of task and the conditions under which it is completed. In physical education, student engagement with the discipline involves physical activity and authentic learning experiences in physical education that engage students must involve movement, otherwise as Thorburn (2008) stated, physical education without movement lacks ‘reality’ for students and he equates this to music education without sound [194].

It is important to remember that self-efficacy is a perception of ability, not a measurement of ability [87]. A teacher’s sense of efficacy of their ability to implement alternative strategies in their classroom may not reflect their ability or execution of this belief. Without observational data, knowing if teachers have under or over-estimated their actual ability to manage, instruct and engage the students in their classes is not possible. The established relationship between teacher efficacy and teacher effectiveness would suggest that in the context of VCE Physical Education, the teachers in this study should all be effective. This connection cannot be clearly determined from the current study and further research is warranted to ascertain if there is a relationship between VCE Physical Education teachers’ levels of efficacy and student academic achievement. It is a commonly held belief that self-efficacy is a determinant of successful educational outcomes
[81], yet self-efficacy is only one aspect of effective teaching. As discussed previously, many characteristics of effective teaching can be seen reflected within a teacher's sense of efficacy. While this study found no evidence to suggest that teachers' level of efficacy was related to the pedagogical approach employed by teachers of VCE Physical Education, teachers in this study reported using student-centred learning approaches for 45% of the time, and that they used a variety of assessment strategies. Teachers with low-efficacy have been found to use fewer cooperative learning and activity based approaches [302], while effective teachers use multiple learning strategies [60, 65, 303, 304]. Specifically in VCE Physical Education, student perceptions of effective teachers identified that pedagogical knowledge extends to the teachers ability to identify how the student best learns (knowing the student) and what strategy will be most appropriate [248].

Sources of efficacy information include mastery experiences, physiological and emotional cues, vicarious experiences and verbal persuasion [78, 290]. The most powerful of these are mastery experiences [74, 298]. Teachers who experience success have their efficacy beliefs strengthened. Future research is warranted to investigate the influence of statistical data (based on student academic achievement in VCE), performance data (school based review) and teacher perceptions of success and how they may influence teacher self-efficacy. However, in terms of opportunities to develop self-efficacy, even in teachers with relatively high levels, the chance to watch others teach and invest in dialogue with other teachers may prove valuable. Efficacy is increased when the observer believes they have the ability to be successful in a similar situation [78]. Vicarious experiences, however, need to be positive, and the model being observed must be a good one. Dialogue between teachers can build efficacy through engagement, sharing of ideas and resources, and building collegiality amongst staff in schools. The Victorian Institute of Teaching (VIT) acknowledge the value of observation and dialogue between teachers; recognising mentoring, collegial visits, professional discussions and meetings as appropriate forms of professional learning [305]. Schools and teachers with open door policies that allow in-service
teachers to observe others teach understand the value of learning via modelling. Pre-service teachers have greater opportunities to watch others teach, however, these opportunities may be limited for in-service teachers.

Determining VCE Physical Education teachers’ self-efficacy was the primary aim of this study. Once determined, factors that influenced or predicated self-efficacy were further investigated. The influence of teaching experience has already been discussed, however other teacher-related factors such as confidence to teach the content in VCE Physical Education and perceptions of student engagement, along with access to resources and facilities, showed small to medium strength relationships with levels of self-efficacy. This study contributes to building a body of knowledge that identifies teacher self-efficacy in specific contexts [82, 86, 306] by including senior secondary physical education teachers. These findings support the recommendation of Chang and Engelhard (2016) that the number (0 – 9) of categories used in the rating scale of the TSES could be reduced by collapsing the three lower categories (0 – 2) into one to make a total of seven ratings [88]. Furthermore, future research is needed to explore the reasons for the differences in VCE Physical Education teachers’ levels of efficacy across the three factors, and to understand effective and suitable forms of professional learning to improve teacher efficacy in the area of student engagement.

There is strong evidence supporting that when efficacy beliefs are established, they appear to be somewhat resistant to change [74]. Pre-service teacher (general and physical education) levels of self-efficacy have been reported in previous studies [87, 307], yet a longitudinal study that tracks changes in teacher self-efficacy of pre-service teachers as they move through their teacher training and into teaching service is warranted. The information gained can then be used to develop strategies for strengthening and reaffirming teacher efficacy in both pre-service and in-service teachers. Teacher efficacy is positively influenced by quality teacher professional development. The development of new skills and knowledge has been shown to have positive effects on efficacy [308]. However, self-efficacy can also be fostered through “positive modelling from successful
peers" (p.75) [294]. Providing opportunities for pre-service teachers to observe good teachers contributes to self-efficacy beliefs [78] and providers of education degrees must consider the impact on pre-service teachers that exposure to inappropriate teaching may have [307]. For in-service teachers, school leaders may encourage professional learning opportunities where teachers observe and interact through dialogue with successful teachers within their own school and in other school settings. Teachers of VCE Physical Education indicated interest in learning from colleagues through classroom observations (Chapter 8). It would appear to be a cost effective mode for professional learning that could be more readily accessed, and one that could be reciprocated between schools and classrooms.

5.6 Limitations

One limitation of any study that uses self-administered questionnaires is social desirability. Self-reported practices, particularly associated with teaching approaches, have shown that teachers’ perceptions of the range of teaching strategies in the classroom are not reflective of the actual range observed [51]. Future research may benefit from asking teachers about their ability to implement a range of teaching strategies, and if student engagement, confidence in teaching content and mandated assessment practice restrictions influence teaching strategies. Secondly, the TSES has had some criticism for not presenting enough challenge for teachers to consider, and that tasks measured by the scale were too easy to endorse [88]. This may be a reason for the relatively high levels of efficacy reported for teachers in this and other studies.

5.7 Conclusion

From the earliest research into teacher efficacy, it has been apparent that a teacher’s sense of efficacy is specific to the situation in which they are teaching. Context specific research has been under represented in teacher self-efficacy research and this study aimed to contribute to the body of knowledge through the determination of self-efficacy in senior secondary teachers of VCE Physical Education. VCE Physical Education teachers were efficacious in their ability to manage
their classrooms, their use of instructional strategies and student engagement. Teacher self-efficacy did not vary significantly with years of teaching experience or specifically VCE Physical Education experience. The importance of this construct in senior secondary physical education is the clear link with the established evidence between teacher self-efficacy, teacher effectiveness and student academic performance. Higher levels of teacher self-efficacy have previously been linked to effective classroom management, innovative varied instructional strategies, setting of high expectations for students and encouraging student-centred learning.

Although VCE Physical Education teachers were found to be efficacious in their classroom management, instructional strategies and student engagement, other teacher-related factors that may influence student academic performance in senior secondary physical education remain unclear. Further research is warranted to further explore other teacher-related factors to inform pre-service and in-service teacher training. The student perspective of the influences they perceive to influence academic performance were considered an important avenue for further research. The following two chapters report on data collected from VCE Physical Education students regarding the ‘Perfect’ VCE Physical Education teacher and an exploration of teacher-related factors students perceived influenced their academic performance.
CHAPTER 6

The ‘perfect’ VCE Physical Education teacher: student perceptions of teacher-related factors that influence academic performance
CHAPTER SIX: The ‘perfect’ VCE Physical Education teacher: student perceptions of teacher-related factors that influence academic performance

6.1 Preface

Identifying teacher-related factors that influence student academic performance in senior secondary physical education is important to inform the development of pre-service teachers and the ongoing development of in-service teachers. Student perceptions of influential teacher-related factors are important to consider, as students are key stakeholders in the process of assessment and certification at the senior secondary level. Therefore, student voice research was imperative to enhance the understanding of student perceptions of the teacher-related factors that may influence student academic performance and lead to improved academic outcomes for students within this subject. Students recruited to participate in this study took part in two aspects of data collection. The first aspect involved identification of the characteristics of the ‘perfect’ VCE Physical Education teacher (Chapter 6) and the second involved participation in focus groups that explored perceptions of teacher-related factors that influenced academic performance (Chapter 7). Chapter 6 is based on a paper published in the peer-reviewed journal the Australian Journal of Teacher Education (Appendix A), [248].

6.2 Introduction

An understanding of the teacher-related factors that affect student academic performance in senior secondary physical education may lead to improved academic outcomes for students in senior secondary physical education courses. Research into senior secondary physical education is limited, and that which has been conducted has focussed on the analysis of the senior secondary physical education curriculum documentation, it’s implementation [17, 51, 111, 112] and assessment [113, 114]. What remain unclear are the specific teacher-related factors that influence student achievement in senior secondary physical education.
Successful performance in senior secondary education, as demonstrated in the assessment of learning for certification, is a key enabler for young people to transition into further education, training or employment [1, 2]. The VCE is one of three senior secondary pathways available to students in their final two years of secondary schooling in Victoria, Australia; with the majority, 83%, of students selecting this course for their senior secondary certificate [309]. This chapter reviews the teacher-related factors that may influence student academic performance in senior secondary physical education through the student lens within the context of a social-ecological model [310]. Enhanced understanding of student perceptions of the teacher-related factors that may influence student academic performance in VCE Physical Education could lead to improved academic outcomes for students within this subject.

6.2.1 Teacher-related factors

As discussed earlier in this thesis there are a number of factors that may affect student academic performance. [7]. Teacher-related factors are potentially modifiable, and research has consistently demonstrated that the actions of the teacher and the activities conducted at the classroom-level, specifically what teachers know and what they do in the classroom, is more important than school-level factors as an influence on student learning [7, 35, 47]. What is not definitively known are the specific teacher-related factors that influence student academic performance, and what it is that effective teachers do to maximise student academic performance within the context of senior secondary physical education.

In the context of this research, teacher-related factors are classified as those factors that result from the teachers’ behaviour [45] that may influence student academic performance. A social-ecological model can be used to describe the multiple levels of influence that may affect an individual’s behaviour [310]. Student perceptions of the ‘perfect’ VCE Physical Education teacher are explored within the context of a social-ecological model, which can be used to provide a
conceptual framework to understand the numerous factors that influence teacher behaviour at the individual, social, physical environment or policy level [44]. The social-ecological model allows for the multiple influential factors on teacher behaviour to be categorised and used to inform strategies that target different levels of influence to be designed and implemented to increase student academic performance. Teacher behaviour, at the individual and social level, that may influence student academic performance are more readily modified by an individual teacher, compared with those influences at the physical environment and policy/organisational level. The physical environment, policy and organisational factors, including timetabling, VCE policy and access to facilities such as a gymnasium and weights room, for example, are beyond the control of the individual teacher.

The qualities, characteristics and teaching practices that enhance student learning, and what it is that constitutes quality and/or effective teaching has been extensively researched [26, 27, 31, 311, 312], and findings are inconsistent across curriculum areas, school year levels and school settings. Quality physical education may look different in diverse settings to account for contextual factors such as local and school culture, timetabling, facilities and resources. Teacher-related factors that may influence student academic performance are likely to be specific to a given context. The differences in teacher-related factors that exist between subjects and those that exist within the subject suggest that there is a case to support differentiated teacher effectiveness [36].

Factors that affect student academic achievement in senior secondary education have received little attention in the past 10 years. Effective strategies and practices that encouraged deeper understanding rather than being exam-driven were significant in successful teaching at the senior secondary level [9]. And yet, students with high aspirations in Ireland showed preference for a more narrow focus on exam preparation in the lead up to their final exam [212]. Teachers themselves attributed success to their relationship with their students, their classroom practices (individual factors), faculty cooperation (social factors) and the students themselves [9]. Similarly, Horsley (2012) found that teachers who facilitated high academic performance in the Year 13
Scholarship in New Zealand had a deep content knowledge, passion for teaching and held high yet realistic expectations for their student [30].

6.2.2 Teacher effectiveness

The link between teacher effectiveness and student achievement [7, 30, 31, 93, 311] has already been discussed and there is no consensus about quantifying teacher effectiveness. Student achievement on standardised tests is commonly used as an indirect measure of teacher effectiveness [212, 216] but academic performance is only one outcome of effective teaching [29]. It is not the intention of this research to dismiss student educational outcomes that are not measured via academic performance as less important. However, the specific focus of this study is VCE Physical Education, whereby success is measured via academic performance and therefore student academic performance can be seen as an indicator of teacher effectiveness. In practical physical education where the desired outcome is increased motor skills and performance in physical activity, effectiveness has been associated with student engagement [102], time on task [45, 67, 77, 100, 104-106] and feedback [38, 95, 104, 313]. These findings are specific to the context of practical physical education classes, and not senior secondary courses, where primarily instruction is classroom-based with student achievement based on a student’s understanding of theoretical knowledge and application to hypothetical or scenario based situations.

Strategies for effective teaching are likely to be determined by the context in which a teacher works. This gives support to research that is contextualised in subject specific areas that seeks to identify teacher-related factors that influence student academic performance in those contexts. However, common attributes that exemplify effective teaching have been previously identified [31], and these categories are used in this study to compare VCE Physical Education student perceptions of teacher-related factors that influence academic performance, with generic characteristics of effective teachers.
6.2.3 Effective teaching in senior secondary physical education

Generic qualities of effective teachers [31] and those characteristics specific to the context of teaching practical physical education have been considered in previous research. In the context of senior secondary physical education, it is unclear if the specific teacher-related factors that influence student achievement are unique to the context of senior secondary physical education.

High ability students’ perceptions of effective teachers are more likely to pertain to a teacher’s knowledge of the subject and content taught when compared to low ability students [30, 36]. In establishing the difference between expert and experienced teachers, Hattie (2003) suggested that pedagogical content knowledge is more important than subject specific content knowledge; that is the way in which knowledge is used in teaching situations to facilitate student learning [7]. Pedagogical content knowledge in physical education has previously been identified to include knowledge of physical education curriculum, physical education as a subject, teaching methods in physical education, students’ learning of physical activity, physical education assessment and instructional environments in physical education [110]. To facilitate student learning in physical education, Ayvazo, Ward and Stuhr (2010), argued that a teacher must first have an in-depth understanding of the subject specific content [108], allowing effective teachers to differentiate their mode of delivery depending on the needs, capabilities, learning styles and backgrounds of their students and the desired learning outcome [36, 93, 314, 315].

Research investigating student perceptions of practical physical education and senior secondary education is not new [212, 303, 316-318]. In a comparison of the Higher Still Physical Education course in Scotland with the Senior Physical Education course in Queensland, Australia, Thorburn and Collins (2006) analysed consequences on student learning [14]. Thorburn and Collins (2006) suggested that evidence of student achievement in senior secondary physical education should be included in any evaluation of curriculum integration and teacher effectiveness [14]. However, student perceptions of teacher-related factors that may influence academic performance in the
specific context of senior secondary physical education in Victoria, Australia, had not been investigated.

The purpose of this study was to explore student perceptions of the teacher-related factors that may influence student academic performance in the VCE Physical Education course, and identify the teacher-related factors that students perceive to be effective in senior secondary physical education teaching.

6.3 Method

6.3.1 Participants

Students completing Units 3 and 4 VCE Physical Education were invited through professional physical education networks to participate in the study. Ethical approval was obtained from the University Human Research Ethics Committee (Appendix C). All students who responded to the advertisement received a plain language statement outlining the research and a dual (parental and participant) consent form.

Unit 3 and 4 VCE Physical Education students from Melbourne's east and south-eastern suburbs (n=23; female=16, male=7) from government secondary schools (n=3) and an independent secondary school (n=1) provided informed consent to participate in the study. In total, five groups of students participated in the poster annotation sessions. Each group met at a mutually convenient time and location in October 2013, just prior to the end of the academic year but before the external VCE examination period for Year 12 students. This window of time was considered appropriate, considering the constraints afforded to students completing courses for certification, where the stakes are high in terms of outcomes for the students. Students had completed the face-to-face teaching component of their studies and were commencing a period of revision before the final examination.
The groups consisted of four to five students from the same school and same VCE Physical Education class. All students who responded to the invitation to participate were included in the study. At one school the number of students who responded was too high for one focus group and as a result, two groups of students from this one school were involved in the study. The homogeneous nature of the groups provided an environment for students to record their thoughts and experiences of their perception of the ‘perfect’ VCE Physical Education teacher within a peer group, while still providing individual responses. Three of the five groups were of mixed gender as the schools were co-educational, however, one school was a single sex school, and therefore the focus group from that school was single sex.

Students were asked to annotate an A3 poster of a super hero figure with characteristics of what they perceived to be the ‘perfect’ VCE PE teacher. Students were instructed to consider those teacher-related factors that they considered to be the ideal in helping improve their academic performance in VCE Physical Education. Students were requested to consider behavioural rather than personal characteristics of their perceived ‘perfect’ teacher, and were asked to comment on teacher behaviours and not the teacher as a person. For example, students were encouraged to consider what the ‘perfect’ teacher does to help improve academic performance. This ensured that student responses reflected teacher-related behaviours and not personal characteristics. The researcher remained in the room with the students while they completed the poster annotations to answer any questions that arose.

6.3.2 Data analysis

Data collected via the poster annotations were de-identified, transcribed and analysed systematically using NVivo (QSR International Pty Ltd, Version 10, 2014) software package. Immersion in, and familiarisation with the data were initially achieved through reading and re-reading, highlighting and annotating the transcribed data [319]. The coding process was then recursive and iterative [320], initially codes were identified apriori. Potential codes were classified
from the theoretical framework guiding the study; the social-ecological model [310]. The theoretical understanding of the existing constructs of the study determined the development of codes. A code book [321] was developed to include the code title, a description of content to be coded, with an inclusion and exclusion criteria, and an example from the data to ensure accuracy and rigor throughout the coding process. A simple word frequency query was performed to gain some insight into the key themes emerging from this initial coding of data. Further coding and analyses to identify emergent themes and explore student perceptions of teacher-related factors on student academic performance in VCE Physical Education were performed in-vivo, where categories were named directly from the words of the participants [322]. This process allowed sub-categories of the dominant levels of influence, namely the individual and social level of the social-ecological model, to be identified as further themes emerged. These sub-categories were then compared with the profile of an effective teacher as described by Stronge (2007) [31].

6.4 Results

The 23 (female=16, male=7, 16-18 year olds) Unit 3 and 4 VCE Physical Education students from government secondary schools (students, n=14) and an independent secondary school (students, n=9) reported many characteristics of the ‘perfect’ teacher and teaching practices. Students identified elements of teacher behaviour in and outside of the classroom that may impact on their academic performance. Examples of the students’ annotated posters are presented in Figure 6.1.

Common patterns were identified both between and within groups with a high level of consistency. The identified themes were consistent between government and independent school students and both male and female students. Initial analyses identified factors at the individual and social level of the social-ecological model to be the most prominent influences from the students’ perspective. Students did not identify factors at the physical environment or policy level of influence in their poster annotations of the ‘perfect’ VCE Physical Education teacher.
The dominant themes that emerged from the poster annotations at the social and individual level of influence on teacher behaviour were found to be:

- Knowledge of content (individual)
- Verbal ability (individual and social)
- Caring (individual)
- Enthusiasm (individual)
- Access (to the teacher) (social)

Students consistently reported teacher knowledge of content, specifically course content in VCE Physical Education, as an important teacher-related factor that may influence academic performance. Students clearly articulated that their perception of the ‘perfect’ VCE Physical Education teacher would be one who is knowledgeable (Table 6.1).

Many students spoke of the importance of communication. Student perceptions of their ‘perfect’ VCE Physical Education teacher included numerous references to their teacher’s ability to communicate. This included communication with the student and also their ability to communicate or convey ideas clearly and compellingly (Table 6.1), as well as providing detailed examples and explanations. Students clearly articulated the importance of using different forms of communication including visual stimulus, using actions and physical demonstrations, relating concepts to real life examples, and relating new concepts to old. Students identified the importance of the ‘perfect’ VCE Physical Education teacher caring about them as individuals. Student poster annotations related to the ‘caring’ theme covered a broad range of teacher attributes, such as being supportive, understanding, kind, friendly, listening to students, encouraging, patient, honest and fair, warm and having a sense of humour. A strong theme to emerge as a characteristic of the ‘perfect’ VCE Physical Education teacher was enthusiasm, with students regularly reporting enthusiasm and passion as important teacher-related factors influencing their academic performance (Table 6.1). Enthusiasm as a theme incorporated enthusiasm, passion and motivation for the subject matter, and for teaching and learning overall.
Figure 6.1: Annotated posters of student perceptions of the ‘perfect’ VCE Physical Education teacher: A. Female student, (18 years), independent school; B. Female student, (18 years), government school; C. Female student, (17 years), government school
### TABLE 6.1: Student perceptions of the ‘perfect’ VCE Physical Education teacher

<table>
<thead>
<tr>
<th>Student quote and theme</th>
<th>Student characteristics (gender, school sector)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge of content</strong></td>
<td></td>
</tr>
<tr>
<td>“Knows the topic (extremely) well”</td>
<td>Female, government school</td>
</tr>
<tr>
<td>“Well educated, smart”</td>
<td>Male, government school</td>
</tr>
<tr>
<td>“Is confident in their teaching – knows the information well”</td>
<td>Female, independent school</td>
</tr>
<tr>
<td>“Knows the topic well”</td>
<td>Male, government school</td>
</tr>
<tr>
<td>“Knowledgeable”</td>
<td>Male, government school</td>
</tr>
<tr>
<td>“At VCE level, knows what to teach in regards to the study design”</td>
<td>Female, independent school</td>
</tr>
<tr>
<td><strong>Verbal ability</strong></td>
<td></td>
</tr>
<tr>
<td>“Offers different insights into the subject that can make it easier to understand”</td>
<td>Female, independent school</td>
</tr>
<tr>
<td>“Able to convey knowledge”</td>
<td>Male, government school</td>
</tr>
<tr>
<td>“Good communication to us as students”</td>
<td>Female, government school</td>
</tr>
<tr>
<td>“Using visuals/actions for certain concepts”</td>
<td>Female, independent school</td>
</tr>
<tr>
<td>“Incorporating knowledge into everyday life activities”</td>
<td>Male, government school</td>
</tr>
<tr>
<td>“Relates content to student experiences”</td>
<td>Male, government school</td>
</tr>
<tr>
<td>“Uses examples to clearly explain concepts”</td>
<td>Female, independent school</td>
</tr>
<tr>
<td>“Relate new concepts to old ones”</td>
<td>Male, government school</td>
</tr>
<tr>
<td>“Using and relating to real life examples”</td>
<td>Female, independent school</td>
</tr>
<tr>
<td><strong>Caring</strong></td>
<td></td>
</tr>
<tr>
<td>“Considerate of other workloads and commitments”</td>
<td>Female, government school</td>
</tr>
<tr>
<td>“Provides support so that I’m not afraid to ask a ‘stupid’ question”</td>
<td>Female, independent school</td>
</tr>
<tr>
<td>“Able to have a laugh, not always serious”</td>
<td>Male, government school</td>
</tr>
<tr>
<td>“Supportive towards student”</td>
<td>Female, government school</td>
</tr>
<tr>
<td>“Sense of humour”</td>
<td>Female, government school</td>
</tr>
<tr>
<td>“Tries to make the lesson fun and engaging”</td>
<td>Female, independent school</td>
</tr>
<tr>
<td>“Cares about how their students are going”</td>
<td>Female, independent school</td>
</tr>
<tr>
<td><strong>Enthusiasm</strong></td>
<td></td>
</tr>
<tr>
<td>“Being confident and enthusiastic about all areas of the course”</td>
<td>Female, independent school</td>
</tr>
<tr>
<td>“Motivated and interested in teaching and student success”</td>
<td>Female, government school</td>
</tr>
<tr>
<td>“Passionate about the subject”</td>
<td>Female, government school</td>
</tr>
<tr>
<td>“Enthusiastic about the content”</td>
<td>Male, government school</td>
</tr>
<tr>
<td>“Energetic, enthusiastic”</td>
<td>Female, government school</td>
</tr>
<tr>
<td><strong>Access (to the teacher)</strong></td>
<td></td>
</tr>
<tr>
<td>“Makes time to see students individually and help answer questions”</td>
<td>Female, independent school</td>
</tr>
<tr>
<td>“Willing to receive and reply to emails students send with concerns”</td>
<td>Female, government school</td>
</tr>
<tr>
<td>“Strongly encourages us to see him outside of class time”</td>
<td>Female, independent school</td>
</tr>
<tr>
<td>“There to help at all times”</td>
<td>Male, government school</td>
</tr>
<tr>
<td>“Allows access outside of class”</td>
<td>Male, government school</td>
</tr>
</tbody>
</table>
The final dominant theme to emerge from the student data was that of access. Student perceptions clearly identified the importance of having access to their teacher outside of class time (Table 6.1). This included both formal and informal meetings, electronic contact and communication as well as being available.

6.5 Discussion

Students involved in this study provided valuable insight into their perceptions of the teacher-related factors that may influence academic performance in VCE Physical Education. Through the student lens, insight into the important influences can be gained, according to the key stakeholders, the students [323]. It should be noted that students in this study were asked to report characteristics of the ‘perfect’ VCE Physical Education teacher; as a consequence they were unlikely to phrase their responses in the negative. Students were very specific in their views and clear in their expectations of the ‘perfect’ VCE Physical Education teacher. The dominant themes that emerged from the data were consistent across government and independent school students and across genders. Few differences were found when comparing the poster annotations of all students.

The poster annotations of the ‘perfect’ VCE Physical Education teacher provided insight into what students perceived to be important for improving their academic performance. The students perceived five key teacher-related factors that they believed may influence academic performance in VCE Physical Education; content knowledge, verbal ability, care, enthusiasm and access.

Teacher access is notably absent from previous research into teacher-related factors that may influence academic performance. Based on observations, the American Association of School Administration (AASA) identified 15 techniques and characteristics of effective teaching, published as a guide for classroom teachers [324]. One of these techniques or characteristics was teachers who are accessible to students outside of class. Students in this study reported that access to their
teacher both electronically and face-to-face was an important teacher-related factor in improving their academic performance that has not been previously identified in research as a key characteristic of an effective teacher, and more specifically, as a characteristic of an effective senior secondary physical education teacher. From a teacher perspective, it may be important to investigate the impact of students having access (electronically), 24 hours a day, seven days a week, and how pre-service and in-service teachers can be prepared and supported to set clear boundaries and expectations for responding to students outside of work time.

Content knowledge has been associated with teacher effectiveness and consequently reported to improve academic performance in numerous studies about diverse subject areas [30, 31, 311, 325, 326]. There is evidence that suggests that teachers with greater subject-matter knowledge are able to ask higher-order questions, involve students in lessons and allow more student-directed activities [7, 8, 220, 318]. Students in this study consistently reported teacher knowledge as an important factor influencing academic performance. They wanted the 'perfect' physical education teacher to be “smart” and “knowledgeable”. Reflecting on the work of Ward (2013) deep content knowledge is required for meaningful outcomes in physical education as it determines the quality of the tasks teachers set [40]. He was specifically referring to the quality of task in practical based physical education classes and yet, the notion of “you get what you teach” (p.437) [40] suggests that high quality tasks designed by teachers who have greater depth in their content knowledge in senior secondary physical education are more likely to improve academic performance compared with low quality tasks.

In physical education, when subject content knowledge increases, so does pedagogical content knowledge [107] and a teacher’s ability to transform the content they are delivering into meaningful learning for students [108, 327]. Conversely, Hattie (2003) argued that when distinguishing between expert and experienced teachers, there is little difference in their subject area content knowledge; expert teachers differ in how they organise and use this knowledge [7]. That is, content knowledge is important but what you do with that knowledge separates expert teachers from the
others. Many of the students in this study expressed different ways in which the ‘perfect’ teacher would teach. The word pedagogy was not in the vocabulary of these students, however, their specific examples provided insight into how teachers could use content knowledge to enhance pedagogy that in turn, influenced academic performance. Students spoke of teachers being able to “relate new concepts to old ones” and “uses examples to clearly explain concepts” and “using and relating to real life examples”. Students suggested that when learning was contextualised in ways that were familiar to them it enhanced their understanding and learning.

Verbal ability has been previously linked to increased student learning [328] and a teacher’s ability to communicate and clearly convey knowledge is an important teacher-related factor that may influence academic performance. Students expressed the ‘perfect’ VCE Physical Education teacher’s ability to convey knowledge across all key content areas as an important teacher-related factor that may influence academic performance. Some students stated very clearly that the teacher should be able to convey knowledge; others provided further insight into how they expect the ‘perfect’ teacher to be able to convey that knowledge. For example, “detailed explanations and examples” and “incorporating knowledge into everyday life activities”. The student poster annotations consistently revealed how the ‘perfect’ teacher would use real-life examples or provide visual representation or actions to demonstrate elements of the content to help clarify student understanding. These students valued clear explanations and an ability to explain concepts in different ways to cater for different learning styles, and the adeptness to provide further but alternative explanation or clarification if students did not understand an idea in the first instance.

Verbal ability and a teacher’s ability to communicate in this context go beyond conveying content knowledge. Students also implied that the teacher’s ability to communicate information relating to organisational factors was important. Students reported that communication regarding changes to the program, homework, additional information such as handouts, and where to access practice exams, for example, was also important in improving academic performance in VCE Physical Education.
When considering Stronge's (2007) 'prerequisites for effective teaching', students identified both content knowledge and verbal ability as being characteristics of the 'perfect' VCE Physical Education teacher [31]. However, notably absent in students’ responses were comments associated with teacher certification (qualification), education coursework and teacher experience. Students may not fully understand the qualification requirements for teaching and expect that teachers are qualified to teach. One student identified teaching experience as a factor that may influence their academic performance, however, the majority did not identify experience as a relevant factor. Students did recognise the importance of the teacher being able to use a variety of teaching styles to convey information, and that the ‘perfect’ teacher would be able to use different instructional strategies when students did not understand a concept. Instructional practices of effective teachers vary [9, 42, 49, 93, 220]; they are skillful at using a variety of strategies and are able to select the most appropriate strategy for the context in which they are teaching. For students, the distinction between content knowledge and pedagogical content knowledge may not have been made. The expectation that a ‘perfect’ teacher is knowledgeable may indeed encompass all aspects of content and pedagogical knowledge. Teacher experience may only be a factor related to academic performance if the teacher is inexperienced. As a measurable variable, teacher experience has been associated with effectiveness, especially in studies in the US, however, as Darling-Hammond (1999) suggested, the differences in effectiveness between experienced and inexperienced teachers level off after five to eight years [311]. It should be noted that neither general teacher experience nor VCE Physical Education experience were reported in this study as this is not a characteristic that students would typically know about their teacher.

Affective teacher attributes such as caring are difficult to measure [31], however, previous research [329] suggested that student perceptions of caring are strongly correlated to student evaluations of their teachers, their affective learning and their perceptions of their cognitive learning. Students who perceived that their teachers care are more likely to exert academic effort [330]. Students in this study also reported that teacher-related factors associated with caring, such as being
supportive, understanding, kind, friendly, listening to students, encouraging, patient, honest and fair, warm and having a sense of humour were positively associated with academic performance. Student perceptions of affective teacher-related factors influenced effective learning.

Students expressed that from their perspective, key characteristics of the ‘perfect’ VCE Physical Education teacher included many traits that related to the teacher treating them with respect, understanding and consideration. Teachers’ capable of responding to student needs and creating a classroom climate of mutual respect, where the common goal for both students and teachers is to improve student academic performance, were seen by these students as ‘perfect’. Use of humour was categorised as a subset of caring, and was also seen to be influential by students. The ‘perfect’ VCE Physical Education teacher is “Humorous” and they “Use humour to (help us) remember concepts”. Similar findings of student perceptions of good teachers were also reported by the National Association of Secondary School Principals, who found that a sense of humour was the most important characteristic of what was described as the best teachers, followed by ‘make the class interesting’ [331]. Humour and fun may be important vehicles to engage students in their learning. The ideas from students in this study suggested that teachers needed to be “able to have a laugh”, and to provide “non-boring classes”, “make classes enjoyable and can make the theory interesting” and “tries to make the lesson fun and engaging”. These statements reflect the students’ need for their teachers to provide a learning environment that interests them. Similarly the high-ability senior-students studied by Horsley (2010) understood the need for the teacher to maintain control of the learning environment [318]. As one student in this study commented, teachers needed to be “Fun, but also strict at the same time”. Students in this study also reported that staying on topic and remaining focussed, using time effectively and being organised may influence their academic performance. Maximising instructional time and focusing on the curriculum has been shown to increase student learning opportunities [9]. The ‘perfect’ VCE Physical Education teacher needs to be able to find the balance between using humour to engage students, make their classes enjoyable and to set clear classroom boundaries to ensure that content is covered and learning occurs.
Enthusiasm has been found to be an important teacher-related factor connected to teacher effectiveness across all levels of schooling [332], and it has been specifically identified as an important teacher-related factor with older students [9, 30]. Enthusiasm has been identified as one of only two teacher behaviours that are generic across all content, year levels and types of student [333]. Consistent with previous research, the students in this study identified factors of teacher enthusiasm, motivation and passion as important factors that may influence academic performance [30, 292, 328]. Teacher enthusiasm has been identified as having at least two dimensions: enthusiasm for teaching and enthusiasm for the subject [334]. While students elect to undertake physical education for certification at the senior secondary level, it is not compulsory (in Australia), and teacher enthusiasm for the subject can contribute to developing a student’s attitude toward the subject matter. This has been shown to increase academic self-concept, interest in the subject area and a desire to learn more [31], with enthusiasm linked to student and teacher perceptions of higher instructional quality [335]. In this study, it is enthusiasm for the subject, “passionate about the subject”, “enthusiastic about content”, for teaching, “put a lot of thought and effort into designing every lesson” and for student success, “motivated and interested in teaching and student success” that students perceived to be important. To be an effective teacher, passion is not a luxury, but an essential element of all good teaching [336] and students in this study identified that ‘perfect’ teachers are “confident and enthusiastic about all areas of the course”, and they are “energetic and enthusiastic”. Students appreciated teachers who exhibited passion for physical education, through words and actions. Teachers who involved themselves in lessons, who were encouraging and motivating towards their students and passionate about ‘physical education’ the subject, were those who were perceived to be influential in improving academic performance.

Students identified teacher access as a central teacher-related factor that impacts on academic achievement at VCE level in physical education. In a digital age where students have expectations of ubiquitous learning opportunities and where access to information has few boundaries, students expressed that access to their teacher was imperative to their success academically. Students repeatedly reported that the teacher being available to them outside of class time was valuable.
Students annotated the posters with multiple examples of how they would like the ‘perfect’ VCE Physical Education teacher to be accessible. “Allows access outside of class time”, “always available to answer questions outside of class” and “willing to receive and reply to emails students send with concerns”. The Victorian Curriculum and Assessment Authority (VCAA) stipulates that for each unit at VCE level, schools must schedule 50 hours of classroom instruction. This equates to 100 hours of teaching across the academic year. Descriptions of teachers who make time to see individual students outside of set class times and those who are willing to use time outside of the scheduled face-to-face teaching to assist students, answer questions, clarify understanding and offer extra revision classes were prevalent in the students’ perception of the ‘perfect’ VCE Physical Education teacher. In research conducted in New Zealand on gifted students, additional out of class support for students was illustrative of the level of commitment shown by teachers [337]. In this context, it was less about needing or wanting greater access to their teacher and more about acknowledging the level of commitment required to support students in their academic pursuits. While some students in this study commented that access to the teachers was to receive help, it is unclear why other students specifically identified access as a key component to their academic success. The reasons may go beyond simply supplying answers to questions and be a conduit for student success through support and the building of confidence, and therefore warrants further research. Effective teachers of the 21st century will need to be available to both students and parents through various electronic formats as well as in person [338]. Further investigation to determine how students prefer to access their teacher (eg. in person, electronically) and what type of information or support they are seeking through this contact should be the focus of future research. The implications on teacher workload, face-to-face teaching and the issues of professional interactions with students through private/personal mediums such as mobile phones and social networks will need careful consideration in teacher preparation, ongoing support for practicing teachers, research and policy development.
6.6 Limitations

Although there was diversity in the student cohort sample (government and independent schools from a range of SES backgrounds, schools with VCE mean study scores of 28 – 36 out of a possible 50, providing a range of low to high performing schools) all the students who participated in this study were from the eastern suburbs of Melbourne, Australia. Future research may consider the inclusion of more geographically diverse student populations, including rural students. It is also relevant to note that students participated in this research prior to undertaking their end of year examination and receiving their final results for VCE Physical Education. Further research could include asking students to outline the notion of the ‘perfect’ VCE Physical Education teacher retrospectively, once they have received their external as well as their internal results, and can reflect on those teacher-related factors that they believe influenced their final outcome in VCE Physical Education.

6.7 Implications for teacher education

An awareness of student perceptions of the ‘perfect’ VCE Physical Education teacher may be beneficial to both in-service and pre-service teachers. Implications for pre-service teachers aspiring to teach senior secondary physical education and for in-service teachers wanting to improve the academic performance of their students, the findings of this study shed some light on what students perceive to be important teacher-related factors that may influence their academic performance.

Students identified ‘perfect’ VCE Physical Education teachers as those who:

- had strong subject specific content knowledge
- were able to clearly convey that knowledge through a variety of instructional strategies
- were caring, considerate, patient and kind, friendly, approachable, helpful and had a sense of humour but had good classroom management
- enthusiastic and passionate, about the subject and about teaching and learning
were accessible to their students outside of the classroom, both face to face and via electronic mediums.

The findings of this study support the need for professional learning opportunities for in-service teachers to improve or update their content specific knowledge to assist them to increase student academic performance. In line with the Australian Institute for Teaching and School Leadership (AITSL) National Professional Standards for Teachers, (AITSL, 2011) [25] physical education teacher education programs may need to ensure programs have a strong emphasis on effective communication training and development of interpersonal skills (verbal and non-verbal). Additionally to meet the standards, teachers are expected to ‘Know the content and how to teach it’ (subject specific content knowledge) and be able to ‘Create and maintain supportive and safe learning environments’ [25]. In this way, the qualities of effective teachers as recommended by students, can be combined with those skills already included in teacher training programs to assist teachers in increasing students’ academic performance in senior secondary physical education.

6.8 Conclusion

This is the first study known to have investigated student perceptions of teacher-related factors that may influence academic performance in senior secondary physical education. Students perceive the ‘perfect’ VCE Physical Education teacher to be knowledgeable, to have strong communication skills to convey this knowledge, care about their students, are enthusiastic about physical education and about teaching and are accessible to students outside of class time. The findings of this study are consistent with previous research but outline key factors through the lens of the senior secondary physical education student, and highlight specifically the perception that access to their teacher beyond scheduled class time is perceived as important.

With increasing pressure on schools, teachers and students to continually improve academic performance in high stakes courses such as the VCE and other senior secondary courses for certification and pathways to higher education, identifying teacher-related factors that may
influence student academic performance may provide opportunities to improve student outcomes. Through increased understanding of what it is that students want from their teacher in this context, teachers can construct a learning environment that meets the needs of the student, and adapt to changes in that environment to capitalise on those ‘teachable moments’ that arise.

While the notion of the ‘perfect’ physical education teacher may not be realistic, the key themes from this research indicate that to improve academic performance, teachers in senior secondary physical education need to have good content knowledge, be able to communicate that knowledge clearly, care about their students, be enthusiastic about teaching physical education and be available to their students outside of class time.

The poster annotations allowed VCE Physical Education students to articulate their perceptions of the ‘perfect’ VCE Physical Education teacher. However, additional opportunity for students to elaborate on their perceptions to further explore the teacher-related factors that they perceived to influence academic achievement was warranted. The same VCE Physical Education students who completed the annotated posters participated in focus group discussions that explored the influences on their academic performance and the findings are reported in the following chapter.
CHAPTER 7

Insights from senior secondary VCE Physical Education students on teacher-related factors they perceive to influence academic achievement
CHAPTER SEVEN: Insights from senior secondary VCE Physical Education students on teacher-related factors they perceive to influence academic achievement

7.1 Preface

With the knowledge gained from the students via the poster annotations on their perceptions of the ‘perfect’ VCE Physical Education teacher, it was evident that student voice was a valuable perspective to consider when investigating factors that influence academic performance. Semi-structured focus groups were therefore employed to further elucidate these findings from the same students who had previously completed the poster annotations of the ‘perfect’ VCE Physical Education teacher. This chapter further explores student perceptions of teacher-related factors that may influence academic achievement in the context of VCE Physical Education. This chapter is based on a manuscript that has been submitted for publication and is currently under peer-review.

7.2 Introduction

Exploring student perceptions may provide valuable insights into teacher-related factors that students perceive increase the likelihood of learning, and ultimately influence their academic achievement. Students are key stakeholders in senior secondary courses for certification. Previous research [248] identified student perceptions of what constitutes the ‘perfect’ senior secondary physical education teacher to include the teacher: i. being knowledgeable, ii. being caring, iii. being enthusiastic, iv. having strong verbal ability (communication skills) and v. being accessible to their students beyond the classroom. This chapter builds on these findings and further explores student perceptions of teacher-related factors that students perceive may influence academic performance in VCE Physical Education.

7.2.1 Student perceptions

Amidst calls for student voice to be included in the conversation around effective teaching [215], educational research has tentatively embraced consultation with senior secondary students,
however few studies have sought student perspectives on teaching and learning [303, 339, 340]. Asking students for their perspective allows those who are the key-stakeholders in this scenario to have a voice in determining how teacher behaviour can be modified to increase academic performance in senior secondary education. Thus, increasing the ecological validity of teaching standards [341] in senior secondary education. Hattie (2009) suggested that student perspectives are key factors when aiming to understand what learning looks like and feels like [42]. Student perspectives may not be a widely used method to inform the ongoing development of learning and teaching because they offer what McIntyre, Pedder and Rudduck (2005) called uncomfortable leanings for teachers [323]. Yet students have something significant, useful and insightful to offer [323] and have shown to be quite capable of identifying quality teaching [342].

Previous research which has explored student perceptions of teacher behaviour suggests that providing leadership and displaying strict or disciplinary behaviours are beneficial in eliciting high cognitive outcomes in the teaching of physics [339]. When affective outcomes for these same students were measured, leadership was still important, however, teacher behaviour also needed to be helpful, friendly and understanding [339]. Final year secondary school students in Ireland identified exam focussed teaching methods as good teaching, but these same methods were seen as inauthentic by lower secondary students [212], suggesting that effective teaching is context specific. Similarly, final year students in the Netherlands attached greater value to exam orientated teaching strategies, yet a clear characteristic of excellent teachers in this context was the use of a wide range of teaching approaches that engaged a broad range of students [341]. Student perceptions of influential teachers in New Zealand aligned closely with the identified characteristics of effective teachers [318]. It is unclear from the literature if student perceptions of effective teaching is context specific, or if teacher-related factors that influence student academic achievement differ across contexts. The aim of this research therefore was to explore student perceptions of teacher-related factors that may influence academic achievement in the context of senior secondary VCE Physical Education.
7.2.2 Teacher-related factors associated with increased academic performance

Effective teaching can be seen in teacher behaviours and actions [343] and generic teacher behaviours have been previously identified and discussed in education research [31, 32, 344] and this thesis. Stronge’s (2007) framework of effective teachers includes prerequisites of effective teachers (verbal ability, educational coursework undertaken by the teacher, level of certification, content knowledge and teaching experience), the teacher as a person (including caring, fairness and respect, social interactions, enthusiasm and motivation, attitude and reflective practice), classroom management and organisation, planning and organising for instruction, implementing instruction and finally, monitoring student progress and potential [31]. However, what works in one educational setting may not work across all contexts [343] and the adoption of a one-size-fits-all approach may not result in increased academic achievement for students. General teaching standards internationally are often linked with teacher accreditation and registration, but may not align with content and pedagogical content knowledge required in senior secondary education. The National Professional Standards for Teachers in Australia identify appropriate levels of professional knowledge, practice and engagement [25]. Witte and Jansen (2016) suggested that for senior secondary teachers, subject specific knowledge and skills are important when determining excellence in teaching and have questioned the ecological validity of generic teaching standards [341].

Of the limited research exploring effective teaching in senior secondary education, senior secondary physical education, has received little, if any attention. Horsley (2012) found that teachers who facilitated high academic performance in an array of subjects in the Year 13 Scholarship examinations in New Zealand had deep content knowledge, passion for teaching and held high, yet realistic expectations for their students [30]. High teacher expectations have been associated with effective teaching, with much of the research focussed on teachers having high expectations for their students to improve learning outcomes [93, 330]. In the context of senior secondary physical education there has been much discourse surrounding authentic assessment
practices [28, 113, 114], curriculum design [14, 17, 18] and pedagogical approaches [15, 28, 112]. Creating rich learning environments is important for student engagement, and in physical education where learning through movement [224] is (or at least should be) valued, practical experiences in VCE Physical Education should allow for the theoretical knowledge to be integrated with practical application [120]. However, the teacher-related factors that students perceive as important in improving their academic performance in this context are unknown. A study that explores student perceptions of effective teaching in senior secondary physical education may provide valuable insights and offer useful additional knowledge to the current literature on teacher effectiveness.

7.2.4 Theoretical framework and methodology

Influences on teacher behaviour that may affect student academic performance can be considered through a social-ecological framework. Specifically, in this context, a social-ecological model allowed for evidence on teacher behaviour at the individual, social, physical environment or policy level to be explored, with the individual and social influences more readily modifiable by the teacher.

Focus groups have been shown to be useful tools for research in educational settings [345, 346] with the questioning and interaction between participants within the group stimulating discussion [347] and providing robust data and insights [348]. By identifying student perceptions of teacher-related factors that influence academic performance, the evidence may be translated into improved academic learning outcomes for students. A limitation associated with the use of focus groups in educational settings is the use of convenience samples. Therefore it was deemed appropriate in this research context [349] to ensure that participants met the inclusion criteria [350] of currently completing Unit 3 and 4 VCE Physical Education.
The research questions that guided this study and formed the basis of the semi-structured interview scheduled were:

I. What are the teacher-related factors that students perceive to influence academic achievement?

II. Are the teacher-related factors that students perceived to be important similar or different to the generic qualities identified in the literature?

7.3 Method

7.3.1 Participants

Following approval from the University College Human Ethics Advisory Network (CHEAN) (Appendix C), students undertaking VCE Physical Education in 2013 were invited through physical education teacher professional networks to participate in a semi-structured focus group. In an educational setting, focus groups explicitly use interactions between group members to produce data and insights [351]. All students who responded to the advertisement and met the specific requirements for participants were provided with a participant and parental information letter. Those who agreed to be involved in the study returned an individual and parental consent form. Students were instructed to attend the focus group at a specified time and location. Recruitment of students occurred in early October 2013 and focus groups were conducted over a two-week period in mid-October 2013. This time period was considered appropriate, as all students had completed the face-to-face teaching component of their studies and were commencing a period of revision before the final external VCE examination period.

7.3.2 Focus group discussions

Focus groups were facilitated, moderated and monitored [351] by the author (a trained facilitator) in October, 2013 with Units 3 and 4 VCE Physical Education students until saturation when no further new themes were emerging. Five focus groups were conducted, which consisted of four to
five students from the same school; the homogeneous groups provided a supportive environment where individuals were more likely to feel comfortable to share their views [352]. Each group were asked a series of questions, using a semi-structured interview schedule (Appendix E), to explore their perceptions of the influence of the teacher and teaching they had experienced on their learning in VCE Physical Education during that year. Focus groups were conducted in private rooms, where participants could not be seen or heard by those not participating in the study. Clear rules were articulated by the facilitator to ensure the environment was conducive to participants feeling comfortable to disclose information, question, clarify or disagree with the responses of others [348, 352]. Focus group discussions ranged from 25 – 40 minutes in duration. Discussions were recorded using a digital voice recorder, downloaded and transcribed verbatim by the author to ensure consistency and accuracy of the data prior to analysis [353]. Additionally, written notes were taken by the facilitator as a means to record non-verbal interactions (such as nodding or shaking of the head) of participants and provide contextual details to assist with voice recognition of individual participants in the transcribing process [352].

7.3.3 Data analysis

Prior to the focus group discussion, participants completed a brief questionnaire to self-report basic demographic information (age and sex) and educational context (Units of VCE Physical Education completed, participation in a transition program (a program to assists students in their preparation for the following year), size of VCE Physical Education class, school sector and the sex of VCE Physical Education teacher) (Appendix F). All de-identified data (transcribed discussions & questionnaires) from the student focus groups were analysed using NVivo (QSR International Pty Ltd, Version 10, 2014) software package. Inductive content analyses [354] were performed to identify emergent themes in the data. The coding process was iterative and recursive [319, 355] to ensure familiarisation with the data and what it contained. A four step process was utilised [355]. Firstly, data immersion was achieved through listening to the recordings multiple times prior to transcription, and then reading and re-reading of the transcribed data. Transcription errors were
identified and corrected at this point, during the data cleaning process. During this process, text was highlighted; underlined and descriptive annotations were made in the margins. Open coding (step two) was conducted asking questions of the data, making comparisons and identifying similarities and differences [320]. The third step involved categorising the data at the individual, social, policy and physical environment levels of influence using a social-ecological model [310]. Finally, themes were generated through an interpretation of the data underpinned by the social-ecological theory [44] and Stronge’s (2007) framework of effective teachers [31] to explore the students’ perceptions of teacher-related influences on student academic performance in VCE Physical Education.

7.4 Results

A total of 23 Unit 3 and 4 VCE Physical Education students (Female=16, Male=7) from government (n=3) and non-government (n=1) schools in Melbourne, Australia’s east and southeast suburbs participated in the student focus groups.

To begin to explore the teacher-related factors that may influence academic achievement, students identified areas of the VCE Physical Education course that they found most challenging to understand (Table 7.1). Reported reasons for difficulty included unfamiliarity with the material or context, limited time devoted to covering the content, volume of information required to be retained, lack of engagement with content and the subjective nature of the content. Establishing the areas of the VCE Physical Education course that students found difficult provided insight from students as to the perceived reasons for the difficulty experienced. From the student responses on challenging content, further discussion followed on how teachers were able to help students overcome these difficulties.
### TABLE 7.1: Student perceptions of challenging areas of content in VCE Physical Education

<table>
<thead>
<tr>
<th>Area of study</th>
<th>Perceived reason for difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring and promotion of physical activity</td>
<td>“the measuring physical activity stuff I guess, cause it can be this or it can be that, its kind of grey.” <em>(Female, non-government school)</em></td>
</tr>
<tr>
<td></td>
<td>“…measuring physical activity and the social ecological model, cause I probably had never been exposed to something like that and it was quite a different way of looking at physical activity and things like that so that was probably the hardest thing for me to understand. And also it is not quite as direct as an answer, like something like energy systems or acute responses might have.” <em>(Female, non-government school)</em></td>
</tr>
<tr>
<td></td>
<td>“I think I was having trouble distinguishing what the subjective and objective methods used were….because they are pretty similar in my mind.” <em>(Male, government school)</em></td>
</tr>
<tr>
<td>Physiological responses to physical activity</td>
<td>“For me, I sort of found energy systems quite confusing when it was new….because I had never been exposed to something like that in areas of science.” <em>(Female, non-government school)</em></td>
</tr>
<tr>
<td></td>
<td>“I didn't do unit one and two so there were some areas (energy systems) that were covered in unit one and two that I struggled to pick up on.” <em>(Female, government school)</em></td>
</tr>
<tr>
<td>Planning, implementing and evaluating a training program</td>
<td>“I think some of the areas that we just brushed over quickly so chronic adaptations to exercise.” <em>(Male, government school)</em></td>
</tr>
<tr>
<td></td>
<td>“It was chronic adaptations that we didn’t have, it wasn’t actually on a SAC at all, but it is coming up to the exam and it is on the exam, so we kind of had to learn it.” <em>(Female, government school)</em></td>
</tr>
<tr>
<td>Performance enhancement and recovery practices</td>
<td>“For me it was remembering all the effects of the drugs like positive and a negative so like diuretics and narcotics and all that and also a bit of the sports psychology, there was a lot of things like the goal-setting to remember.” <em>(Male, government school)</em></td>
</tr>
<tr>
<td></td>
<td>“Probably the sports psychology one because, especially in the SAC when I was answering questions, I would be thinking that sounds really basic and I'm not sure if that is too basic or if that is just right or not.” <em>(Male, government school)</em></td>
</tr>
</tbody>
</table>

*Victorian Curriculum and Assessment Authority [120]*

Emerging themes did not vary between genders or school sector. The key themes, which emerged from the data, were primarily associated with the social-ecological model’s individual and social levels of influence. While students identified factors at the policy level (transition programs) and physical environmental level (access to facilities and resources), those that related specifically to
teacher behaviour are emphasised and discussed in this chapter. The four key themes identified in this study as teacher-related factors that influence student academic achievement are: teacher attitude, teacher attributes, student-teacher interactions and student access to the teacher (outside of scheduled class time). These themes are categorised by level of influence using the social-ecological model as a framework (Table 7.2).

**TABLE 7.2: Emergent themes from focus group data categorised by levels of influence of the social-ecological model**

<table>
<thead>
<tr>
<th>Level of influence within the social-ecological model</th>
<th>Theme</th>
<th>Item description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>Teacher attitudes</td>
<td>Passion and enthusiasm for teaching and learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Expectations for student success, commitment and behaviour</td>
</tr>
<tr>
<td></td>
<td>Teacher attributes</td>
<td>Knowledge of students, content and teaching strategies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skills in communicating, organising and monitoring student progress</td>
</tr>
<tr>
<td>Social</td>
<td>Student-teacher interactions</td>
<td>Approachable, encouraging, supportive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Uses humour to connect with students</td>
</tr>
<tr>
<td></td>
<td>Access to the teacher</td>
<td>Physical and electronic availability to students outside of class time</td>
</tr>
<tr>
<td>Policy</td>
<td>Transition into VCE Physical Education</td>
<td>Structure, function and content of transition programs</td>
</tr>
<tr>
<td>Physical Environment</td>
<td>Access to facilities and resources</td>
<td>Teacher facilitated access to resources and equipment</td>
</tr>
</tbody>
</table>

At the individual level of the social-ecological model, teacher attitudes (defined here as the teacher’s manner of behaving toward learning and teaching in VCE Physical Education) and teacher attributes (defined as the qualities or characteristics that students assigned their teacher) emerged as dominant themes.
At the social level students identified the interactions between the student and teacher as a dominant theme. Teacher-related factors that influenced their behaviour when interacting with students included being approachable, use of humour, being encouraging and supportive, and getting involved with the class. Additionally, access to the teacher outside of class time was a dominant theme.

7.4.1 Individual level factors

7.4.1.1 Teacher attitudes

Students identified several different aspects related to their teacher’s attitude or manner of behaving toward learning and teaching in VCE Physical Education. Passion and enthusiasm for teaching and for physical education were perceived to be important for students involved in the focus groups. A teacher’s positive attitude was seen by a majority of students as an important aspect for enhancing their academic success.

*Just in the general style of what makes a good teacher I think just being really positive and you know that he wants to be there teaching you and he wants to see you do the best that you can and that makes me want to really try my best to try and make everybody happy and stuff. Just for me it doesn’t really work for me when teachers come to class a bit you know they sort of don’t really want to be there, you might think that and they are not as engaging and positive. (Female student, non-government school)*

Teacher attitude to student success was reported by all focus groups as an important determinant of academic success. Students overwhelmingly reported that teachers held high expectations for students as the following examples demonstrate:

*She expects us to put in the time and effort because it is our last year and we should try our best. (Female student, government school)*
.... it’s in a way that you get that he wants you to do well and he’s sort of able to direct that throughout the work that he does and sets it out and to a high standard and he expects you to reach that but if you can’t you get as high as you can. (Female student, government school)

For some students, the perceived expectations teachers had for them were in respect to completing work on time and handing it in. For others, it was about expectations related to behaviour, and for some it was to do well academically.

Yeah he has a pretty high standard of (us) bringing in the worksheets that he sets us on time. I don’t think he would go as far as giving us a detention but we never really give him reason to. Because he always communicates to us, you have got to get this in, you have got to keep a high standard for the class and generally we do hand them in on time. (Male student, government school)

In terms of articulating teacher expectations, with the exception of students in focus group one, the terminology used by students was positive. Students referred to teacher expectations as constructive and encouraging and students felt that even though the expectations from their teacher were high, if students were doing their best and working at the expected level then the teacher was happy with their performance. It is important to note that for one group of students, teacher expectation was not viewed as a positive influence. In this group, four of the five students were completing Units 3 and 4 while in their penultimate year (Year 11), as opposed to all other participants in the study who were in their exit year (Year 12). Students in focus group one noted that teacher expectations differed between Year 12 students and Year 11 students, despite them completing the same Unit 3 and 4 course.

He has a different expectation of the year 12’s than the year 11’s. He expects us, well, he just thinks we are not as good as the year 12’s and it’s a bit like, down putting sometimes. (Female student, non-government school)
Some students felt the expectation to be as good as others in the class was unrealistic. However, for some this competitive environment created by the teacher was perceived to be a motivator.

Yeah like I think that is the main point throughout the year, there is one particular girl, but you know he kind of gives us a nudge, you know you could be like Student X you know, and that is in itself a motivator like he doesn’t have to say much more because you try to beat, not beat, but be on the same level as someone. (Female student, non-government school)

Despite the differing perceptions of teacher expectations, all students identified that their teachers had high expectations for them in VCE Physical Education.

7.4.1.2 Teacher attributes

The qualities and characteristics that students assigned their teachers included dedicated, organised, knowledgeable and a good communicator. VCE Physical Education students consistently identified teacher knowledge as an important teacher attribute. Knowledge in this context was multifaceted: knowledge of the students as individuals, knowledge of teaching strategies and content knowledge (“He’s also really knowledgeable about the subject.” (Female student, non-government school)) were seen as important influences on academic achievement. Specific examples provided by students ranged from teachers’ knowledge of sports they played, preferred learning styles, and strengths and weaknesses. Students recognised that with this knowledge teachers were able to provide suitable examples, vary their teaching styles to accommodate all learners and use appropriate questioning techniques.

One thing that has been helpful for me and probably other people is when he is talking about sport and he will relate it to someone and what they do, so if someone plays soccer, he’ll relate it to that and I know that helped me a lot. (Male student, government school)
I guess like he uses lots of sports and relates to the energy systems and whatever, and 'cause I guess he knows what sports we all do its easier for people who do sports to like relate to it. (Female student, non-government school)

Knowledge of students preferred learning styles was mentioned by students and linked to strategies to enhance understanding. Students perceived teacher knowledge of teaching strategies to be extensive, and furthermore, teachers were equipped to determine the most appropriate strategy to use based on the content and context in which they were teaching.

He also accommodates to all of our learning types so he tries to target the visual learners, I’m more of a visual learner so when he tries to explain having lactate tolerance he’ll get up and get a volunteer to explain what it would be like at the end of a race and then all the other types of learners just to make sure that everybody really understands, its really helpful. (Female student, non-government school)

Realistically he uses every single one of those (teaching strategies) at different stages at different times when they are needed. He is obviously able to determine which one is appropriate at the time. (Female student, government school)

Students in this study specifically emphasised that teachers had a broad repertoire of pedagogical approaches that they utilised. Students identified a number of different teaching strategies used by the teacher that they perceived to be beneficial to their academic success in VCE Physical Education.

He looks at different styles of like how we absorb information. I know that I like visual, that’s how I learn and he always does like (student demonstrates) vasoconstrict, vasodilate and that like really helps me and he likes to targets different learners, that’s what I think. (Female student, non-government school)

Students emphasised the positive influence on academic achievement through the use of questioning, demonstrations and linking of content to real world or everyday situations.
He always keeps it interesting; he always has something interesting, some examples from the real world, which helps us. (Female student, government school)

Students identified that practical activities aided retention and understanding of key concepts, reinforced learning, and provided concrete examples to draw on.

I think it's easy to understand the theory with prac work behind it because if you are sitting there just writing the whole time you kind of go OK, I understand but I don't sort of get the actual component of it and then by doing it, it gives you more of an outlook on it. (Female student, government school)

I know when learning about fatigue and especially we could actually feel what was happening it made us understand better what was going on when we were writing it down because we have actually felt it before. (Female student, government school)

It is evident that the purpose of the practical activity was clear to these students. They understood that the task had a purpose, often to reinforce key concepts, and that the practical activity was underpinned by theoretical concepts:

We never did anything (practical work) that wasn’t related to like the content (of VCE Physical Education) (Female student, non-government school)

Students provided multiple examples of how ‘doing’ influenced their learning; provided concrete examples for them to draw upon and acted as a prompt to help students remember.

We did a prac on that (domains of physical activity) which really stuck with me. I remember them really well. That helps me, prac, doing it physically what we’ve learnt in theory. (Female student, government school)

So he did like physical stuff that made us remember. And like when he was explaining plyometrics he made us all stand up and we tried to jump without bending our knees. (Female student, non-government school)
The perceived benefit of practical activities to the understanding of theoretical concepts was not a consistent perception across all focus groups. In direct contrast, students from one focus group reported the role and value of practical work in VCE Physical Education quite differently to all others:

*I think with him it's more, its almost like he doesn't need to (do demonstrations) when he explains things it is very detailed but there will be things like in the book or the handout, so he doesn't really need to be like, let's go outside and (I'll) show you how this is done, its detailed enough that you don't really need to.* (Female student, government school)

*It was good to have a break (from theory) and do something different.* (Female student, government school)

Organisational skills of the teacher were identified consistently across all groups as important factors influencing academic performance. Students also commonly reported teacher attributes of monitoring student progress and the provision of feedback, both written and verbal, to be important factors affecting academic achievement.

*His organisation is really helpful…he was so organised, it kept us all on the ball.* (Female student, government school)

*He has given us lots of practice papers to do and then if I do one I’ll give it to him that day and he will have it back to me by the end of the day. He’s pretty good!* (Female student, non-government school)

### 7.4.2 Social level factors

#### 7.4.2.1 Student - teacher interactions

Students identified the relationship between student and teacher as an influential factor in regards to academic success. Students reported that their teacher being approachable and caring and being able to relate to their teacher as a person or friend was important. Students often referred to
the teacher attribute of being approachable and that they were able to ask the teacher a question without fear or embarrassment.

*I think that we are able to be friends with the teacher so it makes going to ask a question really easy and you are not concerned that they don’t want to answer your question.*  
(Female student, non-government school)

Students reported other important relational aspects of the student-teacher interaction including the use of humour. Students consistently across all groups indicated that they were able to have a few laughs with their teacher and that contributed to a positive learning outcome for the students.

*Sometimes he like cracks a few jokes and we all (laugh) and he explains it in a way that incorporates into every day movements and motions so that it's easy to understand because we can relate to it.* (Male student, government school)

7.4.2.2 Access to the teacher

Teacher accessibility was an important factor for four of the five groups of students. It was evident in the responses from students in one focus group that the teacher did little beyond the classroom to help with their learning. In contrast, students in the other focus groups reported that their teachers made themselves available to their students beyond the scheduled class time. Students conveyed that access to the teacher through one-on-one meetings, tutorial sessions with peers, email and text messaging were perceived to be important influences on their academic achievement. The primary reason that students required access to the teacher either via direct contact or via electronic media, outside of scheduled classroom time, was to ask questions and clarify understanding.

*Even if we don't use it (accessing the teacher) we know that its there. I know that sometimes I haven’t always gone to see him but you still know that he will be always there like if you have a question or anything.* (Female student, government school)
He gives us his mobile number so that he says we can text him like if we are having trouble with something. (Female student, non-government school)

And we can also email him so that way if we email him on a weekend, like Saturday morning we can then text him and say can you please check you emails, I emailed you, so that he knows that there is an email there. (Female student, non-government school)

We can come and see her in our spare periods or at lunchtime or before school. (Female student, government school)

7.5 Discussion

Overall, student perceptions of teacher-related factors that influence academic achievement in VCE Physical Education are similar to those that reflect effective teaching in general. The social-ecological model [356] provided a useful conceptual framework to explore multiple influences on teacher behaviour and allowed for identification of the teacher-related factors that students perceived to be important for their academic performance in VCE Physical Education. Students predominantly identified factors about teacher behaviour within the individual and social levels on teacher behaviour as the most influential on their academic performance. Individual level factors included teacher attitudes and attributes. The dominant themes identified by students as influential at the social level were relational aspects of the teacher and access to the teacher beyond scheduled class time.

7.5.1 Teacher attitudes

In common with other research [9, 30, 212, 292, 328], students in this study viewed passion and enthusiasm as highly desirable for effective teaching in senior secondary physical education. Teacher enthusiasm has been previously identified as having at least two dimensions: enthusiasm for teaching and enthusiasm for the subject [335]. Teacher enthusiasm and passion for the subject
can spark interest and a desire to learn in students. This enthusiasm factor has been shown to increase student achievement [311]. Teacher enthusiasm and passion can engage students in their learning and those who do not demonstrate a positive attitude toward the subject and teaching are less likely to engage students. The extent to which students are motivated and engaged in their learning by the interactions with their teachers is one of the largest potential mediators of academic outcomes [357] making this an important teacher-related factor when considering academic achievement.

Teacher expectations were perceived by students in this study as a motivator to ensure that work was completed and submitted on time, that classroom behaviour was acceptable and for academic achievement or success. Teacher-related factors that reflect expectations of student behaviour, including setting of rules, has been positively associated with cognitive outcomes of Physics students [339]. Students in this study made statements that reflected an understanding that appropriate levels of behaviour impacted on learning outcomes. Effective class management and organisation are qualities of effective teachers that allow teachers to maximise instructional time [31, 215]. Students in focus group four often referred to time and how their teacher had certain practices in place to save time so that they didn’t run out of time to complete course content. Within the context of this study, teacher-related expectations of students’ commitment to their studies, behaviour and success were identified as influential on academic achievement.

Consistent with previous research [318], students in this study perceived the teachers ability to communicate their belief that students are capable of, and will do well, as an important influence on their academic achievement. In one focus group, the student perception of the commitment to the class and the desire to achieve academic success differed between those students in their exit year (year 12) and those in Year 11. A student’s level of maturity may be a factor in their level of commitment toward achieving academic success. Students in lower secondary school in Ireland perceived both the Junior and Leaving (upper secondary) Certificate exams as high-stakes yet
recognised the greater consequences performance on the Leaving Certificate exam had on post-
school pathways.

While high expectations have been associated with increased achievement levels and effective
teaching [30, 93], teacher expectations can impact both positively and negatively on student self-
esteem and ultimately academic achievement [36]. From the current research it is clear that
students perceived that the expectations of the teacher were influential to their academic
achievement. However, in articulating these expectations, teachers can have either a positive or
negative impact on their students. Comparable to previous research [358], students in this study
who felt devalued or who perceived that more able students receive preferential treatment reported
that teacher expectations negatively impacted on their academic performance and may in fact limit
their achievement [215].

7.5.2 Teacher attributes

Student perceptions of the value of practical tasks reinforce the importance of teaching in and
through movement as well as about movement [224]. Most students saw practical learning as
beneficial. Students reported that the experience of doing (participating in practical physical
activities) provided them with valuable knowledge that they could apply in high-stakes written
assessment tasks. It has been suggested that the value of play and enjoyment in physical
education should not be underestimated [15]. The perception of pleasure in participating in sport
and physical activity, as reported by one group of students in this study, related to students having
a break from the classroom and enjoying a practical based lesson. Teachers determine student
experiences by making judgements on what are worthwhile practical experiences [359]. It may be
that for some teachers of senior secondary physical education, the valid reasons for incorporating
practical based learning activities were beyond pleasure and enjoyment, yet the reasons for their
choice of practical activities were not apparent to the students or reflected in their responses.
Direct instruction [61] emerged as the dominant teaching approach employed by VCE Physical Education teachers. Consistent with the dominant model reported by primary and secondary level physical education teachers [68], direct instruction has been identified as a strategy of effective teaching [360]. Students need opportunities to learn in multiple ways [361] and effective teachers must have the ability to draw on their pedagogical repertoire and use a variety of teaching styles [60, 65, 303, 304]. Students expressed a clear view that effective teachers are able to recognise when students did not understand a concept and were willing to utilise an alternative teaching approach. The ability of teachers to use diverse and flexible teaching strategies was perceived to be an important teacher-related factor when considering academic achievement of senior secondary physical education students. Studies in the Netherlands [341] have also shown that students value teachers that have a broad range of teaching approaches that can engage a diverse range of students. Lessons that lack diversity in teaching approaches and/or methodology have been reported by senior secondary students to be off putting and boring [304]. The ability of the teacher to identify and select the most appropriate approach based on the content being delivered and the learning style of the students was perceived as paramount to student learning and their academic performance. This supports the findings of McIntyre, Pedder and Rudduck (2005) [323] and proponents of complexity pedagogy [361, 362]. The importance of the connected experience was clearly articulated by the majority of students involved in the focus groups. Providing students with authentic learning contexts allows for meaningful learning to occur by connecting and aligning new ideas with familiar and authentic settings. Authentic learning experiences are more than ‘doing’ tasks, they involve complex problems in real-world settings [363]. Authentic tasks in physical education move learning from about movement to learning in and through movement [224]. It may be that the use of demonstrations or the link to the real world provides students with a hook that makes the learning more memorable, but authentic tasks also provide opportunities for students to work collaboratively on sustained investigations. Investigation of a concept from multiple perspectives enables connections to be made between what is familiar and what is novel. Making connections with the content and their lived experiences, the community and the real world, students are able to construct knowledge and meaning [58]. For teachers, this
means providing complex problems for students to work on that cross content areas and allow students to explore new contexts. In senior secondary physical education, adopting a pedagogical approach that provides authentic learning experiences for students can achieve course objectives that go beyond content mastery [363].

Recognising the type of learners students were and being able to deliver material in a manner that allowed students to optimise their learning was closely associated with teachers’ aptitude of knowing their students and knowing the most appropriate strategy for individuals and the content being taught. It has been previously reported that high-stakes examinations can lead to narrowing of the curriculum and teaching to the test [146, 364]. Students discussed techniques for exam preparation including doing practice exams for revision, however, only one group of students referred directly to the teacher ‘teaching to the exam’. The students reflected on an area of study they had found difficult and the fact that it wasn’t on any of their internal assessment tasks so they hadn’t covered the content in class. However, as the final exam approached time was devoted to covering the content. Senior students in Ireland [212] reported exam-focussed teaching strategies as good teaching, yet in contrast Chinese teachers reported that exam-driven pedagogy is only one aspect of effective teaching [50]. In a context not dissimilar to this study, Ayres, Sawyer and Dinham (2004) [9], found that teachers of high-stakes external exit examinations in New South Wales, Australia, focussed on generating interest in, and understanding of the subject [9]. VCE Physical Education students perceived that their teachers’ methods for preparing them for the end of year examination were separate to the teaching and learning that had taken place throughout the year. All students reported the use of practice papers in their examination preparation but some differences were reported between schools regarding student access to practice paper solutions and feedback on their performance. Teacher attributes of monitoring student progress and the provision of feedback, both written and verbal, were commonly reported by students in this study, which supports previous research [31, 42] into teacher effectiveness and ultimately, student academic performance.
7.5.3 Student-teacher interactions

Teacher-related factors that may influence student academic performance at the social level featured teacher behaviours associated with student-teacher interactions. Secondary school students previously identified relational aspects of good teachers [365]. This research supports previous findings which highlighted the importance of student-teacher interactions on academic achievement [357] regardless of the content area of instruction. Improved student-teacher interactions have also been shown to reduce off-task behaviour and result in fewer discipline problems [366]. When considering the teacher-related factors that influence academic achievement, it is not possible to isolate teacher-related attitudes and aptitudes from the relational aspect. For example, the teacher who has good knowledge of their students as individuals develops a good rapport with their students which makes the teacher more approachable, so the students are more comfortable asking questions and are keen to access their teacher more readily.

Humour has previously been positively associated with students increased perceptions of learning [304, 340], and students provided numerous examples of experiences in class where their teacher had made them laugh which facilitated learning. In this context, humour was used to create a positive classroom environment where students felt more comfortable with the teacher, were motivated and engaged in their learning.

7.5.4 Access to the teacher

Access to the teacher was an important factor identified by all five focus groups. It was evident in the responses from students in one focus group that the teacher did little beyond the classroom to help with their learning. In contrast, teachers from the other focus group made themselves available to their students beyond the scheduled class time. Teacher availability has been previously linked to student–teacher relationships [9] and teacher support has been shown to facilitate high academic success [30]. The access to the teacher through one-on-one meetings,
tutorial sessions with peers, email and text messaging were perceived to be important influences on their academic achievement. Findings from this study clearly identify student ubiquitous learning needs and expectations with the desire to access their teacher anywhere at any time. The support gained from the access to the teacher via direct contact or electronic media outside of scheduled classroom time was generally reported to be used by students to ask questions and clarify understanding. As learning and teaching shifts to keep up with the dramatic developments in technology, electronic access to the teacher may well be the key to supporting effective learning [367], as will the need for the development of effective policy concerning this issue. The Victorian Institute of Teaching (VIT) Code of Conduct stipulates that contact with students via written or electronic means must at all times be within a valid educational context [368]. Maintaining a professional relationship with students, while meeting the increased demands of students for access, must be foremost in all student-teacher interactions. Identifying appropriate levels of access that meet the needs of students while maintaining the work-life balance for teachers warrants further exploration in the context of senior secondary education.

The close alignment of the findings of this study with others that have looked specifically at senior secondary education [9, 30] suggest that teacher-related influences on student academic achievement are likely to be specific to the context of senior secondary school education rather than the subject specific context. Furthermore, the perceptions of students provide more specific information on what teachers can do to improve academic achievement than what is provided in general teaching standards. Specific to the VCE Physical Education context is teacher attitude toward the integration of theoretical and practical learning tasks and how teachers utilise physical activity, exercise and sport as a learning medium.

7.6 Limitations

A limitation of this study was the timing of the data collection; students at the time of data collection had not sat their final examination or received their final grade for VCE Physical Education.
Knowledge of actual academic performance, rather than perceived academic progress based on the year’s internal assessments may have yielded different responses from students. Further research is needed where high achieving students reflect on the important influences on that outcome. Furthermore, only a small sample of students participated and the sample was drawn from the eastern suburbs of Melbourne in Victoria, Australia. It would be interesting to compare the views of senior secondary physical education students in other countries. The limitations of the study are acknowledged and any attempt to generalise the findings should be made with some degree of caution. However, in the specific context of VCE Physical Education, little research has been conducted into the teacher-related factors that may influence academic performance, especially from the student perspective. The data presented gives the perspective of students and this is an important aspect in determining influences on academic performance, yet it is only one side of the story. Continuing the exploration to include teachers to gain further understanding of what teachers perceive as important influences on their students academic achievement in this context, and if teacher perceptions align with the student perceptions, warrants future research. Furthermore, understanding if student perceptions of teacher-related factors that may influence academic performance change after students have received their final results is warranted.

7.7 Conclusion

The focus group discussions held with VCE Physical Education students undertaking Units 3 and 4 allowed for robust insight that may be useful in improving the teaching of VCE Physical Education. The importance of having a good ‘attitude’ to teaching of VCE Physical Education, a broad repertoire of teaching strategies, making strong connections with student experiences and the real world, developing positive student-teacher relationships, and a student’s ability to access their teacher outside of scheduled class time were seen as key teacher-related factors influencing achievement by VCE Physical Education students. Many of the teacher-related influences on academic achievement identified within each focus group were consistent with previous research on different senior secondary school subjects, and are closely associated with characteristics of
effective teachers previously identified. However, the student lens has provided a perspective from those with the most to gain, the students. In addition to professional standards, this study provides further information from the student perspective for teachers to consider when evaluating teacher effectiveness within this context. Both in-service and pre-service teachers could incorporate student perceptions into their ongoing professional learning. Asking students what it is the teacher can do to help students learn may help shape what teachers do in the classroom, their interactions with students and the teaching strategies they use.

Student perceptions are only one perspective of what constitutes effective teaching. The investigation of teacher perceptions of teacher-related factors that may influence student academic performance would provide an opportunity to explore the similarities and differences to those of the student, and warrants research.
CHAPTER 8

Teachers’ perceptions of how they influence student academic performance in VCE Physical Education
8.1 Preface

In addition to the student perceptions of teacher-related factors that influence academic performance it is pertinent to also consider the teacher perspective. It was evident that students had clear ideas of what teachers could do to assist them in their learning in VCE Physical Education (Chapters 6 and 7), and knowledge of teacher perceptions was considered to be an important aspect to also explore. Focus group discussions have been shown to be conducive to the exploration of experiences and perspectives of the participants. Therefore VCE Physical Education teacher perspectives of influences on student academic performance were explored using a semi-structured question schedule. This chapter explores teacher perspectives of the influences on student academic performance and draws some parallels with those identified by the students. This chapter is based on a manuscript that has been submitted for publication and is currently under peer-review.

8.2 Introduction

Evidence suggests that teachers are the most important school based influence on student academic performance [7, 35, 47] and that they account for 30% of the variance in student achievement [42]. Behaviour, specifically teacher behaviour, is in turn influenced by individual, social, physical environment and policy level factors [44] that impact on the decisions made by the teacher with respect to the pedagogical approach adopted. The intention of curricula in senior secondary physical education is to apply key knowledge and skills within theoretical and practical contexts. Finding what constitutes the optimal methodology [232] is a constant challenge for teachers of senior secondary physical education.
Generic teacher behaviours that contribute to effective teaching have previously been identified [31]. While some pedagogical behaviours may be generic across all teaching contexts [40], the differences in teacher-related factors that exist between subjects and those that exist within the subject suggest that there is a case to support differentiated teacher effectiveness [36]. However, little is known about the factors that teachers perceive influence student academic performance in senior secondary examinable physical education. A social-ecological model can provide a conceptual framework to understand the numerous factors that influence teacher behaviour. Factors that influence behavior can be identified at the individual, social, physical environment or policy level [44, 310]. Factors influencing teacher behaviour at the individual and social level are more readily modified or inside the teacher’s control [45]. Influences at the physical environment and policy/organisational level (for example timetabling, access to professional learning opportunities and access to resources and facilities such as a gymnasium and weights room) are generally beyond the control of the individual teacher and may be perceived by teachers as barriers to effective teaching.

Understanding the nature of good teaching in different contexts is thought to be important [369], yet little is known about effective teaching strategies in senior secondary physical education. In a study of senior secondary teachers in New South Wales, Australia, across a diverse range of subject areas, teachers identified their relationship with their students, classroom practices, the student themselves and faculty cooperation as key attributes for student success on the external examination [9]. Teachers across an array of year 13 subjects who facilitated high academic performance among their students in Scholarship examinations in New Zealand were found to have deep content knowledge, passion for teaching and held high, yet realistic expectations for their students [30]. Historically, teacher effectiveness research in physical education has lacked outcome measures to verify that the learning and teaching practices contributed to student achievement of the desired outcome objectives [37]. The concept of effective teaching measurable by student achievement is not supported by some [39]. However, in senior secondary physical education, where high-stakes examinations are used to determine academic achievement of
students, teachers of students with high academic achievement are often perceived to be more effective. Research on teacher effectiveness in physical education recognises the complex interactions between the student, teacher, content and context [370] and more recently the focus has been on the student as a mediator of instruction [38]. Teacher effectiveness in physical education has been the focus of much research [95, 106, 371], yet despite the high-stakes associated with senior secondary physical education there has been little research conducted.

It is unclear from previous research if teacher perceptions of the teacher-related factors that influence student academic performance are specific to a given context. Therefore, the aim of this research was to explore the teachers’ perceptions of how they influence the academic performance of their students in the context of VCE Physical Education.

8.3 Method

8.3.1 Participants

Following approval from the University College Human Ethics Advisory Network (CHEAN) (Appendix C), teachers of VCE Physical Education were invited through professional networks to participate in a semi-structured focus group. All teachers who responded to the advertisement were provided with a participant information letter and those who agreed to be involved provided consent. Teachers (male = 23 and female = 14) from schools (n=31) in metropolitan Melbourne and regional Victoria from each sector (Government, Catholic, Independent) were represented in the sample. Prior to the focus group discussion, participants completed a brief questionnaire to determine demographic information (sex, age, level of qualification, years of teaching experience and school sector) (Appendix F). Recruitment continued and focus groups were conducted until saturation of themes was reached.
8.3.2 Focus group discussions

A qualitative approach, employing a semi-structured question schedule with focus groups of Units 3 and 4 VCE Physical Education teachers were conducted by a trained facilitator until saturation and no further emerging themes were identified. A total of nine focus groups were conducted between October 2013 and March 2014 in locations convenient to the participants. Focus groups were conducted at various locations in metropolitan Melbourne and regional Victoria in private rooms, where participants could not be seen or heard by those not participating in the study. Clear rules were articulated by the facilitator to ensure the environment was conducive to participants feeling comfortable disclosing information, asking questions and clarifying or disagreeing with the responses of others [348, 352]. Focus group discussions ranged from 45 – 85 minutes in duration.

Each focus group ranged from two to six teachers and employed a semi-structured interview schedule (Appendix E). Teachers were asked questions in relation to their perceptions of teacher-related influences on their students’ academic performance in VCE Physical Education. Discussions were recorded using a digital voice recorder, downloaded and transcribed verbatim by the author to ensure consistency and accuracy of the data prior to analysis [353]. Additionally, written field notes were logged by the author as a means to provide contextual details of the focus group and to record non-verbal interactions (such as nodding or shaking of the head) of participants to be later linked with verbal accounts [351, 352].

8.3.3 Data analysis

All de-identified data (transcribed discussions and demographic questionnaire) from teacher focus groups were analysed using NVivo (QSR International Pty Ltd, Version 11, 2015) software package. An inductive content analysis [354] was performed to identify emergent themes in the data. The coding process was iterative and recursive [319, 355] to ensure familiarisation with the data and what it contained. Consistent with the methodological approach used in Chapter 7, a four step process was utilised [355]. Data immersion was achieved through listening to the recordings multiple times prior to transcription and then reading and re-reading of the transcribed data.
Transcription errors were identified and corrected at this point. During this process, text was highlighted, underlined and descriptive annotations were made in the margins. Open coding (step two) was conducted by the researcher asking questions of the data, making comparisons and looking for similarities and differences [320]. The third step involved categorising the data at the individual, social, policy and physical environment levels of influence using the social-ecological model [310] to understand the multiple factors that influence teacher behaviour. Finally, themes were generated through an interpretation of the data underpinned by the social-ecological model [44] to explore teacher perceptions of influences on student academic performance in VCE Physical Education.

8.4 Results

A total of 37 teachers of Unit 3 and 4 VCE Physical Education (PE) from government and non-government schools in metropolitan Melbourne and regional Victoria (Table 1) participated in the focus groups. A range of school types including single-sex, co-educational, select entry (years 9 - 12), Foundation (first year of primary school) to Year 12 (final year of secondary school), Year 7 (first year of secondary school) to Year 12 and Senior campus (years 10 -12) schools were all represented in the sample.

**TABLE 8.1: VCE Physical Education teacher demographic characteristics**

<table>
<thead>
<tr>
<th>Teacher</th>
<th>n</th>
<th>Age (years) Mean (SD)</th>
<th>Teaching experience (years) Mean (SD)</th>
<th>Unit 3 and 4 VCE PE teaching experience (years) Mean (SD)</th>
<th>School sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>23</td>
<td>41.2 (9.8)</td>
<td>17.2 (9.9)</td>
<td>10.0 (8.6)</td>
<td>Government: 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Non-government: 11</td>
</tr>
<tr>
<td>Female</td>
<td>14</td>
<td>39.8 (9.2)</td>
<td>16.9 (9.4)</td>
<td>9.1 (6.0)</td>
<td>Government: 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Non-government: 11</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>40.7 (9.4)</td>
<td>17.0 (9.7)</td>
<td>9.3 (7.6)</td>
<td>Government: 15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Non-government: 22</td>
</tr>
</tbody>
</table>
All teachers in the focus groups held a teaching qualification; 4-year Bachelor degree (n=26), Masters degree (n=4) or 3-year Bachelor degree plus a Diploma of Education (n=7).

Individual level factors perceived by teachers to influence student academic achievement included teacher content knowledge, expectations, passion and enthusiasm for teaching physical education. Additionally, teacher perceptions of their own ability to select appropriate teaching methodologies to engage students and the use of reflective practices to inform teaching were identified by teachers as important aspects contributing to student academic success.

At the social level, the value of knowing your students, developing a good rapport and building strong student-teacher relationships were perceived by teachers as important attributes to the overall success of students in VCE Physical Education. Moreover, teachers also identified student access to the teacher and teacher availability outside of class time as important to student success. At the social level teachers also recognised the value of colleagues, both within the physical education faculty and the broader school community to support, share and assist in improving academic outcomes for students.

Policy and physical environmental level factors were generally perceived by teachers to be influences on student academic achievement beyond their control. The availability of adequate or suitable facilities and resources, access to professional learning, policies and timetabling issues were perceived by teachers to be limiting factors to student academic success.

8.4.1 Individual level factors

At the individual level, four dominant themes emerged from the teacher perceptions of what teachers can do to make a difference to student academic performance. There was clear evidence in teacher responses of the interrelated nature of each of the identified factors at the individual
level. Teachers often reported how content knowledge was linked to passion and enthusiasm for different content areas.

And I think this might reflect my weaknesses as a teacher, but certainly energy systems is where my passion is and I can reflect on my past experiences or relate it to elite athletes in different events that the kids might be interested in so I find that easier to engage them, where as maybe with the SEM (social ecological model) because it is a newer area, I admittedly aren’t as strong I suppose in delivering that content. So I think that also has an impact as well. (Male teacher, 22 years of VCE PE teaching experience, non-government school)

Teachers articulated how personal strengths in content knowledge often influenced teaching and the enthusiasm and passion they conveyed to students.

I really think the key to successful teaching of VCE PE is passion. They have got to have a teacher who is passionate and believable, my kids trust me, they know I am working hard with them so it is a real partnership and it is mutual respect. They go through tricky times, I go through tricky times, its like, we all work together but yes, I think passion really sucks them in. (Female teacher, 10 years of VCE PE teaching experience, government school)

Teachers reported that having high expectations for students was important in influencing student academic performance:

That (having high expectations) is probably number one, we have incredibly high expectations in everything. Homework, practical work, whatever it is, high expectations, so yes, and that starts in Year 10. (Male teacher, 4 years of VCE PE teaching experience, non-government school).

Teachers in the focus groups attested to the importance of using reflective practices to inform their teaching. Teachers reported using surveys, assessment data and feedback from students to gain information in order to improve the effectiveness of their teaching at this level.
Yes I definitely do (use assessment data), I’ll have a look in the areas, particularly the Victorian Assessment Software System (VASS) data, I will have a look at the areas where as a class they (previous years cohort of students) have not done very well and I assume that possibly it is me not getting the information across and teaching it correctly so I’ll go back and look at the way I teach that particular area so I find it really useful. (Female teacher, 7 years of VCE PE teaching experience, non-government school)

8.4.1.1 Teaching strategies

Teachers in this study reported using a broad range of teaching strategies to improve student academic performance in VCE Physical Education. The perception held by all teachers involved was that to help students learn, and to help overcome areas that are challenging to students, a variety of strategies are required. Four dominant teaching strategies emerged from teacher responses: practical work, use of information and communication technologies (ICT), real-life examples and exam preparation strategies.

8.4.1.2 Use of practical work

Teacher perceptions of the purpose of practical activities were consistent across all focus groups. Practical activities were intended to enhance understanding, reinforce key learning and to apply theoretical concepts within the context of physical activity. Teachers revealed that practical work engaged, enthused and motivated students. Teachers on the whole reported that learning through doing allowed students to visualise, feel and remember a concept.

Good practical activities that then provide a springboard to the theory, so you are embedding the practical work, which a lot of kids enjoy, they are kinaesthetic learners, they are visual and then bringing back to the theory room…. practice informing the theory. (Male teacher, 25 years of VCE PE teaching experience, government school)

The use of practical work was seen as an important influence on student academic performance in the written assessment tasks.
If you can relate the practical work that they do to the theory that they do I think it paints a better picture for them in terms of their understanding. So where possible if you can apply the practical, do the practical, so an ice bath for example, then you would hope that they would remember that if they are asked a question about that in a paper (examination).

(Female teacher, 3 years of VCE PE teaching experience, non-government school)

Some teachers reported perceived barriers to teaching through practical activities including time pressures, limited opportunities and facilities (space). The strong impression given by those teachers who reported time as a barrier to the inclusion of practical work, overwhelmingly, was that with more time there would be more practical work undertaken.

We don’t do a lot (of practical work). It’s just time, we find that we just can’t fit it in if we need to get through the entire curriculum. So we do the essential ones, the ones that are needed for the SAC’s and we try to do a couple of extra ones, we do other practical work, but we could be doing a whole lot more. (Female teacher, 7 years of VCE PE teaching experience, non-government school)

8.4.1.3 Use of ICT in the classroom

Teachers reported using technology in multiple ways, including as a teaching tool and as a means of communication. ICT applications included use of apps, computer software programs and interactive DVD’s that were accessed on a range of devices including smart phones, tablets, laptop and desktop computers. Teachers suggested that the use of ICT was important in engaging students, having quick access to visual stimulus, measurement tools, discussion starters, real-life examples and providing students with access to further resources.

I use YouTube™ a lot, for other things, so when I say I don’t use PowerPoint, I do regularly have snippets of YouTube™ clips for a particular cycling event or whatever else and I find the kids love that and they absolutely find that that’s engaging. (Female teacher, 20 years of VCE PE teaching experience, non-government school)
8.4.1.4 Relating concepts to real-life

Most teachers made reference to using real-life examples that linked to student interest to deliver concepts. This was closely linked to themes of engaging students in their learning, knowing their students and making the content relevant. Making connections between the content and what students are seeing in the popular media was also perceived to be an effective strategy:

*I think also the real life examples are good, for example, this year, performance enhancing drugs for example, was an area that I think students really took an interest in because they were seeing it in the newspaper and hearing about it, so I find that useful to keep an eye out for what is actually happening and try and relate it.* (Male teacher, 3 years of VCE PE teaching experience, non-government teacher)

However, one teacher acknowledged there are constraints around using real-life examples:

*They (the students) don’t really get a chance to explore in depth or take time to have a look through a few newspaper articles and stuff because you are just bang, bang, bang and whatever and they will pick up on anything you say, like you will sit there and you will say, oh Lance Armstrong….. and they will grab it but you would like them to have the chance to sit down and have a flick through and say I see what you are talking about, but it just doesn’t happen.* (Male teacher, 19 years of VCE PE teaching experience, government school)

8.4.1.5 Preparing for the external examination

When asked to consider how teachers prepared students for the internal and external assessment tasks, teachers consistently cited practice strategies. Providing students with opportunities to practice responding to examination style questions was perceived to be an important influence on student academic performance. Teachers across all nine focus groups reported using practice examination papers and past VCAA examination papers. Examination questions were routinely
referred to throughout the year, with greater emphasis on completing a number of practice papers prior to the end-of-year external examination.

Yes, I like to give them the exams, past exams and refer back to them all the time. We might be doing energy systems or even fitness components or fitness testing and I will go, this is the sort of questions they have had and so they get an idea of what to expect or how questions could be worded, so they have to interpret and come up with their own response, so yes I find that is important, going back to past exams. (Male teacher, 3 years of VCE PE teaching experience, government school)

In contrast, one teacher was adamant that an external examination didn’t influence how they taught. The following response was given when asked if the external examination influenced the way they taught:

No. I think that I’m just passionate about what I teach and so I try and bring my passion, and my students do lots of track and field stuff, to the classroom, so my passion is for them to learn. (Female teacher, 20 years of VCE PE teaching experience, non-government school)

Other strategies used by teachers that they perceived beneficial in preparing their students for the examination and ultimately improving academic performance included attending revision seminars, writing their own questions, marking their own work based on exemplar responses and developing examination strategies. Those teachers who had experience in assessing the external examination felt that this experience was invaluable, and possibly the best professional learning they had participated in, and an important aspect influencing student academic performance in VCE Physical Education.

8.4.2 Social level factors

8.4.2.1 Student-teacher relationships
Teachers in all focus groups conveyed their perception of the importance of knowing their students and how student-teacher relationships are key to effective teaching. Teachers reported using different practices such as surveys, coaching sports teams and interactions with students outside the classroom environment to build relationships with students, which then influenced teaching practices used, particularly in relating concepts to student experiences. Teachers linked knowing their students with engagement. The following comments typify teacher responses:

_We do a very similar thing to that (ask students what sorts of sports they play) as well so we know exactly where we are going to be picking up on their interests and they do definitely seem more engaged if you are focussing on what they are interested in rather than I guess just what you are._ (Female teacher, 7 years of VCE PE teaching experience, non-government school)

Other relational aspects of the student-teacher interaction included relating examples to student interests, sporting activities and real-life experiences of the students, developing a rapport so students felt comfortable asking for assistance, and getting the best out of each individual student.

8.4.2.2 Colleagues

A majority of teachers reported that colleagues were the most readily accessed source of advice. Sharing of ideas and resources and seeking assistance or clarification of VCE Physical Education requirements were the main reasons teachers referred to colleagues, both within their own school and externally, through personal and professional networks and cluster arrangements. Teachers reflected on the benefits of teaching in a faculty as opposed to being the only VCE Physical Education teacher in a school. A number of teachers believed that being able to watch others teach, _“I’d love to watch other people teach”_ (male teacher, 2 years of VCE PE teaching experience, government school), talking to other teachers and sharing ideas would be highly beneficial to their own teaching:

_I find that my teaching improves when I see other people teach in a similar area to me. I find that to be really beneficial, that's another way I suppose, not so much data but using_
collegial observations as a way to improve your own teaching. (Male teachers, 22 years of VCE PE teaching experience, non-government school)

8.4.2.3 Teacher access and availability

Student access to their teachers was perceived to be an important factor influencing student academic achievement for teachers in all focus groups. Teachers revealed multiple strategies to increase the access students had to them, including at lunchtime, before and after school, during holidays and weekend revision sessions and one-on-one sessions.

I run two lunchtime classes, so two lunchtimes a week I am sitting in a particular room and they come, a lot will just come and do homework to catch up, for them it is a forced way of studying and I don’t make them, actually, if you have failed a SAC you do have to come, so that’s good as well, so kids who may be afraid of asking for help in front of everyone else will do it then they know where I am going to be. (Female teacher, 10 years of VCE PE teaching experience, government school)

In addition to face-to-face access, teachers conveyed the importance and ease of access students had via electronic media. There was great diversity in the platforms used by teachers and students to communicate, and about the perceptions of appropriate forms of communication. Some teachers were happy to provide students with mobile phone numbers and communicate directly with students in this manner:

I have their mobile numbers and I regularly just text them and that works. (Female teacher, 20 years of VCE PE teaching experience, non-government school)

Some were restricted by school policy:

I would have no hesitation to giving my number out, but we are not allowed. (Male teacher, 6 years of VCE PE teaching experience, non-government school)

Others were adamant that it was not a suitable form of communication for them.
Wouldn’t touch it (giving students mobile phone number) with a barge pole! (Male teacher, 9 years of VCE PE teaching experience, government school)

Teachers consistently cited email as an appropriate form of access and many verbalised the tensions between being available to students and setting appropriate boundaries for responding to emails:

It is a 24/7 job now, they email all the time and you get back to them all the time. (Female teacher 4 years of VCE PE teaching experience, non-government school)

Anyone who has got a smart phone has their email on their phones now so you are not a teacher from 9am – 3pm, not that I think you ever were, but you are certainly at 10pm, 11pm or 12am at night still getting emails. I have to stop myself from replying, because I will check them and so I think there is this huge overlap between life and work absolutely with regards to technology. (Female teacher, 3 years of VCE PE teaching experience, non-government school)

Teachers had different perceptions of the use of intranets and educational platforms such as Moodle™ or Edmodo™. Some teachers used them extensively and others reported that students did not access these sites and preferred to use a tool such as Facebook™ or Twitter™ that students were more likely to engage with.

I have a Facebook™ group with my students, similar to Edmodo™ but I am not actually friends with them on Facebook™ and I only do it with my Year 12 students and they are very aware of what’s acceptable and not, they don’t click on anything of mine or anything but it pretty much gives them access to ask questions, almost 24/7. I find the kids are pretty hesitant with email, it means you know, opening the email up, but they are on Facebook™ as it is so just quickly open that group page and that’s all it is a group page and shoot off a note, a question and I find they answer each other before I get a chance to get to it which is really effective. (Male teacher, 3 years of VCE PE teaching experience, non-government school)
The majority of teachers agreed that electronic communication was beneficial for ensuring information was conveyed to students, particularly when a student or teacher had been absent from class. The strong impression given by teachers was that electronic communication was seen as a positive influence on their ability to improve student academic performance in VCE Physical Education.

8.4.3 Policy level factors

8.4.3.1 Time

A strong perception held by a majority of the teachers involved in the focus groups was lack of time available to deliver the content stipulated in the official curriculum document. Further, teachers reported that time to prepare, develop and reflect on lessons is limited, and they perceived that this impacted on their ability to plan engaging and creative lessons for their students.

For me it is time, always wanting to put more time into lesson planning and so that is the biggest constraint, absolutely. So therefore if I was teaching less, just one less class, and say have three extra periods to put more time in. (Female teacher, 17 years of VCE PE teaching experience, non-government school)

Some teachers who held positions of responsibility within their school felt that the responsibilities of their role often detracted from their classroom teaching.

When you have a position of leadership, teaching is your second priority; it is never your first priority. I don’t apologise for that because I don’t think it can be and I know that it is really sad but its reality and a lot of people end up stepping out of positions of responsibility to concentrate on their teaching again, and I have no doubt I will go for that and I will be a hands down better teacher than I am currently. (Female teacher, 4 years of VCE PE teaching experience, non-government school)

8.4.3.2 Professional learning opportunities
Teachers perceived that professional learning opportunities were reaffirming, provided new ideas and ensured content knowledge was up-to-date. Staying current with new ideas so that the delivery of content is not stale was at the forefront of responses. One teacher (Female teacher, 9 years of VCE PE teaching experience, non-government school) succinctly stated: “I know the content, tell me what to do with it”. Others reflected on the benefits to their teaching:

_Sometimes I can get a bit, personally I can get very narrow minded, I’ve been doing it this way for so many years, I’m going to keep doing it and when you bring something fresh and new, kids just love it. That’s something I have learnt this year, make sure you keep updating yourself._ (Female teacher, 6 years of VCE PE teaching experience, non-government school)

A number of teachers reported policy level barriers to attending professional learning opportunities, including not being supported to be released from classes to attend, costs associated with attending and time away from class. Some teachers reported school policies that stipulated each staff member was allowed to attend one professional learning day per year, thus limiting opportunities for teachers to engage in external professional development.

**8.4.4 Physical environment level factors**

**8.4.4.1 Facilities and resources**

The majority of teachers agreed that having facilities and resources available to teach influenced how they taught. For some teachers, the school in which they taught didn’t have the physical resources required, for example a gym or an oval. The following statement reflects a common response from teachers when asked about the impact of the lack of facilities on the planning and delivery of VCE Physical Education:

_Absolutely (it affects the way you plan, and deliver), because you have got to make modifications and of course you want to make it as practical as possible but if you are varying it that much it is so difficult it becomes sometimes pointless, sometimes its just not_
worth the effort in some cases. You try and be flexible about it but…it’s just the facilities in general, funding is not an issue but just having the space available more than anything. (Male teacher, 3 years of VCE PE teaching experience, non-government school)

However, a far greater barrier was access to the limited facilities available. Limited access to suitable facilities was perceived by teachers as a barrier to effective teaching, and was epitomised by the following statement: “I’m never timetabled in the gym, we have only got one so I just have to find a space somewhere to do that (practical work).” (Male teacher, 8 years of VCE PE teaching experience, government school). In contrast, one teacher reported that “You don’t need facilities, you just need a classroom” (Male teacher, 4 years of VCE PE teaching experience, non-government school), and another “We don’t have accelerometers but we have pedometers so we make use of what we have got” (Female teacher, 17 years of VCE PE teaching experience, non-government school). Teachers, in particular those from government schools, commented on the impact a lack of funding has on providing resources for students, including buying and printing practice exams, text books and other resources to support student learning.

8.5 Discussion

Teacher perceptions of factors they perceived as influential to their students academic achievement in VCE Physical Education were consistent with previous research that reflects effective teaching in general. Influences on teacher behaviours that may impact on student academic performance in VCE Physical Education are multidimensional and are characterised by interrelationships between the four levels of the social-ecological model. Effective teaching results in greater intended learning outcomes for students [372], and teachers in this study perceived that their content knowledge, passion, enthusiasm and high expectations were important influences on their students academic performance. Additionally, teachers perceived that the use of reflective practices, multiple and diverse teaching strategies, knowing their students, and teacher accessibility had positive influences on student academic performance.
Policy level and physical environmental factors were perceived as barriers to effective teaching in VCE Physical Education. The social ecological model provided a useful conceptual framework [373] to explore these multiple influences on teacher behaviour, and allowed for the classification of the teacher-related factors perceived by teachers to be important for student academic performance in VCE Physical Education.

The influences on teacher behaviour are interrelated and therefore it is not meaningful to discuss the factors in isolation. For example, teachers who identified that they had high content knowledge in one area of the course often described it as an area they were passionate about, and that this in turn allowed them to use more real-life examples that engaged students in their learning. Teacher content knowledge was perceived to be imperative to effective teaching which supports previous research in senior secondary education [9, 71], and more specifically in physical education [45, 68, 374]. Ward (2013) [40] proposed that teachers who hold deeper content knowledge construct higher quality learning tasks for students as they have deeper understanding of the content. Teachers in this study believed that content knowledge influenced how they taught. Effective teaching has been linked closely to teacher pedagogical content knowledge [31, 315] and having a broad repertoire of teaching strategies from which to select an optimal method for the cohort, the content and the task. It has been suggested that pedagogical content knowledge is more important than subject content knowledge [110]. Teachers of senior secondary physical education suggested that further development of specific pedagogical knowledge to deliver content effectively would be beneficial if they were to further improve their student’s academic performance. In senior secondary physical education improving teacher pedagogical content knowledge may have the potential to engage students in their learning and improve their academic performance. A broad repertoire of teaching strategies is essential for effective teaching [49, 60], and no single pedagogical approach will be universally effective for all students in all situations [375]. Teachers of VCE Physical Education identified numerous teaching strategies consistent with previous research. They identified teaching strategies that maximised learning time in class such as questioning, discussions and practical work.
Teacher attitude toward the subject, the student and the activity is essential for effective teaching [187]. Within the context of this study, teachers identified that passion and enthusiasm influence student academic achievement. This is consistent with educational research in a range of different settings [212, 292, 328] and specifically in senior secondary education [9, 30]. The enthusiasm factor has been shown to increase student achievement [31, 311] and findings from this study support the idea that teachers believe that enthusiasm and passion engage students in their learning. Student engagement with their learning has been shown to have positive effects on academic performance [301, 376]. A shared passion and enthusiasm for learning has been associated with student engagement [299] and enthusiasm was identified by students as a characteristic of the ‘perfect’ VCE Physical Education teacher [248]. Specifically in senior secondary physical education, students who were highly motivated and engaged with learning tasks performed better on written assessment tasks [232]. Teachers in this study reported that student engagement often influenced the choice of learning activities, and teacher perception was that content that didn’t engage students was more challenging to teach. The relationship between teacher attitude towards the content and the activity as discussed by Tinning [187], was reflected in the teacher perceptions. Teachers suggested that because they were not as enthusiastic and passionate about some content, they were not able to construct learning activities that engaged students.

Student engagement and motivation through interactions with the teacher has also been identified as a potential mediator of academic outcomes [357], making this an important teacher-related factor when considering academic achievement in secondary education. VCE Physical Education students reported the importance of the student-teacher relationships [248] on their academic performance, and similarly, VCE Physical Education teachers reported that knowing your students and developing a relationship was paramount to academic success. Teachers suggested that developing strong relationships with students impacted on the effort students exert toward their study of physical education, a finding supported by previous research in primary [330] and secondary [365] education that identified relational aspects of good teachers. The findings of this
research are comparable to previous research that has identified the importance of student-teacher interactions on academic achievement [357] regardless of the content area of instruction. For these teachers, having high expectations for students was considered influential on academic achievement, as it was a motivator to ensure that students worked hard, completed and submitted tasks on time, and did their best. These findings support those of Stronge, Ward and Grant (2011) and Wentzel (1997) who have previously shown the association between high teacher expectations, effective teaching and increased academic achievement [93, 330]. Specifically in senior secondary education, teacher expectations have been shown to be critical to student success [30].

Teachers in this study made themselves available to their students beyond the scheduled class time through extra classes, formal and informal meetings and via electronic communication platforms, and for some, almost twenty-four hours a day, seven days a week. Teacher availability has been previously linked to student–teacher relationships [9] and teacher support has been shown to facilitate high academic success [30]. Teacher availability and access, particularly through electronic media, was perceived in this specific context to be highly desirable for the student. Students of VCE Physical Education reported that being able to access teachers influenced their academic success [248]. Teachers have previously suggested electronic communication to be time effective and a suitable form of contact to support effective learning [367]. However, many teachers were torn between supporting students and having the capacity to switch off. This is an emerging issue in education, identified here specifically in the context of senior secondary physical education. Understanding if this is an issue limited to courses with high-stakes assessment warrants further investigation. Future school-policy may well dictate appropriate windows of time for teachers to respond to student queries that are delivered electronically, to ensure work-life balance and appropriate expectations are able to be established.

In VCE Physical Education, as in senior secondary physical education in Scotland [14, 232], and perhaps in other examinable senior secondary courses, the intended integration of theory and
practical work may be in reality a dichotomous split. The prescribed [120] integration of practical work with content or subject matter knowledge learning has proved difficult for teachers of VCE Physical Education. The idea that students ‘do prac’ contributes to the dichotomy. A shift in mindset and the surrounding discourse of ‘theory’ and ‘prac’ classes in senior physical education may be required to bridge this gap. While the value of learning through practical activities was perceived to be important by teachers, practical work was often sacrificed to enable teachers to devote more time to covering theoretical content. This ongoing tension may reflect the lack of accountability to governing authorities mandating the amount of practical work undertaken in VCE Physical Education. The perception held by teachers that the purpose of practical work in VCE Physical Education was to reinforce, cement or support learning of theoretical concepts. This suggests that teachers felt that content needed to be taught first and experienced second, and learning of content didn’t occur through the practical experience. Teachers in Scotland [232] had similar concerns, identifying that students don’t make the connections between practical learning tasks and the underpinning content knowledge. This presents teachers of senior secondary physical education with a conundrum of how to incorporate practical learning activities that result in the desired learning outcomes that are expressed in written tasks. Teachers in this study suggested that all practical activities had a purpose. The effectiveness of a practical experience is reduced when students cannot make the connection between what they are experiencing and the underlying theoretical concept; it cannot be assumed that the ideas to be learnt will emerge from the experience [377]. VCE Physical Education teachers generally spoke of practical activities as a trigger for students to recall or remember a concept. The effectiveness of practical activities may be enhanced when the learning outcome is made explicit for students and if students have some input into the design and implementation of the activity.

Teachers in this study articulated the importance of the connected experience when they referred to using real-life examples. The use of real-world examples can provide students with opportunities to apply knowledge to tangible experiences relevant to themselves, connecting what is known with new concepts. This supports the findings of McIntyre, Pedder and Rudduck (2005) [323], and
proponents of complexity pedagogy [361, 362] where students learn through dynamic engagement with content knowledge. Teachers felt that real-world examples engaged students through situating the content in contexts that students could relate to. Teaching strategies that utilised ICT were associated with student engagement by teachers of VCE Physical Education. The visual stimuli accessible through online sites allowed teachers to quickly and easily show students an example to demonstrate the topic being taught in a broad range of contexts.

High-stakes examinations can lead to narrowing of the curriculum and teaching to the test [146, 364]. Teachers spoke specifically about preparing students for the external examination in VCE Physical Education through practice questions and exam strategies and techniques. While teachers perceived this to be an important practice influencing student academic achievement, the desire of teachers to engage students in their learning through authentic tasks suggests they are striving to teach for understanding rather than to the test. Exam-driven pedagogy is not always perceived negatively. Senior-students in Ireland [212] reported exam-focussed teaching strategies as good teaching, and Chinese teachers identified exam-driven pedagogy as one aspect of effective teaching [50]. High-stakes assessment such as the external examination certainly guided the classroom practices of the VCE Physical Education teachers involved in the focus groups. Teachers suggested that reinforcing student application of knowledge with exam type questions was a focus of some of the teaching strategies used.

Effective teachers are reflective teachers [31] and teachers in this study reported using a number of different reflective practices to monitor their teaching, collect evidence to develop understanding and inform their teaching for the future. Strategies used by teachers were both informal and formal. A common practice involved analysis of student examination data provided by the VCAA via the Victorian Assessment Software System (VASS) system. The data provided by the VCAA is intended to ‘empower’ teachers so that they can use the data about their students achievements to identify problems and build upon their strengths in future years [219]. Teachers viewed the (poor) performance of students in some areas of the course to be a reflection on their teaching rather
than the student. This reflection and assessment of the effects of what is done in the classroom can be used to refine and improve instruction in the future. Data driven decision making can lead to improved student success [378]. Data can inform decisions made by teachers in senior secondary physical education. However, availability of data does not ensure effective use. Schools need to equip teachers with the required level of expertise to interpret and understand the data to inform their teaching.

Policy level factors reported by teachers were generally perceived as barriers to improving student academic performance. Time was by far the greatest perceived barrier: time to deliver content, time to do practical work and time to plan and prepare. Timetabling constraints and external interruptions such as school assemblies, sports days and camps impact on the actual time available to teachers. When teachers perceived they were running out of time they were more likely to revert to teacher-centred teaching strategies such as direct instruction for the transmission of knowledge. Professional learning policies in some schools limited the access to regular professional learning for some teachers. While others reported a conflict between staying current, (by attending professional learning opportunities), and being in front of their class to teach their students. Overwhelmingly teachers said that their colleagues were the best source of professional learning. For the majority of teachers, colleagues were perceived to be supportive, provide mentoring, share ideas and resources and provide advice around the content and assessment of VCE Physical Education. Teachers spoke specifically about the perceived benefit of being able to watch colleagues teach and how this would be a highly desirable professional learning opportunity. Observation and dialogue between teachers, mentoring, collegial visits and professional discussions are recognised forms of professional learning [305].

Factors at the physical environment level were also perceived to be barriers to effective teaching and student academic performance. Teachers reported lack of access to facilities as well as lack of facilities, lack of funding to purchase resources and unreliable access to technology in the
classroom. These findings are not dissimilar to the institutional barriers perceived by teachers in primary and secondary school physical education programs that focussed on practical skill development [45, 46].

8.6 Limitations

It is important to recognise that teacher perceptions of influence on their behaviour may not accurately reflect the teaching delivered. Previous research suggests that teachers may say one thing but do another [379]. SueSee and Edwards (2011) found that teachers reported using a variety of teaching styles to teach senior secondary physical education in Queensland, Australia, yet this contradicted the findings of classroom observations [51]. A limitation of the present study was that the teaching practices of the teachers were not observed and therefore could not be validated. Although the teachers in this study were considered a diverse sample of the total population, including three different school sectors across metropolitan and rural Victoria, this was not a representative sample. To add to the work of Casey and O’Donovan [71] in Advanced Subsidiary level physical education, perceptions of teachers delivering exit year senior secondary physical education courses nationally and internationally warrants further research. The limitations of the study are acknowledged and some degree of caution is required when any attempt to generalise the findings is made. However, in the specific context of VCE Physical Education, little research has been conducted into the teacher-related factors that may influence student academic performance, and the findings from this study may inform the development of programs for pre-service teachers and professional learning for in-service teachers to support teachers to maximise the academic performance of their VCE Physical Education students.

8.7 Implications for teacher education

An awareness of teacher perceptions of the influences on student academic performance in VCE Physical Education may be beneficial to both in-service and pre-service teachers. Pre-service teachers aspiring to teach senior secondary physical education and in-service teachers wanting to
maximise the academic performance of their students may benefit from the insight from this study and potentially implement some of the strategies suggested in their teaching.

Teachers identified the following as important influences on student academic achievement:

- being passionate and enthusiastic about the content and teaching in physical education
- knowing your students and developing effective relationships
- setting high expectations for students
- developing strong subject specific content knowledge and pedagogical content knowledge
- setting specific learning outcomes for practical tasks
- using reflective practices to inform teaching
- being accessible to students outside of the classroom, both face to face and via electronic media (within the bounds of school policies and expectations).

The findings of this study support the need for professional learning opportunities for in-service teachers that are time and cost efficient while meeting the needs of the teacher. Findings of this study suggest that opportunities to watch other senior secondary teachers teach within different school settings was perceived as beneficial to VCE Physical Education teacher development. Physical Education teacher preparation programs need to ensure that pre-service teachers are exposed to teaching strategies that allow for the integration of practical and theoretical concepts. In this way, the specific influences on effective teaching in senior secondary physical education as recommended by teachers can be combined with those skills already included in teacher training programs, to assist teachers in maximising their students’ academic performance in senior secondary physical education.

8.8 Conclusion

This study sought teacher insights into how they perceived they influenced their students’ academic performance in senior secondary physical education, specifically in the context of VCE Physical Education. From a social-ecological perspective, multiple factors of influence on teacher
behaviour were identified. At the individual level, teachers perceived content knowledge, expectations, passion and enthusiasm, pedagogical content knowledge and use of reflective practices to inform teaching, as key factors influencing student academic performance. Social level influences identified were positive student-teacher relationships and student access to the teacher outside of class time. How teachers operationalise the VCE Physical Education curriculum within the school setting is constrained by time, policy, resources and facilities, yet teachers reported a myriad of teaching strategies that they used to engage and motivate their students to succeed in the written assessment tasks that determine academic success in VCE Physical Education. Effective teaching strategies for VCE Physical Education included practical work, use of ICT, real-life examples and exam preparation strategies. This research identified context specific ideas of how effective teachers deliver particular content to their learners in a variety of settings. Similarities were found between previous research on student perceptions and the teacher perceptions in this study with the importance of the teacher being accessible to students outside class time and for the teacher to be passionate, enthusiastic and knowledgeable.
CHAPTER 9

Overall conclusions
CHAPTER NINE: Overall conclusion

9.1 Conclusions

The series of studies undertaken and reported on within this thesis investigated factors that influence academic performance in senior secondary physical education. The teacher has previously been identified as the most important school-based influence on student achievement after the students themselves [7, 8], with teacher effectiveness shown to be positively associated with student academic performance [35, 93]. Generic characteristics of effective teachers have previously been identified [31]. However, it is evident that teacher effectiveness is context specific and what constitutes effective teaching is not the same in all settings [36]. A number of factors influence teacher behaviour and may contribute to the decisions made by teachers on how to teach VCE Physical Education with the aim to maximise student academic performance. Influences on teacher behaviour are multifaceted, therefore a social-ecological model was used to explore the multiple levels of influences on teacher behaviour [310, 356]. Through a series of studies, teacher-related factors were explored to identify factors at the individual, social, policy and physical environmental level that contribute to the effective teaching of VCE Physical Education. The studies aimed to investigate these factors in relation to the curriculum and from the perspective of the student and the teacher.

Overall, the following conclusions were drawn based on the findings of the series of studies conducted:

International review of senior secondary (16-19 year olds) physical education courses (Chapter 2)

i. An unprecedented review of national and international senior secondary physical education courses confirmed the sustained growth and the inclusion of senior secondary physical education in accredited courses for certification. Course aims and objectives of the expected outcomes for students of senior secondary physical education were diverse. Reaching beyond subject specific knowledge and skills, course aims and objectives encompassed an array of additional general educational
There was great consistency in the course rationales, with the intended focus on the complex interrelationships between the biophysical and sociocultural factors influencing physical performance and participation. However, the alignment of the intended rationale with the prescribed content is not clearly evident in all of the courses reviewed. Assessment in senior secondary physical education was predominately a combination of internal and external assessment, with 10 of the 15 courses reviewed utilising both modes of assessment. The review of senior secondary physical education courses found that an end-of-year written examination was the most commonly used external assessment task. The ongoing challenge for teachers is in transferring curriculum policy into meaningful student learning that extends knowledge and understanding, and is supported by valid and authentic assessment [18, 116]. Senior secondary physical education is constrained by policy. Curriculum documents stipulate what is to be taught, but how that content is taught provides teachers with opportunities to engage students using diverse pedagogy.

Student performance in high-stakes examinations based on content area, question type and cognitive process in VCE Physical Education (Chapter 3 and 4)

ii. & iii. This is the first time VCE Physical Education examination data has been analysed to investigate the influence of content, question type and cognitive level on student performance. Student performance on the external assessment task (written examination) of VCE Physical Education varied by the Area of Study (content) being assessed, type of questions (multiple-choice or short answer) and cognitive process (based on Bloom’s revised taxonomy). In Unit 4, Area of Study 1 (planning, implementing and evaluating a training program) in both 2011 and 2012, student performance was significantly lower than the overall examination mean. Student examination data revealed that low achieving students (UG – D) were not necessarily achieving more marks in questions that required low-order processing, but performed well below the examination mean across all questions. The findings of this study provide valuable insights for providers of pre-service teacher
training and for the professional development of in-service teachers. The development of appropriate learning strategies to enhance student understanding of content identified as challenging (planning, implementing and evaluating a training program) is needed. Furthermore, professional learning for teachers to develop tasks that provide students with opportunities to develop the skills assessed through the external examination, particularly higher order thinking skills is warranted. Effective teaching strategies aligned with course objectives and assessment practices will ensure students are provided with tasks that enable the development of the required higher-order thinking skills to excel on examinations that are designed to assess these skills.

Exploring context specific teacher efficacy in VCE Physical Education teachers (Chapter 5)

iv. Teachers’ sense of efficacy is specific to the situation in which they are teaching; yet context specific research has been under represented in teacher self-efficacy research. This study was the first to identify self-efficacy levels of senior secondary teachers of VCE Physical Education. VCE Physical Education teachers were efficacious in their ability to manage their classrooms, their use of instructional strategies and student engagement. Teacher self-efficacy did not vary significantly with years of teaching experience or specifically VCE Physical Education experience. The investigation did not find a set of teacher characteristics that predicted levels of efficacy. Higher levels of teacher self-efficacy are linked to effective classroom management, innovative and varied instructional strategies, setting of high expectations for students and encouraging student-centred learning. Teacher efficacy is explicitly linked to teacher effectiveness and student academic performance [380]. Teacher efficacy in a senior secondary physical education context is an important construct when considering teacher-related influences on student academic performance in senior secondary physical education.

Student perceptions of teacher-related factors that influence academic performance (Chapter 6 and 7)
Students perceived the ‘perfect’ VCE Physical Education teacher to be knowledgeable, to have strong communication skills to convey this knowledge, care about their students, be enthusiastic about physical education and about teaching, and be accessible to students outside of class time. Students also identified the importance of the teacher having a good attitude to teaching of VCE Physical Education, a broad repertoire of teaching strategies, the ability to make strong connections with student experiences and the real world, and to develop positive student-teacher relationships. These findings provide a unique contribution to our understanding of the context specific factors related to effective teaching in VCE Physical Education from a student perspective. The student lens provided an insight from those with the most to gain, the students. This study provides valuable information from the student perspective to be considered for pre-service teacher development and ongoing professional learning for in-service teachers in this context.

Teachers’ perceptions of how they influence student academic performance in VCE Physical Education (Chapter 8)

The findings from focus group discussions with VCE Physical Education teachers make an important contribution to the understanding of teacher effectiveness. Supporting the proposition that teacher effectiveness is context specific [36], multiple factors of influence were identified. Similar to the student perspective, teachers perceived knowledge (content and pedagogical), expectations, passion, enthusiasm, student-teacher relationships and student access to the teacher outside of class time as important factors influencing student academic performance. Additionally, teachers’ use of reflective practices was identified as key factors influencing student academic performance. How teachers operationalise the VCE Physical Education curriculum within the school setting is constrained by time, policy, resources and facilities, yet teachers reported a myriad of teaching strategies that they used to engage and motivate their students to succeed in the written assessment tasks that determine academic success in VCE Physical Education. Effective teaching strategies for VCE Physical Education included practical work, use of ICT, real-life examples and exam
preparation strategies. This research identified diverse context specific ideas, including the role of practical work in senior secondary physical education, use of ICT, connection with students lived experiences and exam preparation strategies, of how effective teachers deliver particular content to their learners in a variety of settings. These findings can be used to inform pre-service and in-service teacher training programs.
9.2 Limitations and Delimitations

Limitations and delimitations of these studies included:

i. A document analysis provides a purely theoretical perspective of the aims, objectives and rationales, content and assessment practices in senior secondary physical education. It enabled the identification of commonalities and differences. A limitation of a theoretical approach is that the lived experiences of teachers and students for which the documents are intended cannot be captured. However, the review did identify the current state and status of senior secondary physical education and provided a context for further research.

ii. The senior secondary physical education courses included in the review were limited to those identified as native English speaking countries [150] and where curriculum documentation was available in English. The common language was selected to assist in the comparison of each of the senior secondary physical education courses.

iii. The secondary data analyses were conducted on student examination data from the first two years of implementation of the 2011 – 2017 VCE Physical Education curriculum [120]. The external examination for VCE Physical Education is written and developed by a panel appointed by the VCAA each year and while the examinable content is underpinned by the key knowledge and skills stipulated in the official curriculum document, the questions vary from year to year. Student data was collected from two different student cohorts completing two different examinations, in two separate years, and therefore caution is required when interpreting the findings and drawing comparisons between student performances across the two years. The analysis of two years of data does, however, provide a richer context for the discussion of student performance.

iv. Self-administered questionnaires can be influenced by social desirability and recall bias. Chapter 5 utilised self-reported data, which has some limitations, particularly when
associated with teaching approaches. Research has shown that teachers perceptions of the range of teaching strategies in the classroom are not always reflective of the actual range observed [51, 379]. It is important to recognise that teacher perceptions of influence on their behaviour may not accurately reflect the teaching delivered. However, a validated, widely utilised self-efficacy scale was used and does enable comparisons to be made with teacher efficacy in other contexts (school setting, year level, subject or class).

v. There was diversity in the student cohort sample involved in the studies presented in Chapters 6 and 7. Students were from government and independent schools from a range of SES backgrounds and VCE mean study scores. However, all the students who participated in this study were from the east and south-eastern suburbs of Melbourne, Australia. Future research may consider the inclusion of more geographically diverse student populations, including rural students.

vi. Teachers involved in the study presented in Chapter 8 were considered a diverse sample of the total population, including three different school sectors across metropolitan and rural Victoria, Australia. However, some degree of caution is required when any attempt to generalise the findings to local, national and international senior secondary physical education contexts is made.
9.3 Recommendations

At the conclusion of these studies the following recommendations are made for future directions in research in the context of senior secondary VCE Physical Education:

i. The intent of the prescribed curricula of senior secondary physical education courses for certification is clearly stipulated in official documentation. Future research could now focus on developing an understanding of how teachers interpret, implement and deliver curricula. The alignment of the curricula intent with actual delivery, and the implications this has for effective learning and teaching in senior secondary physical education is worthy of further investigation.

ii. The current research focused on student and teacher perceptions of effective teaching practices that influence student academic performance in VCE Physical Education. Further investigation of the teaching strategies and characteristics of teachers who have demonstrated high levels of achievement of student academic success is warranted. By identifying teachers with a consistent record of student achievement above their projected/predicated achievement level in physical education may provide greater insight into what effective teaching in senior secondary physical education actually looks like.

iii. The findings of these studies provided valuable insights to inform pre-service teacher training and for the professional learning of in-service teachers. Further research in the context of VCE Physical Education is needed to explore how teachers can create effective experiential, practical, applied learning contexts within the environmental and policy constraints of schools. Furthermore, investigation of the implementation of the intended integration of theoretical and practical concepts stipulated in the curriculum documentation is warranted to determine if that leads to successful student performance on written examinations (assessments).
iv. Professional learning opportunities based on modelling of effective teaching in senior secondary physical education for pre and in-service teachers will require policy and management support to allow for collaborative learning (for teachers) to occur. Opportunities for observation of colleagues within and across schools, accompanied by discussion and reflection, may encourage teachers to learn from and with each other. Further research is warranted to assess the value and impact of peer-to-peer observation as a professional learning opportunity and the impact this has on teacher efficacy levels and student academic performance.

v. The importance of teacher accessibility beyond face-to-face classroom instruction was clearly identified by students and teachers as an influence on academic achievement. It is imperative that future research seeks to identify the learning needs of students that require interaction with the teacher beyond scheduled class time. Additionally, the impact on teachers of the increasing demands being placed on their time, and finding suitable personal and school-based strategies to manage the twenty-four hours a day, seven days a week access expectations of senior secondary students is needed.

**In Summary,** from this series of studies it is possible to conclude that the intent of senior secondary physical education courses is for the integration of theoretical and practical knowledge and that written examinations are widely used to assess student academic achievement. In addition, student performance on the written examinations suggests that the application of knowledge is more challenging for students to demonstrate in written examinations. Teachers may need to provide students with practical-based authentic learning experiences to draw on to enable them to demonstrate this knowledge and skills in written assessment tasks.

Teachers of senior secondary VCE Physical Education were found to be efficacious in their management of students, classroom management and student engagement. However, further
research is warranted to determine influences on teacher-efficacy amongst pre-service teachers, as teaching experience was not found to affect levels of efficacy in this context.

Students identified characteristics of the ‘perfect’ VCE Physical Education teacher as being knowledgeable, enthusiastic and caring, having good communication skills and being accessible outside of scheduled class time. Student perceptions of teacher-related influences on their academic achievement included teacher attitude, range of teaching strategies, ability to connect learning to student experiences and the real world, positive student-teacher relationships and the ability to access the teacher in person and electronically outside of class time.

Many of these influences were mirrored in teacher perceptions of influences on student academic achievement; passion and enthusiasm, knowledge (content and pedagogical), student engagement through real-world examples, practical work and use of ICT, knowing your students (student-teacher relationships) and student access to the teacher outside face-to-face classroom instruction. Teachers further identified having high expectations for their students and the use of reflective practices to inform teaching as positive influences on student academic performance. The findings of these studies offer a unique contribution to the understanding of context specific effective teaching, providing some clarity as to what constitutes effective teaching in senior secondary VCE Physical Education from both a student and teacher perspective. Further research may build on these findings by identifying characteristics of effective teaching and learning practices in senior secondary physical education in other contexts, both nationally and internationally.
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APPENDIX A: Published peer-reviewed journal articles

The ‘Perfect’ Senior (VCE) Secondary Physical Education Teacher: Student Perceptions of Teacher-related Factors that Influence Academic Performance

Rachael J. Whittle
Amanda Telford
Amanda C. Benson

Discipline of Exercise Sciences, School of Medical Sciences, RMIT University,

Abstract: Improving student academic performance in senior-secondary education increases student opportunities for employment, training and further education. The aim of this research was to identify students', completing the Victorian Certificate of Education (VCE) Physical Education, perceptions of teacher-related factors that influence subject specific academic performance. Unit 3 and 4 VCE Physical Education students (n = 23) from three government secondary schools and one independent secondary school in Victoria, Australia completed poster annotations identifying their perception of the 'perfect' VCE Physical Education teacher. The de-identified data from the posters were transcribed verbatim, coded and analysed using NVivo software to explore student perceptions of teacher-related factors that influence academic performance. Emergent themes from the poster annotations suggested that student's perceptions of the 'perfect' VCE Physical Education teacher included the teacher-related factors of knowledge (of subject matter), verbal ability, caring, enthusiasm and teacher accessibility.

Introduction

An understanding of the teacher-related factors that affect student academic performance in senior-secondary physical education may lead to improved academic outcomes for students in senior-secondary physical education courses. Research into senior-secondary physical education is limited, and that which has been conducted has focussed on the analysis of the senior-secondary physical education curriculum documentation, it's implementation (Thorburn & Collins, 2006a; MacPhail, 2007; Bowes & Bruce, 2011; SueSee & Edwards, 2011; Brown & Penney, 2012) and assessment (Thorburn & Collins, 2006b; Penney, Jones, Newhouse, & Cambell, 2012). What remains unclear is the specific teacher-related factors that influence student achievement in senior-secondary physical education. Successful performance in senior-secondary education, as demonstrated in the assessment of learning for certification, is a key enabler for young people to transition into further education, training or employment (Curtain, 2001; Pinquart, Juang, & Silbereisen, 2003). The Victorian Certificate of Education (VCE), administered by the Victorian Curriculum and Assessment Authority (VCAA), is one of three post-compulsory pathways available to students in their final two years of secondary schooling in Victoria, Australia; with the majority, 83% (VCAA, 2013a) of students selecting this course for their senior-secondary certificate. Senior-secondary education is characterised by greater subject specialisation (Dufaux, 2012) and student enrolments in senior-secondary physical education courses both
nationally (VCAA, 2003; 2013b) and internationally (Green, 2001; MacPhail, 2002; Thorburn, 2007) continues to increase. This paper will review the teacher-related factors within the context of the social-ecological model (Salmon & King, 2010) that may influence student academic performance in senior-secondary physical education. Enhanced understanding of student perceptions of the teacher-related factors that may influence student academic performance in VCE Physical Education could lead to improved academic outcomes for students within this subject and data could be used to inform the development of pre-service teacher education as well as in-service professional learning opportunities for practising teachers.

Teacher-related Factors

There are a number of factors that may affect student academic performance, including the student themselves, home, the school, principals, peers and teachers (Hattie, 2003). Research has consistently demonstrated that the actions of the teacher and the activities conducted at the classroom-level, specifically what teachers know and what they do in the classroom, is more important than school-level factors as an influence on student learning (Hattie, 2003; Rowe, 2003; Kyriakides, Christoforou, & Charalambous, 2013). The factor contributing to the largest source of variance (50%) in student academic performance is the students themselves; what they bring to the table, including their family background, socio-economic status, prior learning and motivation (Ayres, Sawyer, & Dinham, 2004; Hattie, 2012; Kyriakides et al., 2013). Teachers account for a further 30% of the variance in student achievement; and this factor is potentially modifiable by teachers. Previous research that examined student achievement in the final year of secondary education in Australia, found that the class/teacher effects accounted for 59% of the residual variance in students’ achievement (Rowe, 2004). What is not definitively known are the specific teacher-related factors that influence student academic performance and what it is that effective teachers do to maximise student academic performance within the context of senior-secondary physical education.

In the context of this research, teacher-related factors are classified as those factors that result from the teachers’ behaviour (Morgan & Hansen, 2008) that may influence student academic performance. A social-ecological model can be used to describe the multiple levels of influence that may affect an individual’s behaviour (Salmon & King, 2010). The social-ecological model allows for analyses of a particular problem in a given setting. Student perceptions of the ‘Perfect’ VCE Physical Education teacher are explored within the context of a social-ecological model which can be used to provide a conceptual framework to understand the many factors that influence teacher behaviour at the individual, social, physical environment or policy level (Elder, Lytle, Sallis, Young, Steckler, Simons-Morton, Stone, Jobe, Stevens, & Lohman, 2007). The social-ecological model allows for the multiple influential factors on teacher behaviour to be categorized and used to inform strategies that target different levels of influence to be designed and implemented to increase student academic performance. Individual and social factors that influence teacher behaviour that may influence student academic performance are more readily modified compared with those influences at the physical environment and policy/organisational level. The physical environment, policy and organisational factors, including timetabling, VCE policy and access to facilities such as a gymnasium and weight room for example, are beyond the control of the individual teacher.

Governments, accrediting bodies and schools acknowledge that quality teaching is imperative for student achievement and seek to define quality teaching across the teaching
profession. The term quality is used in educational policy documents without clear definition. The qualities, characteristics and teaching practices that enhance student learning, and what it is that constitutes quality and/or effective teaching has been extensively researched (Darling-Hammond, 1999; Goe, 2007; Stronge, 2007; Dinham, 2011; Wang, Lin, Spalding, Klecka, & Odell, 2011), and commentary on quality teaching, particularly from policy makers, have and continue to struggle to reach a consensus about what constitutes quality teaching (Dinham, 2013). After decades of research, and constant shifts in how effective teachers are viewed, (Cruickshank & Haefele, 2001) there is little agreement, and possibly more conjecture over what quality teaching looks like. There is no ‘one-size-fits-all’ definition. Findings are inconsistent across curriculum areas, school year levels and school settings, and while it is assumed that quality teaching is imperative to student academic performance, the concept of quality is often defined differently (Wang et al., 2011). Defining quality teaching in a physical education context “may be neither appropriate nor helpful” (Penney, Brooker, Hay, & Gillespie, 2009, p. 423) and what constitutes quality physical education may need to differ in different settings to account for contextual factors such as local and school culture, timetabling, facilities and resources. Teacher-related factors that may influence student academic performance are likely to be specific to a given context. The differences in teacher-related factors that exist between subjects and those that exist within the subject suggest that there is a case to support differentiated teacher effectiveness (Muijs, Campbell, Kyriakides, & Robinson, 2005).

Despite these differences, what is commonly accepted is that excellence in teaching is the “single most powerful influence on achievement” (Hattie, 2003, p. 4). Teachers, in the most part, have a positive effect on student learning (Hattie, 2009). The size of this effect will vary; more effective teachers have greater positive effects on student outcomes than less effective teachers. The findings from Hattie’s (2009) comprehensive meta-analysis on influences on academic achievement showed 20 of the 29 positive effects on student performance were teacher-related.

Factors that affect student academic achievement in senior-secondary education have received little attention in the past 10 years. Effective strategies and practices used by teachers of high performing students (top 1% of the state of New South Wales), established that a classroom environment that encouraged deeper understanding rather than being ‘exam-driven’ was significant in successful teaching at the senior-secondary level (Ayres et al., 2004). And yet, students with high aspirations in Ireland showed preference for a more narrow focus on exam preparation in the lead up to their final exam (Smyth & Banks, 2012). Teachers themselves attributed success to their relationship with their students, their classroom practices (individual factors), faculty cooperation (social factors) and the students themselves (Ayres et al., 2004). Similarly, Horsley (2012) found that teachers who facilitated high academic performance in Year 13 Scholarship in New Zealand had deep content knowledge, passion for teaching and held high yet realistic expectations for their students.

**Teacher Effectiveness**

Although a strong link has been consistently demonstrated between teacher effectiveness and student achievement, (Darling-Hammond, 1999; Hattie, 2003; Stronge, Ward, & Grant, 2011) there is no consensus about quantifying teacher effectiveness. Student achievement on standardised tests is commonly used as an indirect measure of teacher effectiveness. Student academic performance in VCE Physical Education is determined through a series of internal assessment tasks that are moderated against an external examination, set by the VCAA. It is not the intention of the authors to dismiss student
educational outcomes that are not measured via academic performance as less important, however, the specific focus of this study is on VCE physical education whereby success is measured via academic performance and therefore our focus. Student performance, as argued by Crickshank and Hafele (2001), is only one outcome of effective teaching. However, at the senior-secondary level, academic performance is used extensively to determine certification. Student study scores in VCE subjects are used to calculate an Australian Tertiary Admission Rank (ATAR) that is then used by the Tertiary sector and industry to inform decisions in relation to entrance into higher education, TAFE or a range of employment and training opportunities. At the senior-secondary level, student academic performance is therefore often used as an indicator of teacher effectiveness.

Increases in student achievement have previously been attributed to teacher effectiveness (Hattie, 2003; Stronge, 2007; Horsley, 2012). When effective teaching is defined by increases in student academic performance, comparisons between more and less effective teachers can be made. There have been a number of reviews and meta-analyses that have attempted to find a suitable framework to investigate teacher effectiveness. Effective third grade teachers in the US were found to score higher across the four dimensions of teacher effectiveness: instructional delivery, student assessment, learning environments and personal qualities (Stronge, Ward, Tucker, & Hindman, 2007). More effective teachers, based on student achievement gains in English, Mathematics, Social Sciences and Science in this context (third grade) placed greater emphasis on meaning versus memorisation, asked their students more higher order (for example application, analysis, synthesis, evaluation), questions, used a broader range of instructional strategies, provided differentiated assignments, were more organised, had higher expectations of their students and had fewer incidences of off-task behaviour (Stronge et al., 2007). It has been argued that a generic approach to teacher effectiveness is counter-intuitive and Muijs and colleagues (2005) suggested that there is evidence for differentiated definitions of effectiveness for different curriculum areas, student backgrounds and ability, students’ personal characteristics and different teacher roles such as pastoral and leadership. The fact that different curriculum areas have different content supports the notion that teacher effectiveness may well be inconsistent between curriculum areas. What is effective in teaching English to non-English speaking junior-secondary students is unlikely to be effective in teaching Physics to gifted students in their final year of secondary education. There is some evidence to suggest that effectiveness within subjects may also differ as a result of the desired learning outcome (Muijs et al., 2005). For example, effective teaching of locomotive skills to Year 1 students in physical education is not likely to be the same as the effective teaching of acute physiological responses of physical activity to senior-secondary physical education students. Multiple contextual factors including subject, setting and students provide support for differentiated teacher effectiveness, rather than a ‘one-size-fits-all’ approach.

Subject specific research into teacher and teaching effectiveness has often focussed on English and Mathematics, perhaps due to the availability of standardised test results in these areas. It is unclear if results from one subject area can be applied to other subjects. The results from a meta-analysis conducted by Donker, de Boer, Kostons, Dignath van Ewijk, and van der Werf (2014) found that the strategies that were effective in improving academic performance differed across primary and secondary education in writing, science, mathematics and reading. It stands to reason that different subject areas contain knowledge and skills that will require different and specific teaching approaches for effective delivery.

With so much research conducted into teacher and teaching effectiveness, and additionally the number of meta-analyses combining the results of these studies, there is some common ground across the different studies. Stronge (2007) identified common attributes that exemplify effective teachers and these categories are used in this study to
compare VCE Physical Education student perceptions of teacher-related factors that influence academic performance with generic characteristics of effective teachers. The danger however, in compiling a list of generic effective teacher and teaching characteristics that have been shown to influence student academic performance is that there is little consistency across the studies in methodology or frameworks used for determining effectiveness. These limitations give support to research that is contextualised in subject specific areas and seeks to identify teacher-related factors that influence student academic performance in those contexts.

Quality Physical Education

Quality teaching and teaching effectiveness have been researched extensively (Rowe, 2003; Stronge & Hindman, 2003; Rowe, 2004; Stronge et al., 2011; Hattie, 2012; Horsley, 2012), and it is clear from the research that teachers are the most influential school-based factor on student achievement. However, much of the research looks at compulsory education, and none to our knowledge have focused on senior-secondary (post-compulsory) physical education. Of those that have specifically looked at physical education, all have concentrated almost exclusively on the delivery of programs where the focus is motor skill development and performance, primarily within practical classes (Behets, 1997; Stirling & Belk, 2002; Boyle, Jones, & Walters, 2008; Kyriakides & Tsangaridou, 2008; Morgan & Hansen, 2008). Perceived barriers to the delivery of quality physical education with this focus have been identified in previous research (Kulinna & Cotran, 2003; Barroso, McCullum-Gomez, Hoelscher, Kelder, & Murray, 2005; Rink, 2013). Boyle and colleagues (2008) suggested that the delivery of a quality physical education program in schools is “constrained by many institutional, teacher- and student-related barriers” (Boyle et al., 2008, p. 4) and Morgan and Hansen (2008) suggested that the perceived barriers to the delivery of a ‘quality’ physical education program in schools can be categorised as either teacher-related or institutional. Much of the research has focused on primary school level where the barriers to delivering a quality physical education program are often associated with non-specialists teaching physical education, lack of time, physical education being considered a low priority in a crowded curriculum, large class sizes and lack of facilities and resources (Barroso et al., 2005; DeCorby, Halas, Dixon, Wintrup, & Janzen, 2005; Morgan & Hansen, 2008; Jenkins & Benson, 2010). There are some similarities and some differences in the barriers identified to delivering effective physical education in both primary and secondary educational settings. However, it is more likely that in secondary-school settings physical education is taught by a specialist teacher, whose training may allow them to overcome the perceived barriers more readily (Jenkins & Benson, 2010).

As stated earlier, teacher effectiveness has been clearly linked to student outcomes, particularly academic outcomes, however, in physical education a major component of effectiveness has been engagement, and time on task (Tinning, 1994). The notion of teaching physical education effectively is considered ‘muddled’ (McKenzie & Lounsbury, 2013). Teacher effectiveness in secondary physical education may be measured through student achievement, and this has been closely associated with time, which is a measurable variable used for predicting student improvement (Parker, 1995; Manross & Templeton, 1997; Barroso et al., 2005; Caprara, Barbaranelli, Steca, & Malone, 2006; Morgan & Hansen, 2008; Aktop & Karahan, 2012; Moy, Renshaw, & Davids, 2013). When comparing more and less effective teaching behaviours in secondary physical education gymnastics classes, Behets (1997) identified five characteristics of effective teachers; four of which related to time: higher activity time, lower instructional time, more time spent observing students in activity.
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spent less time and attention on providing information for students. While time practicing a motor skill does not guarantee the learning of the skill, it is unlikely for learning to occur if students are not provided with enough appropriate practice time. The fifth characteristic that is consistent across much of the research into effective teaching is feedback (Behets, 1997; Manross & Templeton, 1997; Rink, 2013). Effective physical education teachers provide more corrective feedback than less effective teachers. Again these findings are specific to the context of practical physical education classes and not senior-secondary courses where primarily instruction is classroom-based with student achievement based on a student’s understanding of and application of theoretical knowledge to hypothetical or scenario based situations.

Effective Teaching in Senior-secondary Physical Education

Generic qualities of effective teachers (Stronge, 2007) and those characteristics specific to the context of teaching practical physical education have been considered in previous research. In the context of senior-secondary physical education it is unclear if the specific teacher-related factors that influence student achievement are unique to the context of senior-secondary physical education.

High ability students’ perceptions of effective teachers are more likely to pertain to a teacher’s knowledge of the subject and content taught when compared to low ability students (Muijs et al., 2005; Horsley, 2012). In establishing the difference between expert and experienced teachers, Hattie (2003) suggested that pedagogical content knowledge was more important than subject specific content knowledge; that is the way in which knowledge is used in teaching situations to facilitate student learning. Pedagogical content knowledge in physical education has previously been identified (You, 2011, p. 104) to include knowledge of:

- Physical education as a subject
- Physical education curriculum
- Teaching methods in physical education
- Students’ learning of physical activity
- Physical education assessment
- Instructional environments in physical education

To facilitate student learning, Ayvazo, Ward, and Stuhr (2010) argued that a teacher must first have an in-depth understanding of the subject specific content.

Further research has sought to determine the most effective pedagogical approaches to teaching physical education. With the shift towards teaching games for understanding and games sense approaches in practical physical education, a more constructivist approach may enhance student learning. While little is known about the use and perceptions of these various styles of teaching (Kulina & Cothran, 2003), the current understanding is that effective teachers should use a number of different styles; this is consistent with other subjects that are classroom-based. Effective teachers are able to differentiate their mode of delivery depending on the needs, capabilities, learning styles and backgrounds of their students and the desired learning outcome (Kyriakides, Campbell, & Christofidou, 2002; Wenglinsky, 2002; Muijs et al., 2005; Stronge et al., 2011).

Research investigating student perceptions of practical physical education and in senior-secondary education is not new (Cothran, Kulina, & Garrah, 2003; Cothran & Kulina, 2006; Horsley, 2010; Smyth & Banks, 2012; Lamb & Lane, 2013). In a comparison of the ‘Higher Still Physical Education’ course in Scotland with the ‘Senior Physical
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Education’ course in Queensland, Australia, Thorburn and Collins (2006b) analysed the consequences on student learning, assessment experiences and analytical abilities of teacher’s decision-making within an integrated senior-secondary physical education curriculum through student interviews and assessment. From their research, Thorburn and Collins (2006b) suggested that evidence of student achievement in senior-secondary physical education should be included in any evaluation of curriculum integration and teacher effectiveness. However, to our knowledge, student perceptions of teacher-related factors that may influence academic performance in the specific context of senior-secondary physical education in Victoria has not been investigated.

The purpose of this study was to explore student perceptions of the teacher-related factors that may influence student academic performance in the VCE Physical Education course and identify the teacher-related factors that students perceive to be effective in senior-secondary physical education teaching.

Method

Participants

Students completing Units 3 and 4 VCE Physical Education were invited through professional physical education networks to participate in the study. Ethical approval was obtained from the University Human Research Ethics Committee. All students who responded to the advertisement received a plain language statement outlining the research and a dual (parental and participant) consent form.

Unit 3 and 4 VCE Physical Education students from Melbourne’s east and south-eastern suburbs (n=23; female=16, male=7) from government secondary schools (n=3) and an independent secondary school (n=1) provided informed consent to participate in the study. In total, five groups of students participated in the poster annotation sessions. The groups met in October 2013, just prior to the end of the academic year but before the external VCE examination period for Year 12 students. This window of time was considered appropriate, considering the constraints afforded to students completing courses for certification where the stakes are high in terms of outcomes for the students. Students had completed the face-to-face teaching component of their studies and were commencing a period of revision before the final examination.

The groups consisted of four to five students from the same school and same VCE Physical Education class. The homogeneous nature of the groups provided an environment for students to record their thoughts and experiences of their perception of the ‘perfect’ VCE Physical Education teacher within a peer group, while still providing individual responses.

Students were asked to annotate an A3 poster of a super hero figure with characteristics of what they perceived to be the ‘perfect’ VCE PE teacher. Students were instructed to consider those teacher-related factors that they considered to be the ideal in helping improve their academic performance in VCE Physical Education. Students were requested to consider behavioural rather than personal characteristics of their perceived ‘perfect’ teacher and were asked to comment on teacher behaviours and not the teacher as a person. For example, students were encouraged to consider what the ‘perfect’ teacher does to help improve academic performance. This ensured that student responses reflected teacher-related behaviours and not personal characteristics.
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Data analysis

The poster annotation data were de-identified, transcribed and analysed systematically using NVivo Version 10 (QSR International, 2014) software package. Immersion in, and familiarisation with the data were originally achieved through reading and re-reading, highlighting and annotating the transcribed data (Grbich, 2013). The coding process was then recursive and iterative (Cope, 2009), initially codes were identified a priori. Potential codes were classified from the theoretical framework guiding the study; the social-ecological model (Salmon & King, 2010), where the theoretical understanding of the existing constructs of the study determined the development of codes. A code book (DeCuir-Gunby, Marshall, & McCulloch, 2011) was developed to include the code title, a description of content to be coded, with an inclusion and exclusion criteria and an example from the data to ensure accuracy and rigor throughout the coding process. A simple word frequency query was performed to gain some insight into the key themes emerging from this initial coding of data. Further coding and analysis to identify emergent themes and explore student perceptions of teacher-related factors on student academic performance in VCE Physical Education was performed in-vivo where categories were named directly from the words of the participants (Bringer, Johnston, & Brackenridge, 2004). This process allowed sub-cATEGORIES of the dominant levels of influence, namely the individual and social level of the social-ecological model to be identified as further themes emerged. The sub-categories were then compared with the profile of an effective teacher as described by Stronge (2007).

Results

The 23 (F = 16, M = 7, 16 – 18 year olds) Unit 3 and 4 VCE Physical Education students from government secondary schools (n = 14) and independent secondary school (n = 9) reported many characteristics of the ‘perfect’ teacher and teaching practices. Students identified elements of teacher behaviour in and outside of the classroom that may impact on their academic performance. Examples of the student’s annotated posters are presented in Figure 1.
Common patterns were identified both between and within groups with a high level of consistency. The identified themes were consistent between government and independent school students and both male and female students. Initial analysis identified factors at the individual and social level of the social-ecological model to be the most prominent influences from the students’ perspective. Students did not identify factors at the physical environment or policy level of influence in their poster annotations of the ‘perfect’ VCE Physical Education teacher. The dominant themes that emerged from the poster annotations at the social and individual level of influence on teacher behaviour were found to be:

- Knowledge of content (individual)
- Verbal ability (individual and social)
- Caring (individual)
- Enthusiasm (individual)
- Access (to the teacher) (social)

Students consistently reported teacher knowledge of content, specifically course content in VCE Physical Education, as an important teacher-related factor that may influence
academic performance. Students clearly articulated that their perception of the 'perfect' VCE Physical Education teacher would be one who is knowledgeable (Table 1).

Many students spoke of the importance of communication. Student perceptions of their 'perfect' VCE Physical Education teacher included numerous references to the teachers’ ability to communicate. This included communication with the student and also their ability to communicate or convey ideas clearly and compellingly (Table 1), as well as providing detailed examples and explanations. Students clearly articulated the importance of using different forms of communication including visual stimulus, using actions and physical demonstrations, relating concepts to real life examples, and by relating new concepts to old.

Students identified the importance of the ‘perfect’ VCE Physical Education teacher caring about them as individuals. Student poster annotations related to the ‘caring’ theme covered a broad range of teacher attributes such as being supportive, understanding, kind, friendly, listening to students, encouraging, patient, honest and fair, warm and having a sense of humour.

A strong theme to emerge as a characteristic of the ‘perfect’ VCE Physical Education teacher was enthusiasm with students regularly reporting enthusiasm and passion as important teacher-related factors influencing their academic performance (Table 1). Enthusiasm as a theme incorporated enthusiasm, passion and motivation for the subject matter and for teaching and learning overall.

The final theme to emerge from the student data was that of access. Student perceptions clearly identified the importance of having access to their teacher outside of class time (Table 1). This included both formal and informal meetings, electronic contact and communication as well as being available.

<table>
<thead>
<tr>
<th>Student quote</th>
<th>Student characteristic</th>
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<tbody>
<tr>
<td><strong>Knowledge of content</strong></td>
<td></td>
</tr>
<tr>
<td>“Knows the topic (extremely) well”</td>
<td>Female, government school</td>
</tr>
<tr>
<td>“Well educated, smart”</td>
<td>Male, government school</td>
</tr>
<tr>
<td>“Is confident in their teaching – knows the information well”</td>
<td>Female, independent school</td>
</tr>
<tr>
<td>“Knows the topic well”</td>
<td>Male, government school</td>
</tr>
<tr>
<td>“Knowledgeable”</td>
<td>Male, government school</td>
</tr>
<tr>
<td>“At VCE level, knows what to teach in regards to the study design”</td>
<td>Female, independent school</td>
</tr>
<tr>
<td><strong>Verbal ability</strong></td>
<td></td>
</tr>
<tr>
<td>“Offers different insights into the subject that can make it easier to understand”</td>
<td>Female, independent school</td>
</tr>
<tr>
<td>“Able to convey knowledge”</td>
<td>Male, government school</td>
</tr>
<tr>
<td>“Good communication to us as students”</td>
<td>Male, government school</td>
</tr>
<tr>
<td>“Using visuals/actions for certain concepts”</td>
<td>Female, independent school</td>
</tr>
<tr>
<td>“Incorporating knowledge into everyday life activities”</td>
<td>Male, government school</td>
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<table>
<thead>
<tr>
<th>Attribute</th>
<th>Sex</th>
<th>School Type</th>
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</thead>
<tbody>
<tr>
<td>“Relates content to student experiences”</td>
<td>Male</td>
<td>government school</td>
</tr>
<tr>
<td>“Uses examples to clearly explain concepts”</td>
<td>Female</td>
<td>independent school</td>
</tr>
<tr>
<td>“Relate new concepts to old ones”</td>
<td>Male</td>
<td>government school</td>
</tr>
<tr>
<td>“Using and relating to real life examples”</td>
<td>Female</td>
<td>independent school</td>
</tr>
<tr>
<td><strong>Caring</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“Considerate of other workloads and commitments”</td>
<td>Female</td>
<td>government school</td>
</tr>
<tr>
<td>“Provides support so that I’m not afraid to ask a ‘stupid’ question”</td>
<td>Female</td>
<td>independent school</td>
</tr>
<tr>
<td>“Able to have a laugh, not always serious”</td>
<td>Male</td>
<td>government school</td>
</tr>
<tr>
<td>“Supportive towards student”</td>
<td>Female</td>
<td>government school</td>
</tr>
<tr>
<td>“Sense of humour”</td>
<td>Female</td>
<td>government school</td>
</tr>
<tr>
<td>“Tries to make the lesson fun and engaging”</td>
<td>Female</td>
<td>independent school</td>
</tr>
<tr>
<td>“Cares about how their students are going”</td>
<td>Female</td>
<td>independent school</td>
</tr>
<tr>
<td><strong>Enthusiasm</strong></td>
<td></td>
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</tr>
<tr>
<td>“Being confident and enthusiastic about all areas of the course”</td>
<td>Female</td>
<td>independent school</td>
</tr>
<tr>
<td>“Motivated and interested in teaching and student success”</td>
<td>Female</td>
<td>government school</td>
</tr>
<tr>
<td>“Passionate about the subject”</td>
<td>Female</td>
<td>government school</td>
</tr>
<tr>
<td>“Enthusiastic about the content”</td>
<td>Male</td>
<td>government school</td>
</tr>
<tr>
<td>“Energetic, enthusiastic”</td>
<td>Female</td>
<td>government school</td>
</tr>
<tr>
<td><strong>Access (to the teacher)</strong></td>
<td></td>
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</tr>
<tr>
<td>“Makes time to see students individually and help answer questions”</td>
<td>Female</td>
<td>independent school</td>
</tr>
<tr>
<td>“Willing to receive and reply to emails students send with concerns”</td>
<td>Female</td>
<td>government school</td>
</tr>
<tr>
<td>“Strongly encourages us to see him outside of class time”</td>
<td>Female</td>
<td>independent school</td>
</tr>
<tr>
<td>“There to help at all times”</td>
<td>Male</td>
<td>government school</td>
</tr>
<tr>
<td>“Allows access outside of class”</td>
<td>Male</td>
<td>government school</td>
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</table>

Table 1: Student Perceptions of the ‘Perfect’ VCE Physical Education Teacher

### Discussion

Students involved in this study provided valuable insight into their perceptions of the teacher-related factors that may influence academic performance in VCE Physical Education. Through the student lens, we can gain insight into the important influences according to the key stakeholders, the students (McIntyre, Pedder, & Rudduck, 2005). It should be noted that...
students in this study were asked to report characteristics of the ‘perfect’ VCE Physical Education teacher; as a consequence they were unlikely to phrase their responses in the negative. Students were very specific in their views and clear in their expectations of the ‘perfect’ VCE Physical Education teacher. The dominant themes that emerged from the data were consistent across government and independent school students and across genders. We found few differences when comparing the poster annotations of all students.

The poster annotations of the ‘perfect’ VCE Physical Education teacher provided insight into what students perceived to be important for improving their academic performance. The students perceived five key teacher-related factors that they believed may influence academic performance in VCE Physical Education; content knowledge, verbal ability, care, enthusiasm and access. Teacher access is notably absent from previous research into teacher-related factors that may influence academic performance. Based on observations, the American Association of School Administration (AASA) identified 15 techniques and characteristics of effective teaching, published as a guide for classroom teachers (Demmon-Berger, 1986). One of these techniques or characteristics was teachers who ‘are accessible to students outside of class’. Students in our study reported that access to their teacher both electronically and face-to-face was an important teacher-related factor in improving their academic performance that has not been previously identified in research as a key characteristic of an effective teacher, and more specifically as a characteristic of an effective senior-secondary physical education teacher. From a teacher perspective it may be important to investigate the impact of students having access (electronically) 24/7 and how pre-service and in-service teachers can be prepared and supported to set clear boundaries and expectations for responding to students outside of ‘work time’.

Content knowledge has been associated with teacher effectiveness and consequently reported to improve academic performance in numerous studies about diverse subject areas (Darling-Hammond, 1999; Wenglinsky, 2000; Hill, Rowan, & Ball, 2005; Stronge, 2007; Horsley, 2012). There is evidence that suggests that teachers with greater subject-matter knowledge are able to ask higher order questions, involve students in lessons and allow more student-directed activities (Hattie, 2003; Stronge et al., 2007; Horsley, 2010; Hattie, 2012). Students in this study consistently reported teacher knowledge as an important factor influencing academic performance. They wanted the ‘perfect’ Physical Education teacher to be ‘smart’ and ‘knowledgeable’. Reflecting on the work of Ward (2013), deep content knowledge is required for meaningful outcomes in physical education as it determines the quality of the tasks teachers set. He was specifically referring to the quality of task in practical based physical education classes and yet, the notion of “you get what you teach” (Ward, 2013, p. 437) suggests that high quality tasks designed by teachers who have greater depth in their content knowledge in senior-secondary physical education are more likely to improve academic performance compared with low quality tasks. In physical education, when subject content knowledge increases, so does pedagogical content knowledge (Shulman, 1987) and a teachers ability to transform the content they are delivering into meaningful learning for students (Chen, 2002; Ayvazo et al., 2010). Conversely, Hattie (2003) argued that when distinguishing between expert and experienced teachers, there is little difference in their subject area content knowledge; expert teachers differ in how they organise and use this knowledge. That is, content knowledge is important but what you do with that knowledge separates expert teachers from the others. Many of the students in this study expressed different ways in which the ‘perfect’ teacher would teach. The word pedagogy was not in the vocabulary of these students, however, their specific examples provided insight into how teachers could use content knowledge to enhance pedagogy that in turn, influenced academic performance. Students spoke of teachers being able to “relate new concepts to old ones” and “uses examples to clearly explain concepts” and “using and
relating to real life examples”. Students suggested that when learning was contextualised in ways that were familiar to them it facilitated understanding and learning.

Verbal ability has been previously linked to increased student learning (Rowan, Chiang, & Miller, 1997) and a teachers ability to communicate and clearly convey knowledge is an important teacher-related factor that may influence academic performance. Students expressed the ‘perfect’ VCE Physical Education teachers’ ability to convey knowledge across all key content areas as an important teacher-related factor that may influence academic performance. Some students stated very clearly that the teacher should be able to convey knowledge; others provided further insight into how they expect the ‘perfect’ teacher to be able to convey that knowledge. For example, “detailed explanations and examples” and “incorporating knowledge into everyday life activities”. The student poster annotations provided regular comments on how the ‘perfect’ teacher would use ‘real-life’ examples or provide visual representation or actions to demonstrate elements of the content to help clarify student understanding. These students valued clear explanations and an ability to explain concepts in different ways to cater for different learning styles and the aptness to provide further but alternative explanation or clarification if students did not understand an idea in the first instance.

Verbal ability and a teacher’s ability to communicate in this context goes beyond conveying content knowledge. Students also implied that the teachers’ ability to communicate information related to organisational factors was important. Students reported that communication regarding changes to the program, homework, additional information such as handouts and where to access practice exams for example was also important in improving academic performance in VCE Physical Education.

When considering Stronge’s (2007) ‘prerequisites for effective teaching’, students identified both content knowledge and verbal ability as being characteristics of the ‘perfect’ VCE Physical Education teacher. However, notably absent in their responses were comments associated with teacher certification (qualification), education coursework and teacher experience. This may be explained by the level at which students understand the requirements of teaching, that is, if a teacher stands in front of the classroom, the student expects that: i) they are qualified to teach; and ii) they have completed the required training, including educational coursework. One student identified teaching experience as a factor that may influence their academic performance, however, the majority did not identify experience as a relevant factor. Students did recognise the importance of the teacher being able to use a variety of teaching styles to convey information, and that the ‘perfect’ teacher would be able to use different instructional strategies when students did not understand a concept.

Instructional practices of effective teachers vary (Ayres et al., 2004; Stronge et al., 2007; Hattie, 2009; Grieve, 2010; Stronge et al., 2011); they are skilful at using a variety of strategies and are able to select the most appropriate strategy for the context in which they are teaching. For students, the distinction between content knowledge and pedagogical content knowledge may not have been made. The expectation that a ‘perfect’ teacher is knowledgeable may indeed encompass all aspects of content and pedagogical knowledge. Teacher experience may only be a factor related to academic performance if the teacher is inexperienced. As a measurable variable, teacher experience has been associated with effectiveness, especially in studies in the US, however as Darling-Hammond (1999), suggested the differences in effectiveness between experienced and inexperienced teachers level off after five to eight years. It should be noted that neither general teacher experience nor VCE Physical Education experience were reported in this study as this is not a characteristic that students would typically know about their teacher.

Affective teacher attributes such as caring are difficult to measure (Stronge, 2007), however, previous research (Teven & McCroskey, 1997) suggested that student perceptions
of caring are strongly correlated to student evaluations of their teachers, their affective learning and their perceptions of their cognitive learning. Students who perceived that their teachers care are more likely to exert academic effort (Wentzel, 1997). Students in this study also reported that teacher-related factors associated with caring, such as being supportive, understanding, kind, friendly, listening to students, encouraging, patient, honest and fair, warm and having a sense of humour were positively associated with academic performance. Student perceptions of affective teacher-related factors influenced effective learning.

Students expressed that from their perspective, key characteristics of the ‘perfect’ VCE Physical Education teacher included many traits that related to the teacher treating them with respect, understanding and consideration. Teacher’s who are able to respond to student needs and create a classroom climate of mutual respect and one where the common goal for both students and teachers is to improve student academic performance, were seen by these students as ‘perfect’. Use of humour was categorised as a subset of caring, and was also seen to be influential by students. The ‘perfect’ VCE Physical Education teacher is “Humorous” and they “Use humour to (help us) remember concepts”. Similar findings of student perceptions of good teachers were also reported by the National Association of Secondary School Principals, (National Association of Secondary School Principals (U.S.) NASSP, 1997) who found that a sense of humour was the most important characteristic of the ‘best’ teachers, followed by ‘make the class interesting’. Humour and fun may be important vehicles to engage students in their learning. The idea that teachers needed to be “able to have a laugh”, and to provide “non-boring classes”, “make classes enjoyable and can make the theory interesting” and “tries to make the lesson fun and engaging” reflect the students need for their teachers to provide a learning environment that interests them. Similarly the high-ability senior-students studied by Horsley (2010), understood the need for the teacher to maintain control of the learning environment, as one student commented, they needed to be “Fun, but also strict at the same time”. Students in this study also reported that staying on topic and remaining focussed, using time effectively and being organised may influence their academic performance. Maximising instructional time and focusing on the curriculum has been shown to increase student learning opportunities (Ayres et al., 2004). The ‘perfect’ VCE Physical Education teacher needs to be able to find the balance between using humour to engage students, make their classes enjoyable and to set clear classroom boundaries to ensure that content is covered and learning occurs.

Enthusiasm has been found to be an important teacher-related factor connected to teacher effectiveness across all levels of schooling (Bain & Jacobs, 1990), and it has been specifically identified as an important teacher-related factor with older students (Ayres et al., 2004; Horsley, 2012). Gage, in Peterson and Walberg (1979) suggested that enthusiasm is one of only two teacher behaviours that are generic across all content, year levels and types of student. Consistent with previous research, the students in this study identified factors of teacher enthusiasm, motivation and passion as important factors that may influence academic performance (Rowan et al., 1997; Walls, Nardi, von Minden, & Hoffman, 2002; Horsley, 2012). Teacher enthusiasm has been identified as having at least two dimensions: enthusiasm for teaching and enthusiasm for the subject (Kunter, Frenzel, Nagy, Baumert, & Pekrun, 2011). While students elect to undertake physical education for certification at the senior-secondary level, it is not compulsory (in Australia), and teacher enthusiasm for the subject can contribute to developing a student’s attitude toward the subject matter. This has been shown to increase academic self-concept, interest in the subject area and a desire to learn more (Stronge, 2007) with enthusiasm linked to student and teacher perceptions of higher instructional quality (Kunter, Tsai, Klusmann, Brunner, Krauss, & Baumert, 2008). In this study, it is enthusiasm for the subject, “passionate about the subject”, “enthusiastic about content”, for teaching, “put a lot of thought and effort into designing every lesson” and for
student success, “motivated and interested in teaching and student success” that students perceived to be important. To be an effective teacher, passion is not a luxury, but an essential element of all good teaching (Day, 2004) and students in this study identified that “perfect” teachers are “confident and enthusiastic about all areas of the course”, and they are “energetic and enthusiastic”. Students appreciated teachers who exhibited passion for physical education, through words and actions. Teachers who involved themselves in lessons, who were encouraging and motivating towards their students and passionate about physical education the subject, were those who were perceived to be influential in improving academic performance.

Students identified teacher access as a central teacher-related factor that impacts on academic achievement at VCE level in Physical Education. In a digital age where students have expectations of ubiquitous learning opportunities and where access to information has few boundaries, students expressed that access to their teacher was imperative to their success academically. Students repeatedly reported that the teacher being available to them outside of class time was valuable. Students annotated the posters with multiple examples of how they would like the ‘perfect’ VCE Physical Education teacher to be accessible. “Allows access outside of class time”, “always available to answer questions outside of class” and “willing to receive and reply to emails students send with concerns”. The Victorian Curriculum and Assessment Authority (VCAA) stipulates that for each unit at VCE level, schools must schedule 50 hours of classroom instruction. This equates to 100 hours of teaching across the academic year. Descriptions of teachers who make time to see individual students outside of set class times and those who are willing to use time outside of the scheduled face-to-face teaching to assist students, answer questions, clarify understanding and offer extra revision classes were prevalent in the students’ perception of the ‘perfect’ VCE Physical Education teacher. In research conducted in New Zealand on gifted students, additional out of class support for students was illustrative of the level of commitment shown by teachers (Horsley, 2008). In this context, it was less about needing or wanting greater access to their teacher and more about acknowledging the level of commitment required to support students in their academic pursuits. While some students in this study commented that access to the teachers was to receive help, it is unclear why other students specifically identified access as a key component to their academic success. The reasons may go beyond simply supplying answers to questions and be a conduit for student support for the building of confidence and therefore warrants further research. In her article ‘Teacher behaviours for new millennium learners’, Collins (2012) suggested that effective teachers of the 21st century will need to be available to both students and parents through various electronic formats as well as in person. Further investigation to determine how students prefer to access their teacher (eg. in person, electronically) and what type of information or support they are seeking through this contact should be the focus of future research. The implications on teacher workload, face-to-face teaching and the issues of professional interactions with students through private/personal mediums such as mobile phones and social networks will need careful consideration in teacher preparation, ongoing support for practicing teachers, research and policy development.

Limitations

Although there was diversity in the student cohort sample (government and independent schools from a range of SES backgrounds, schools with VCE mean study scores of 28 – 36 out of a possible 50, providing a range of low to high performing schools) all the students who participated in this study were from the eastern suburbs of Melbourne,
Implications for teacher education

An awareness of student perceptions of the ‘perfect’ VCE Physical Education teacher may be beneficial to both in-service and pre-service teachers. Implications for pre-service teachers aspiring to teach senior-secondary physical education and for in-service teachers wanting to improve the academic performance of their students, the findings of this study shed some light on what students perceive to be important teacher-related factors that may influence their academic performance. Students identified ‘perfect’ VCE Physical Education teachers as those who:

- had strong subject specific content knowledge
- were able to clearly convey that knowledge through a variety of instructional strategies
- were caring, considerate, patient and kind, friendly, approachable, helpful and had a sense of humour but had good classroom management
- were enthusiastic and passionate, about the subject and about teaching and learning
- were accessible to their students outside of the classroom, both face to face and via electronic mediums.

The findings of this study support the need for professional learning opportunities for in-service teachers to improve or update their content specific knowledge to assist them to increase student academic performance. In line with the Australian Institute for Teaching and School Leadership (AITSL) National Professional Standards for Teachers, ‘4. Create and maintain supportive and safe learning environments’ (Australian Institute for Teaching and School Leadership, 2011) physical education teacher education programs may need to ensure programs have a strong emphasis on effective communication training, development of interpersonal skills (verbal and non-verbal) as well as ‘2. Know the content and how to teach it’, subject specific content knowledge. In this way, the qualities of effective teachers as recommended by students can be combined with those skills already included in teacher training programs to assist teachers in increasing student academic performance in senior-secondary physical education.
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Conclusion

This is the first study to our knowledge, which sought to investigate student perceptions of teacher-related factors that may influence academic performance in senior-secondary Physical Education. We found that students perceive the ‘perfect’ VCE Physical Education teacher to be knowledgeable; to have strong communication skills to convey this knowledge, care about their students, are enthusiastic about physical education and about teaching and are accessible to students outside of class time. The findings of this study are consistent with previous research but outline key factors through the lens of the senior-secondary physical education student, and highlight specifically the perception that access to their teacher beyond scheduled class time is perceived as important.

With increasing pressure on schools, teachers and students to continually improve academic performance in high stakes courses such as the VCE and other senior-secondary courses for certification and pathways to higher education, identifying teacher-related factors that may influence student academic performance may provide opportunities to improve student outcomes. Through increased understanding of what it is that students want from their teacher in this context, teachers can construct a learning environment that meets the needs of the student, and adapt to changes in that environment to capitalise on those ‘teachable moments’ that arise.

Student perceptions are only one perspective of what constitutes effective teaching and the investigation of teacher perceptions of teacher-related factors that may influence student academic performance would provide an opportunity to explore the similarities and differences to those of the student and warrants investigation.

While the notion of the ‘perfect’ physical education teacher may not be realistic, the key themes from this research indicate that to improve academic performance, teachers in senior-secondary physical education need to have good content knowledge, be able to communicate that knowledge clearly, care about their students, be enthusiastic about teaching physical education and be available to their students outside of class time.

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Student performance in high-stakes examinations based on content area in senior secondary (VCE) physical education

Rachael J. Whittle, Amanda C. Benson, Shahid Ullah & Amanda Telford

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Student performance in high-stakes examinations based on content area in senior secondary (VCE) physical education

Rachael J. Whittle*, Amanda C. Benson*, Shahid Ullahb and Amanda Telfordc

*School of Health and Biomedical Sciences, RMIT University, Bundoora, Australia; bSouth Australian Health and Medical Research Institute (SAHMRI), Adelaide, Australia

ABSTRACT

Background: Senior secondary physical education courses for certification continue to evolve with curricula reform occurring to ensure content is contemporary. Student learning outcomes are maximised and assessment practices are valid for determining certification of students. The content of eximnible senior secondary physical education courses privilege theoretical concepts over student physical performance of motor skills and this is reflected in the use of written assessment of cognitive outcomes in many courses internationally.

Purpose: Student examination data were analysed from the year 12 (exit year) written examination of Victorian Certificate of Education (VCE) Physical Education to determine if student performance varied by Area of Study (content). Additionally, it investigated whether there was a relationship between student performance in each of the four Areas of Study examined and overall examination performance and considered the alignment of curriculum, assessment and pedagogy and the implications the findings may have on the teaching of VCE Physical Education in the future.

Methods: A secondary data analysis of student results from the 2011 (n = 9323; M = 5212, F = 4111) and 2012 (n = 8781; M = 5011, F = 3770) VCE Physical Education (Victoria, Australia) examinations were conducted. Examination questions were categorised by content, and means and standard deviations (SD) for discrete and continuous data were calculated, and categorical variables were presented as percentages. Regression analysis was also performed to establish the relationship between student cohort size and examination scores. An independent sample t-test was used to explore the examination scores and each Area of Study scores across 2011 and 2012. A one-way ANOVA were performed to investigate the differences of each Area of Study scores between examination grades from UG to A+. 

Results: The results showed a positive correlation between VCE Physical Education student cohort size in a school and examination score in 2011 and 2012. Student performance differed across both years (2011 and 2012) and across Areas of Study within each of the years analysed. Students performed significantly lower on questions relating to the ‘planning, implementing and evaluating a training program’ Area of Study in 8 of the 11 possible grades (2011) and 10 of the possible 11 grades (2012) than in each of the other Areas of Study.

Discussion and conclusions: This study reveals that student performance on the external VCE Physical Education examination is not consistent across all content areas (Areas of Study). This may suggest that student
difficulties in answering questions based on content in ‘planning, implementing and evaluating a training program’ result from topic or content difficulty rather than process or question difficulty. From these findings, implications for teaching examinable physical education effectively include the use of experiential learning and practical experiences to provide students with experiences from which they can draw knowledge when completing written assessment tasks. Additionally, the importance of having the required content knowledge to teach examinable physical education confidently for pre-service and in-service teachers is discussed.

Introduction

Senior secondary physical education curricula have continued to evolve since the introduction of physical education into senior secondary courses for certification some 30 years ago (Green 2008; López-Pastor et al. 2013). Curriculum is defined here as the academic content, student learning objectives (key knowledge and skills expected of students) and the assessments used to evaluate student learning. Curriculum is influenced by social, political and educational developments (Bruniges 2005); and curriculum change in the context of senior secondary physical education is essential to ensure content is contemporary, student learning outcomes maximised and assessment practices are valid for determining certification of students. Achievement of learning outcomes is reflected in student academic performance in senior secondary education and can determine access to further educational or employment opportunities. Greater accountability for schools and increased demand for places in higher education may contribute to an increasing focus on improving student academic achievement. The (un)intended consequences for schools of student performance in high-stakes assessment have been discussed in detail elsewhere (Au 2007; Diamond and Spillane 2004; Muñoz, Scoskie, and French 2013; Rowe 2000). The role that student performance data, specifically examination data, can play in informing teaching practice (Rowley and Congdon 2005) and improving teacher effectiveness which in turn may increase student achievement (Hattie 2003; Stronge et al. 2007) has been previously established. However, in the context of the Victorian Certificate of Education (VCE) Physical Education, an accredited senior secondary (years 11 and 12) course for certification offered in Victoria, Australia, the role examination data can play in informing teaching practice is unknown.

The alignment of curriculum, pedagogy and assessment in the context of senior secondary physical education, can be explored based on the framework presented by Penney et al. (2009). This framework allows for issues associated with each dimension and how they influence each other to be considered. Knowledge of the historical influences on the development of physical education courses enhances our understanding of the curriculum as it evolves, and the context in which it operates can help in understanding potential changes to content and assessment that are needed (Evans 2004; Kelly and Melograno 2004; Kirk, Macdonald, and O’Sullivan 2006).

Traditionally, physical education has been a physical performance-based subject (e.g. development of motor skills and physical fitness). However, with the emergence of senior secondary courses for certification, content of examinable courses has privileged theoretical concepts over physical performance, which is reflected in the assessment of cognitive outcomes of courses internationally. Courses in all states and territories in Australia, Botswana, Ontario, Canada, Caribbean Islands, England, New Zealand, South Africa, and Scotland and in countries that offer the International Baccalaureate Sports, Exercise and Health Science program, assess cognitive outcomes. Six of these courses assess performance in physical activity. The structure of examinable physical education courses is ‘understandable’ as it reflects the ‘ethos’ (Carroll 1994) of senior secondary education; providing physical education with an equal status to other ‘academic’ subjects.
With the intent of curricula engaging student learning ‘through’, ‘in’ and ‘about’ movement, as suggested by Arnold (1979); international senior secondary physical education courses for certification have an underlying rationale of integrating physical performance with theoretical concepts, but primarily persist in determining student academic performance through written assessment tasks. Written examination questions may well engage with only the third aspect of Arnold’s framework; that of examining knowledge ‘about’ movement. Scenario-based examination questions may be effective in identify student knowledge attained through or in movement when questions require students to draw on knowledge gained through practical experiences.

The cognitive demand of examination questions need to align with the cognitive demand of the environment for which the task is preparing the student, if it is to be an authentic task (Savery and Duffy 1995). As discussed by Thorburn and Collins (2006a), the pursuit for authentic achievement (and assessment) in senior secondary physical education involves experiential learning. Using a student-centred approach, experiential learning places experience at the centre of the learning process (Kolb and Kolb 2012) and is well positioned to integrate practical and theoretical knowledge. Based on constructivist theory, experiential learning is situated to engage students in a process designed to enhance learning (Kolb and Kolb 2005). It is interesting to note that in Western Australia, where practical performance is examined externally, the content areas are dichotomously examined (Penney et al. 2012), suggesting that authentic assessment where practical and theoretical knowledge is integrated (Macdonald and Brooker 1997) is difficult to achieve.

Questions may be raised that written examinations in senior secondary physical education do not provide students with authentic assessment. Yet the assessment of theoretical content is regarded as an appropriate gauge of student knowledge, particularly in high-stakes assessments (Bishop 1997; Dufaux 2012; Masters 2014). The construction of authenticity in high-stakes assessment must include higher-order thinking, specific content knowledge and emulation of real-world activities (Cumming and Maxwell 1999). However, there is an inherent danger when assessment tasks are dressed up to appear authentic. The expectations for students must be clear and link to the nature of the content knowledge (Cumming and Maxwell 1999; Thorburn and Collins 2006a).

Previous research in the context of senior secondary physical education has explored the extent to which the intent of curriculum documents is enacted by teachers (Bowes and Bruce 2011; Brown and Penney 2013; Gillespie and McBain 2011; Penney and Hay 2008). Many aspects of assessment including teacher perceptions of student ability (Hay and liishunter 2006; Hay and Macdonald 2010a, 2010b), use of standards-based assessment (Hay and Macdonald 2008), authentic assessment in performance-based subjects (Hay and Penney 2009; Macdonald and Brooker 1997; Penney et al. 2011) and the integration of curriculum, pedagogy and assessment, specifically in a Scottish context have been explored (Thorburn 2003, 2007, 2008; Thorburn and Collins 2003, 2006a, 2006b). However, to our knowledge, explicit investigation of student performance in high-stakes assessment practices, specifically in the context of VCE Physical Education, has not been conducted.

Curriculum development in senior secondary physical education

Victoria (Australia), New Zealand, Scotland and the United Kingdom (UK) have reviewed and made changes to their senior secondary physical education curriculum in recent years. There is disparity seen in a number of senior secondary physical education courses where the teaching and learning is intended, and may well occur in a practical performance context, but assessment, particularly high-stakes assessment, requires written evidence of student learning. The review and consultation process undertaken by each of the countries stated previously have resulted in changes to the assessment components of the course with little change (if any) to the content to be delivered. Through this consultation process, the General Certificate of Education (GCE), Advanced Subsidiary (AS) level, and Advanced (A) level Physical Education courses offered in England, Wales and in a number of international schools, has maintained an external written examination (70%). The remaining 30% of the total marks available is allocated to non-examination formats. The current Higher and Advanced
Higher Physical Education offered in Scotland has seen a shift from a course underpinned by a ‘practical experiential rationale’ (Thorburn 2007, 170) to a course which aims for students to research, critically analyse and evaluate factors that underpin and impact on performance. Similar to GCE AS and A-Level Physical Education, the current Scottish course maintains a physical performance component of assessment (30%), however, the examination has been replaced with a project designed to assess students’ ability to integrate and apply skills, knowledge and understanding of performance skills and factors impacting on performance (Scottish Qualifications Authority 2013).

The change in assessment in Scotland is comparable to the change in assessment in the Scholarship Award in New Zealand, where candidates previously completed a written examination which had been considered by some as ‘well-advanced from some traditional physical education assessments’ (Bowes 2010, 23). Assessment in the Scholarship Award is now conducted through an evidence-based report on a topic selected from the physical education curriculum that demonstrates high-level critical thinking, abstraction and generalisation that integrates, synthesises and applies knowledge, skills, understanding and ideas to complex situations. These developments across senior secondary courses internationally demonstrate changing approaches to the task but not the modality of assessment. Students in senior secondary physical education ultimately require the ability to demonstrate knowledge and skills of the content stipulated in official curricula documents through written assessment tasks.

Since the inception of senior secondary examinable physical education in Victoria, Australia, in the early 1980s, the course has evolved through a number of cyclic reviews consistent with the Victorian Curriculum and Assessment Authority (VCAA) policy (the VCAA is an independent authority responsible for the development of courses, curriculum and assessment products and services at the senior secondary level of education in Victoria, Australia). The most recent of these reviews was undertaken in 2015, resulting in revisions to the curriculum documentation due for implementation in 2017–2018. Historically, senior secondary physical education in Victoria emphasised propositional knowledge at the expense of physical activity (Fitzclarence and Tinning 2005), ensuring it established and maintained academic credibility. This is not dissimilar to other courses internationally that require examinable senior secondary physical education courses to be framed theoretically (Macfadyen and Bailey 2002).

The introduction of the VCE program in 1991 aimed to situate the biophysical understandings alongside sociocultural understandings of physical education. While maintaining some biophysical content knowledge, the VCE Physical Education course was at the time, considered innovatory for its inclusion of content situated firmly in the sociocultural realm (Fitzclarence and Tinning 2005). As reflected in previous commentary of senior secondary physical education in Victoria, (Brown and Penney 2013), the intent of the original (1991) VCE course was to integrate the biophysical with the sociocultural and to marry the relationship between physical activity and theoretical knowledge through the tasks undertaken by students. This intent was not dissimilar to the revised VCE Physical Education course (2011): ‘The study enables the integration of theoretical knowledge with practical application through participation in physical activities’ (VCAA 2010, 7). Concerns surrounding the integration of theoretical and practical knowledge have been previously documented (Brown and Penney 2013, 2017; Macdonald and Brooker 1997; Thorburn 2003, 2007) and continue to be problematic in teaching and assessing practical-based subjects. Despite the debate surrounding what is worthwhile knowledge in senior secondary physical education and the place of physical activity in examinable physical education, courses that emphasise theoretical knowledge over performance in physical activity, sport and exercise continue to have high student enrolments in Victoria, Australia (VCAA 2003, 2013).

**Senior secondary physical education course content**

Content across senior secondary physical education courses internationally is typically consistent with traditional sub-disciplines associated with physical education (Abernethy et al. 2013). The
content assessed is essentially associated with understanding how and why the human body moves from both a biophysical and sociocultural perspective. A number of courses internationally retain units on developing and applying physical skills and performance in practical settings (See e.g. senior secondary physical education courses offered in South and Western Australia, Botswana, the Caribbean, Scotland and England). The study of anatomy and physiology to produce movement are common across all courses. Analysis and application of skill acquisition, biomechanical principles to improve performance and an understanding of sports psychology and how it can be applied to improving performance are also key areas of study undertaken in most courses. The most commonly used external assessment task to assess content knowledge and determine student academic achievement in senior secondary physical education courses for certification is an examination: a set of previously unseen questions for students to answer under prescribed conditions (Carroll 1994).

The current senior secondary physical education course (2011–2016) offered at the senior secondary level, in Victoria, Australia, comprises of four units of study, equating to 50 hours of classroom teaching (or one semester) and structured to be completed over a two-year period, usually the final two years of senior secondary education (years 11 and 12). Students’ level of achievement in the exit year (year 12; Units 3 and 4) is determined through a series of internal (50%) and external (50%) assessment tasks. The internal tasks are set and assessed by the classroom teacher. The external task is an externally set and marked end-of-year examination. The external examination serves a duplicate purpose, contributing to a student’s level of achievement in VCE and acting as a tool against which the internal tasks can be moderated. The examination is set and assessed by a panel appointed by the VCAA and questions represent a sample of the course content, drawn from the four Areas of Study in Units 3 and 4. Students are assessed on their understanding and application of the key knowledge and skills, as stated in the official curriculum document (VCE Physical Education study design, VCAA 2010), that underpin the outcomes in Units 3 and 4. The respective weighting of each of the four Areas of Study are shown in Table 1. The format of the examination is determined by the VCAA and currently comprises 15 multiple-choice questions and 105 marks of short answer questions, a total of 120 marks. Questions on the examination are designed to assess student ability to describe, participate in, perform, observe, analyse, report on, explain, compare and contrast, evaluate, apply, identify, justify and design across each Area of Study. Examination items may be scenario based and/or refer to a variety of stimulus material such as tabulated data, graphs or images, and questions may have multiple, interrelated parts that increase in cognitive demand. A full version of the 2011 and 2012 examination papers can be accessed at Physical Education – Exams and Examination Reports: http://www.vce.vic.edu.au/Pages/vce/studies/physicaledu/exams.aspx

Previous research (Thorburn 2003, 2007; Thorburn and Collins 2003, 2006b) has identified issues in senior secondary physical education that suggest the misalignment of curriculum, pedagogy and assessment. The purpose of this study was to determine whether student performance on the external assessment task (examination) varied by Area of Study (content area). Additionally, the research investigated whether there was a relationship between student performance in each of the four Areas of Study examined and overall examination performance. Within the broader context of the alignment of curriculum, assessment and pedagogy, the findings of the secondary data analyses are considered and discussed. The implications the findings may have on the teaching of VCE Physical Education in the future, the training of pre-service physical education teachers and the professional development opportunities provided to in-service (practicing) teachers are discussed.

Method

A secondary data analysis was performed using the 2011 and 2012 VCE Physical Education examination data obtained, with permission, from the VCAA. Secondary data analysis by definition uses data collected previously for a purpose other than the current investigation (Vartanian 2010). The VCAA is the holder of all data on student achievement in senior secondary education across the
Table 1. Content in Unit 3 and 4 VCE Physical Education and respective examination weighting.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Content covered in each area of study</th>
<th>Exam weighting (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 3</td>
<td>Subjective and objective methods for assessing physical activity and sedentary levels.</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Advantages and limitations of each method to determine the most appropriate measure for a given setting.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Components of the social-ecological model.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Government and non-government strategies aimed at increasing physical activity within the population.</td>
<td></td>
</tr>
<tr>
<td>Area of Study 1</td>
<td>Systems and mechanisms associated with the energy required for human movement.</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Cardiovascular, respiratory and muscular systems and the roles of each in supplying oxygen and energy to the working muscles.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Energy production via the three energy systems and the associated fuels used for activities of varying intensity and duration.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Factors that contribute to fatigue and recovery strategies used to return to pre-exercise conditions.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Energy system usage during physical activity.</td>
<td></td>
</tr>
<tr>
<td>Unit 4</td>
<td>Components of fitness and assessment of fitness from a physiological perspective.</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Training principles and methods.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Activity analysis to determine the fitness requirements of a selected sport or physical activity.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assessment of fitness.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training program design and evaluation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chronic adaptations to the cardiovascular, respiratory and muscular systems.</td>
<td></td>
</tr>
<tr>
<td>Area of Study 1</td>
<td>Nutritional, physiological and psychological strategies used to enhance performance.</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Legal and illegal substances and methods of performance enhancement.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anti-doping codes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>used to promote recovery, including nutritional, physiological and psychological practices.</td>
<td></td>
</tr>
</tbody>
</table>

Source: Victorian Curriculum and Assessment Authority 2016.

government, catholic and independent school sectors within in Victoria, Australia (VCAA 2016a). The data analysed in this study are not publicly available and while the University College Human Ethics Advisory Committee (CHEAN) determined that this study was exempt from review, permission was sought and provided by the VCAA for access to, and use of the data. The population for this study were all students who undertook the external examination for Units 3 and 4 VCE Physical Education in Victoria, Australia and internationally. The total number of students in 2011 was 9323 (male = 5212, female = 4111) and in 2012, 8781 (male = 5011, female = 3770) students. Students who had a derived examination score (students who are ill or affected by other personal circumstances at the time of a VCE external assessment and whose result is unlikely to be a fair or accurate indication of their learning or achievement in the study and awarded a derived examination score (VCAA 2015a)) were removed from the data set prior to analyses (2011 n = 211, 2012 n = 212). The VCAA provided state level student enrolment data by school sector (government and non-government schools) and de-identified student level examination data from 2011 and 2012. De-identified student data included student scores for each item (question or question part) on the VCE Physical Education examination, total examination score and student study score (a combined score of each graded assessment in Unit 3 and 4 Physical
Education that compares student performance with all other students in the cohort (VCAA 2015b) for 2011 and 2012.

Initial analyses of the 2011 and 2012 VCE Physical Education examinations were conducted to classify and categorise each item based on the Area of Study from which the key knowledge and/or skill being assessed was from. Based on the content area being assessed by an examination item, each question or question part was categorised as either Unit 3, Area of Study 1 or 2 or Unit 4, Area of Study 1 or 2 (VCAA 2010). Examination items that were based on assessing student knowledge and skills related to the content in each of the four Areas of Study (Table 1) were categorised accordingly. Classifying individual examination items allowed for questions with multiple parts that drew on content from multiple Areas of Study to be categorised in different Areas of Study.

Examination assessors are appointed by the VCAA and are provided with a confidential assessor training manual and marking guide. All assessors must have experience in teaching VCE Physical Education, Units 3 and 4, and attend a full day of training where assessors are given detailed and clear instructions on how each question in the examination should be interpreted and marked. These processes are designed to ensure clear, consistent and independent application of the marking guide (VCAA 2016b). Two assessors, independent to each other and to the student, mark student examinations in VCE Physical Education and the final examination score is the combined total score from both assessors (total possible marks 240) and if necessary, discrepancy marking by an additional assessor, without knowledge of the previous assessments is completed (VCAA 2015c).

To allow for comparison of student performance in each Area of Study, the content area scores were transformed to the equivalent of total exam score by calculating the weighted score of each content area: (student score for Area of Study/total possible marks for Area of Study) × 240 (total examination mark) = weighted score. The grade (Ungraded (UG) to A+) cut points used were taken from the score ranges provided by the VCAA in the grade distributions for each year (VCAA 2011, 2012), which were based on a bell curve.

Statistical analysis

Data management and statistical analyses were performed using IBM SPSS version 22.0 (SPSS Inc., Chicago, IL, USA) and STATA version 14.0 (StataCorp LP, College Station, TX, USA). Means and standard deviations (SD) for discrete and continuous data were calculated, and categorical variables were presented as percentages. Regression analysis was also performed to establish the relationship between student cohort size and examination scores. An independent sample t-test was used to compare the examination scores and each Area of Study scores across years 2011 and 2012. A one-way ANOVA analyses was performed to assess the differences of each content area scores between examination grades from UG to A+.

Limitations of the study

The secondary data analysis was conducted on student examination data from the first two years of implementation of the revised VCE Physical Education (Victorian Curriculum and Assessment Authority 2010). It is important to note that student data were collected from two different student cohorts: those completing VCE Physical Education in 2011 and those in 2012. The external examination for VCE Physical Education is written and developed by a panel appointed by the VCAA each year, and while the examinable content is underpinned by the key knowledge and skills stipulated in the official curriculum document, the questions vary year to year. The results of this study report on student performance in 2011 and 2012 and further analysis of subsequent years data may provide further evidence that supports the findings of this study, or identify further variations in student performance based on Area of Study.
Table 2. Mean (SD) scores of each area of study in the 2011–2012 VCE Physical Education examinations.

<table>
<thead>
<tr>
<th>Content area</th>
<th>2011</th>
<th>2012</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring and promotion of physical activity</td>
<td>29.68 (10.30)</td>
<td>23.11 (9.47)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Physiological responses to physical activity</td>
<td>29.99 (11.98)</td>
<td>30.22 (12.28)</td>
<td>.210</td>
</tr>
<tr>
<td>Planning, implementing and evaluating a training program</td>
<td>36.82 (17.39)</td>
<td>31.30 (14.07)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Performance enhancement and recovery practices</td>
<td>17.96 (8.18)</td>
<td>24.01 (8.39)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Notes: SD: standard deviation; p values are based on two samples independent t-test.

Results

There was a positive correlation between VCE Physical Education student cohort size in a school and examination score in 2011 ($r = 0.29$, 95% CI = 0.25–0.34, p < .001) and 2012 ($r = 0.34$, 95% CI = 0.29–0.39, p < .001). For every increment of 10 students in the cohort, examination scores increased by 2.9 marks in 2011 and 3.4 marks in 2012.

Student performance on the external examination in VCE Physical Education differed across both years (2011 and 2012) and across Areas of Study within each of the years analysed. The mean (SD) examination scores for each content area in VCE PE for 2011 and 2012 can be seen in Table 2. Student scores in the monitoring and promotion of physical activity and the planning, implementing and evaluating a training program Areas of Study have decreased significantly in 2012 compared to 2011. However, scores in the performance enhancement and recovery practices Area of Study have increased in 2012 compared to 2011. No significant differences were found for the Area of Study physiological responses to physical activity between 2011 and 2012 (Table 2).

In 2011, mean examination scores in the monitoring and promotion of physical activity and physiological responses to physical activity Areas of Study were significantly higher than total examination mean scores. However, with the Areas of Study planning, implementing and evaluating a training program and performance enhancement and recovery practices, examination scores were significantly lower than total examination mean scores in the same year. In 2012, scores from all Areas of Study except planning, implementing and evaluating a training program were significantly higher than overall examination mean scores (Table 3).

The mean (SD) examination scores for each content area across each grade (UG to A+) in VCE Physical Education for 2011 and 2012 are presented in Tables 4 and 5, respectively. In 2011, the mean scores for planning, implementing and evaluating a training program in grades B to A+ were significantly lower than in each of the other content areas. In 2012, the mean scores for planning, implementing and evaluating a training program in grades B to A+ were significantly lower than in each of the other content areas.

Table 3. Mean (SD) scores of each area of study and mean examination scores in the 2011–2012 VCE Physical Education examination.

<table>
<thead>
<tr>
<th>Content area</th>
<th>2011</th>
<th>2012</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring and promotion of physical activity</td>
<td>125.16 (45.95)</td>
<td>146.60 (49.75)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Physiological responses to physical activity</td>
<td>125.16 (45.95)</td>
<td>136.07 (54.20)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Planning, implementing and evaluating a training program</td>
<td>125.16 (45.95)</td>
<td>110.99 (48.58)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Performance enhancement and recovery practices</td>
<td>125.16 (45.95)</td>
<td>115.41 (47.71)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

*Exam score.
*The content area scores were transformed to the equivalent of total exam score by using weighting factor of each content area; SD: standard deviation; p values are based on two samples independent t-test.
Table 4. Mean (SD) score of each area of study across each grade (UG to A+) of exam score in 2011.

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring and promotion of physical activity</td>
<td>5.77 (6.50)</td>
<td>39.44 (24.12)</td>
<td>91.55 (31.45)</td>
<td>138.12 (28.89)</td>
<td>170.38 (23.71)</td>
<td>196.58 (18.51)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Physiological responses to physical activity</td>
<td>6.30 (6.42)</td>
<td>30.62 (18.75)</td>
<td>70.89 (26.43)</td>
<td>121.16 (27.31)</td>
<td>164.94 (21.72)</td>
<td>199.10 (18.05)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Planning, Implementing and evaluating a training program</td>
<td>7.56 (4.23)</td>
<td>26.90 (10.23)</td>
<td>53.25 (16.32)</td>
<td>92.33 (19.96)</td>
<td>134.71 (18.23)</td>
<td>175.08 (18.65)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Performance enhancement and recovery practices</td>
<td>11.82 (7.66)</td>
<td>31.29 (15.46)</td>
<td>62.49 (23.86)</td>
<td>101.12 (26.63)</td>
<td>137.21 (24.69)</td>
<td>171.50 (24.38)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Notes: SD: standard deviation; p values are based on one-way ANOVA; UG: ungraded (students received UG when awarded less than 12 marks out of a possible 240 on the examination).

Table 5. Mean (SD) score of each area of study across each grade (UG to A+) of exam score in 2012.

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring and promotion of physical activity</td>
<td>6.93 (7.76)</td>
<td>34.47 (18.24)</td>
<td>72.17 (26.25)</td>
<td>110.43 (27.27)</td>
<td>143.30 (26.37)</td>
<td>175.13 (24.50)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Physiological responses to physical activity</td>
<td>14.14 (7.37)</td>
<td>33.42 (16.03)</td>
<td>68.84 (21.60)</td>
<td>111.36 (22.07)</td>
<td>147.13 (19.62)</td>
<td>181.37 (19.90)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Planning, Implementing and evaluating a training program</td>
<td>7.03 (5.91)</td>
<td>28.31 (13.03)</td>
<td>56.53 (17.22)</td>
<td>91.30 (20.45)</td>
<td>122.97 (20.37)</td>
<td>169.61 (22.71)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Performance enhancement and recovery practices</td>
<td>14.13 (9.53)</td>
<td>47.09 (20.08)</td>
<td>81.98 (22.20)</td>
<td>113.37 (23.36)</td>
<td>142.14 (20.87)</td>
<td>171.06 (21.78)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Notes: SD: standard deviation; p values are based on one-way ANOVA; UG: ungraded (students received UG when awarded less than 15 marks out of a possible 240 on the examination).

Discussion

This is the first time that VCE examination content has been explored to understand influences on academic achievement. Student performance in the 2011 and 2012 VCE Physical Education external examination differed each year based on the size of the student cohort within a school undertaking VCE Physical Education and the Area of Study examined. Students performed better in questions relating to content in Unit 3, Area of Study 1 (monitoring and promotion of physical activity) and 2 (physiological responses to physical activity) in 2011 and 2012 and also in Unit 4 Area of Study 2 (performance enhancement and recovery practices) in 2012. Examination performances in these Areas of Study were significantly (Table 2) higher than the overall examination mean score. Student performance on questions relating to content from Unit 4, Area of Study 1 (planning, implementing and evaluating a training program) in both the 2011 and 2012 examination revealed that students had difficulty answering questions that required them to draw on key knowledge and key skills relating to the planning, implementation and evaluation of a training program. This was consistently seen across all grades, E through A+, (Tables 3 and 4), demonstrating that both low and high-performing students experienced similar difficulties in this content area. Analysis of student data for the remaining years of accreditation (2013–2017) of the course is warranted to investigate if the findings of this study are replicated in subsequent years for the same curriculum.

It has been previously suggested by Pollitt et al. in Carroll (1994) that difficulties with answering examination questions fall into three categories: (i) subject or content difficulty (an area of study which may be more or less difficult), (ii) process difficulty (cognitive processes that may be more or less difficult) and (iii) question difficulty (wording and/or structure of question). The cognitive processes required to answer examination questions vary, with multiple levels of cognitive processing required in all four content areas. Question difficulty, based on structure and wording, is likely to be consistent across examination questions. Therefore, when comparing student performance across
the four Areas of Study in VCE Physical Education, the differences in student performance based on the area of study examined suggest that topic or content difficulty may account for the findings of this study. The prescribed intention of the curriculum for Unit 4, Area of Study 1 is that students perform an activity analysis to determine the fitness requirements of a selected sport. Students then conduct the appropriate fitness tests to determine their individual strengths and weaknesses before designing, implementing and evaluating a training program to enhance and maintain identified fitness components. The findings of this secondary data analysis suggest that students’ level of attainment in this area was lower than in other Areas of Study, and students had greater difficulty demonstrating understanding of this content area in the examination. This may be due to a lack of familiarity with the content or the abstractness of the idea (Carroll 1994). Subsequent research investigating the student perspective may provide insight to the reasons pertaining to student attainment levels in this Area of Study.

It has been suggested (Harlen 2005) that in high-stakes assessment, teachers train students to answer specific types of questions. Qualification authorities in both Scotland and Victoria, Australia, have commented on the detrimental impact to student academic performance of prescribed or generic answers to assessment items on examinations. Such answers demonstrate only a superficial awareness of content and often fail to link the knowledge and understanding to the context in which the question is asked. This may provide some explanation for the depth of knowledge demonstrated by students in senior secondary physical education examinations. Student learning has been shown to increase with exposure to multiple experiential learning strategies (Hamer 2000). In physical education, students need opportunities to perform or participate in a variety of pertinent movement contexts. Then, by creating learning environments that afford students the opportunity to apply and adapt their knowledge in practical settings, students’ ability to draw on relevant practical experiences and apply their knowledge in written examinations may improve.

Student examination performance on items that required students to draw on the key knowledge and key skills outlined in Unit 4, Area of Study 1: planning, implementing and evaluating a training program, were significantly lower than the overall examination mean (Table 3). The advice for teachers published by the VCAA (2010) provided examples of suitable activities that reflect the rationale of an integrated approach to teaching of VCE Physical Education. The content in this Area of Study includes: factors affecting fitness components, assessment of fitness, training principles and methods and chronic adaptations to training. Suggested learning activities include: students performing an activity analysis, performing a series of fitness tests and participating in a variety of training methods (VCAA 2010). Learning ‘in’ movement refers to outcomes associated with this content area; ‘appraising the physical capabilities and requirements of an activity’ (Brown and Penney 2013, 43). For example, students may determine the fitness components and energy system requirements for basketball through participation in, and analysis of, a game of basketball. In an examination, students then demonstrate an ability to draw on this experience to apply an understanding of the data collected to determine the fitness components in a new or novel context.

For teachers, Shulman (1987) stated that content knowledge is the first source of knowledge as a base for teaching. Recent findings from Iserbyt, Ward, and Li (2015) suggest that improving (specialised) content knowledge impacts on teachers pedagogical content knowledge and student performance. Further research in this context is warranted to explore the possible relationship between teachers’ (lack of) content knowledge and (lack of) pedagogical content knowledge and the difficulty students were found to have with assessment of the content associated with planning, implementing and evaluating a training program. In a study of pre-service physical education teachers, Herold and Waring (2017) found that content knowledge impacted on teaching confidence. In depth content knowledge was beneficial in implementing teaching approaches that met the learning needs of students. Expertise and/or confidence to teach with unfamiliar methodologies such as experiential learning may limit the ability of students to gain the knowledge required to successfully address questions on an examination relating to practical experiences. Further opportunities are required for the development of content knowledge, particularly around planning, implementing and
evaluating a training program for both pre-service and in-service teachers, and of pedagogical practices that allow teachers to create a learning environment where students can develop an understanding of the interaction between theory and practice.

Senior secondary awards for certification both in Australia and internationally are characterised by a theoretical core with the physical movement experiences traditionally seen in compulsory physical education less apparent in senior secondary courses (see e.g. A-level Physical Education (UK), Physical Education Studies (Western Australia), Sports, Exercise and Health Science (International Baccalaureate)). Previous research suggests that students of teachers who are able to effectively teach through experiential learning in senior secondary physical education have greater academic achievement (Thorburn 2007; Thorburn and Seatter 2015). In a Scottish context, Thorburn and Collins (2006b) suggest that teaching senior secondary physical education is challenging and the ability of teachers to teach through movement contexts and achieve high levels of student attainment is limited. The process of learning from experience is ubiquitous (Kolb and Kolb 2005), and much can be learnt through experience (Rink 1996), yet task selection that engages and enhances learning must also align with the curriculum and assessment.

Students of VCE Physical Education have previously reported the perceived importance of a teacher’s ability to connect theoretical concepts to real-life examples and to relate concepts to student experiences as an influence on their learning (Whittle, Telford, and Benson 2015). Authentic learning tasks may allow students to integrate new ideas with old, creating knowledge and developing problem-solving and decision-making skills. The merging of propositional and practical knowledge is implied in official documentation; however, with the use of written assessment tasks that do not assess practical performance, there appears to be a misalignment of intent with reality. Curriculum documents, assessment requirements, texts and the context of senior secondary physical education are suggested by Brown and Penney (2017) to construct the reality of what teachers do in the classroom. While it is beyond the scope of the statistical analyses performed in this study, further research exploring the pedagogical approaches employed by teachers of senior secondary physical education and the extent to which the approaches adopted align with the curriculum and assessment task is warranted.

The findings of the secondary data analysis indicate that student examination performance does vary between Areas of Study and across both years (2011 and 2012); high and low-achieving students had difficulty in responding to examination items that assessed content from Unit 4, Area of Study 1 (planning, implementing and evaluating a training program). A limitation of the secondary data analyses performed is that the findings do not explain the reasons for the poorer performance on examination items relating to Unit 4, Area of Study 1. It is unclear whether these findings are a reflection of students’ lack of ability to draw on practical experiences in written assessment tasks, or a lack of exposure to learning contexts where they have had an opportunity to learn in and through the movement experiences. The intent of the curriculum does not necessarily mean that the course content is delivered as intended. Further research is warranted to investigate approaches to learning and teaching across the different Areas of Study (topic or content areas) to determine if learning is integrated in, through as well as about movement. Similar analyses comparing student achievement in different aspects of the senior secondary physical education course in Scotland (Thorburn and Collins 2006a) found that student achievement was greater in the performance component of the course when compared to the analysis and investigation of the performance component in the course; both were assessed through a written examination. These results, together with the findings of this study, suggest that if the intended integration of theoretical and practical knowledge is to be realised in assessment, appropriate professional learning for both in-service and pre-service teachers may be required. The use of external written examinations in senior secondary physical education is quite widespread, and future research in different local contexts may provide further insight into variations in student performance in high-stakes assessment tasks. This issue may also need to be addressed with pre-service teachers and teacher training courses. Explicit development of effective pedagogical practices that focus on teaching in, through and about movement, in the context of
senior secondary physical education of pre-service teachers, may allow for greater student achievement on written tasks that assess content situated firmly in the practical realm.

Conclusion

The secondary data analyses performed revealed that student performance on the external assessment task (examination) of VCE Physical Education varied by the Area of Study (content) being assessed. Student performance was significantly lower than the overall examination mean in Unit 4, Area of Study 1 (planning, implementing and evaluating a training program) in both 2011 and 2012. Additionally, in 2011, student level of attainment in Unit 4, Area of Study 2 (performance enhancement and recovery practices), was also below the examination mean. The practical performance-based nature of the Area of Study relating to planning, implementing and evaluating a training program, suggests that content may be best delivered through an experiential or practical-based pedagogy. Classroom-based theoretical strategies may not provide students with the valuable practical experiences from which they may reflect upon in responding to examination questions. Pedagogical strategies utilised by teachers need to allow for the intended learning outcomes of the curriculum in senior secondary physical education. Further research in the context of VCE Physical Education is needed to explore how teachers create effective experiential, practical, applied learning contexts that implement the intended integration of theoretical and practical concepts stipulated in the curriculum documentation, to determine if that leads to successful student performance on written examinations (assessments).

Acknowledgements

The authors wish to thank the VCAA for providing the data files of the examination results.

Disclosure statement

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References


APPENDIX B: Peer-reviewed conference oral presentations

1. Whittle, R.J., Telford, A., Benson, A.C., An exploration of student perceptions of teacher-related factors that may influence academic performance in Unit 3 and 4 VCE Physical Education. The joint Australian Association for Research in Education and New Zealand Association for Research in Education Conference. 30th November - 4th December 2014 Brisbane, Australia.

An exploration of student perceptions of teacher-related factors that may influence academic performance in Unit 3 and 4 VCE Physical Education

Purpose: Improving student academic performance in senior secondary education increases student opportunities for employment, training and further education. Teacher effectiveness has been identified as a key element in increasing student academic performance. The aim of this research was to identify students', completing the Victorian Certificate of Education (VCE) Physical Education, perceptions of teacher-related factors that influence subject specific academic performance. Method: Focus group discussions and poster annotations were conducted across one independent and three government secondary schools in Victoria, Australia. Focus groups consisted of 23 Unit 3 and 4 VCE Physical Education students, each with 4–5 students per group until saturation of themes was obtained. A student usually undertakes unit 3 and 4 VCE Physical Education in their final year of senior secondary education. Prior to the focus group discussion, participants completed a brief self-report questionnaire that included: demographic information, number of students in their VCE Physical Education class, Physical Education transition program, sex of their teacher & school sector. Each focus group session, including the annotation of a poster identifying the student’s perception of the ‘perfect’ VCE Physical Education teacher, ran for approximately 35 minutes. Focus groups were conducted using a semi-structured interview format that explored student perceptions of their VCE Physical Education teacher within the context of a social-ecological framework. Factors that may influence teacher behaviour at the individual, social, policy and physical environment level were considered. The de-identified focus group data were transcribed verbatim and with the annotated posters and demographic questionnaire, coded and analysed using NVivo (Version 10) software to explore student perceptions of teacher-related factors that influence academic performance. Results: Emerging themes from the focus groups suggested that student’s perceptions of an effective VCE Physical Education teacher included the teacher-related factors of: teacher personality, content knowledge, provision of feedback, teaching practices, use of practical activities and teacher accessibility. Conclusion: This research identified student perceptions of the characteristics of effective teachers and teaching practices that influence student academic performance in Unit 3 and 4 VCE Physical Education. These findings can be used to inform training of pre-service Physical Education teachers within tertiary degree programs and the development of professional learning opportunities for in-service teachers of senior secondary physical education nationally and internationally.
2. **Whittle, R.J.,** Telford, A., Benson, A.C., Student voice: What makes an effective senior secondary Physical Education teacher? *Physical Education New Zealand (PENZ), New Zealand Health Education Association (NZHEA) and Education Outdoors New Zealand (EONZ) National Conference 6th-8th July 2015 Hamilton, New Zealand.*

**Student voice: What makes an effective senior secondary Physical Education teacher?**

Improving student academic performance in senior secondary education increases opportunities for employment, training and further education. Focus group discussions, using a semi-structured interview format, were conducted in secondary schools in Victoria, Australia to identify senior Physical Education students’ perceptions of teacher-related factors that influence their academic performance in Unit 3 and 4 Victorian Certificate of Education (VCE) Physical Education. De-identified data were transcribed verbatim, coded and analysed using NVivo (Version 10) software to explore student perceptions of teacher-related factors that influence academic performance within the context of a social-ecological framework. Student’s perceptions of an effective VCE Physical Education teacher included: teacher personality, knowledge (content and pedagogical), use of practical activities and access beyond scheduled class time. Student voice provides valuable insight into how students’ value the contribution of different teacher attributes to their learning. This session will explore the practical implications of these findings include developing strategies and/or policies for teachers to manage the increased demands on their time while meeting the students’ ubiquitous learning needs and expectations. In addition, the student perceptions provide insight for the training of pre-service and in-service senior secondary physical education teachers nationally and internationally.
3. Whittle, R.J., Telford, A., Benson, A.C., Senior secondary Physical Education: it's so much more than just the theory! Physical Education New Zealand (PENZ), New Zealand Health Education Association (NZHEA) and Education Outdoors New Zealand (EONZ) National Conference 6th - 8th July 2015 Hamilton, New Zealand.

Senior secondary Physical Education: it's so much more than just the theory!

Engaging kinaesthetic learners in theoretical classes can be challenging for some teachers of senior secondary physical education. A review of International senior secondary physical education courses identified differences in structure, aims and objectives but consistency across content areas. The most common method to assess student achievement is a combination of internal and external assessment. In a subject area that has historically been based in, through and about movement, assessment of theoretical knowledge, particularly in high-stakes examinations, has lead to concerns that teaching of physical education at the senior secondary level, while implied in curriculum documentation, is not taught through practical application. Appropriate interpretation of curriculum allows teachers to develop teaching and learning programs where meaningful learning and authentic assessment is possible. Applied learning in senior secondary physical education may lead to increased student engagement and understanding, and ultimately increased academic achievement in (written) assessment tasks. Participants will have the opportunity to participate in a range of practical activities (e.g. '5 biomechanics principles in 5 minutes' and 'cardiac output and a kitchen sponge'). Student-centred activities for the classroom and beyond develop higher-order thinking skills and understanding of theoretical concepts that can be assessed through written tasks in senior secondary physical education.
APPENDIX C: Human ethics approval letters

17th December 2013

Amanda Benson
Building 203 Level 3, Room 2
School of Medical Sciences
RMIT University

Dear Amanda


Thank you for providing copies of:

- the documentation sent to the VCAA seeking permission to receive and use the data
- the approval from VCAA giving you permission to receive and use the data

I am pleased to inform you that the CHEAN reviewed the documentation and have determined that your project is **Exempt from Review**.

The CHEAN commends you for recognising the potential need for ethics approval for your project and would like to take this opportunity to wish you all the best with your most worthwhile research.

Annual/Final reports are due during December for all research projects that have been approved, endorsed or classified as exempt by the College Human Ethics Advisory Network (CHEAN). Your CHEAN Reference number is **ASEHAPP 60 - 13** please refer to this number when submitting your annual/final report.

If any issues regarding ethics arise during the running of the project, please do not hesitate to contact the Secretary or Chair of the Network.

Yours sincerely

Linda Jones
Chair, Science Engineering & Health
College Human Ethics Advisory Network
19th September 2013

Amanda Benson
Building 203 Level 3, Room 2
School of Medical Sciences
RMIT University

Dear Amanda

ASEHAPP 45 – 13 BENSON-WHITTLE-TELFORD Understanding factors that influence student academic performance in post-compulsory physical education

Thank you for submitting your amended application for review.

I am pleased to inform you that the CHEAN has approved your application for a period of 11 Months from the date of this letter to 19th August 2014 and your research may now proceed.

The CHEAN would like to remind you that:

All data should be stored on University Network systems. These systems provide high levels of manageable security and data integrity, can provide secure remote access, are backed up on a regular basis and can provide Disaster Recover processes should a large scale incident occur. The use of portable devices such as CDs and memory sticks is valid for archiving; data transport where necessary and for some works in progress. The authoritative copy of all current data should reside on appropriate network systems; and the Principal Investigator is responsible for the retention and storage of the original data pertaining to the project for a minimum period of five years.

Annual reports are due during December for all research projects that have been approved by the College Human Ethics Advisory Network (CHEAN).

The necessary form can be found at: www.rmit.edu.au/staff/research/human-research-ethics

Yours faithfully,

Linda Jones
Chair, Science Engineering & Health
College Human Ethics Advisory Network
9th September 2013

Amanda Benson
Building 203 Level 3, Room 2
School of Medical Sciences
RMIT University

Dear Amanda

ASEHAPP 43 – 13 BENSON-WHITTLE-TELFORD A qualitative exploration of student perceptions of teacher based factors that influence academic performance in Units 3 and 4, VCE Physical Education.

Thank you for submitting your amended application for review.

I am pleased to inform you that the CHEAN has approved your application for a period of 12 Months from the date of this letter to 9th September 2014 and your research may now proceed.

The CHEAN would like to remind you that:

All data should be stored on University Network systems. These systems provide high levels of manageable security and data integrity, can provide secure remote access, are backed up on a regular basis and can provide Disaster Recover processes should a large scale incident occur. The use of portable devices such as CDs and memory sticks is valid for archiving; data transport where necessary and for some works in progress. The authoritative copy of all current data should reside on appropriate network systems; and the Principal Investigator is responsible for the retention and storage of the original data pertaining to the project for a minimum period of five years.

Annual reports are due during December for all research projects that have been approved by the College Human Ethics Advisory Network (CHEAN).

The necessary form can be found at: www.rmit.edu.au/staff/research/human-research-ethics

Yours faithfully,

Linda Jones
Chair, Science Engineering & Health
College Human Ethics Advisory Network
Dear Amanda


Thank you for submitting your amended application for review.

I am pleased to inform you that the CHEAN has approved your application for a period of 12 Months from the date of this letter to 10th September 2014 and your research may now proceed.

The CHEAN would like to remind you that:

All data should be stored on University Network systems. These systems provide high levels of manageable security and data integrity, can provide secure remote access, are backed up on a regular basis and can provide Disaster Recover processes should a large scale incident occur. The use of portable devices such as CDs and memory sticks is valid for archiving; data transport where necessary and for some works in progress. The authoritative copy of all current data should reside on appropriate network systems; and the Principal Investigator is responsible for the retention and storage of the original data pertaining to the project for a minimum period of five years.

Annual reports are due during December for all research projects that have been approved by the College Human Ethics Advisory Network (CHEAN).

The necessary form can be found at: www.rmit.edu.au/staff/research/human-research-ethics

Yours faithfully,

Linda Jones
Chair, Science Engineering & Health
College Human Ethics Advisory Network
APPENDIX D: VCE Physical Education teachers questionnaire

The following questions are designed to find out a little bit more about you and your teaching experience.

How many years have you been teaching?

How many years have you taught Units 1 and 2, VCE Physical Education? (or equivalent, eg. previous study designs, Senior Physical Education in another State or country)

How many years have you taught Units 3 and 4, VCE Physical Education? (or equivalent eg. previous study designs, final year Physical Education in another State or country)?

Have you previously, or are you currently teaching any other Units 3 and 4 VCE subjects (other than Physical Education)?

- Yes
- No

Which Unit 3 and 4 VCE subjects have you previously taught or are currently teaching? (please select all that apply)

- Biology
- Chemistry
- English
- Health and Human Development
- Maths Methods
- Outdoor and Environmental Studies
- Physics
- Sport and recreation (VCE VET)
- Food Technology
- Other (please specify)

About your school

The following questions are designed to find out a little bit more about the school in which you are currently teaching.

Which sector best describes the school you are currently teaching in? (please select one only)

- Government
- Independent
- Catholic
- Other (please specify)
The campus on which I teach is a (please select one only)

- Foundation (Prep) - Year 12
- Year 7 - Year 12
- Senior Campus (Years 10 - 12, or 11-12)
- Other (please specify)

Does the school you are currently teaching in offer a combined Units 1 and 2 with Units 3 and 4, VCE Physical Education?

- Yes
- No

How many combined Units 1 and 2 with Units 3 and 4, VCE Physical Education classes are there?

How many students are in each combined Units 1 and 2 with Units 3 and 4, VCE Physical Education class?

How many students in the combined class are completing Units 1 and 2, VCE Physical Education?

How many students in the combined class are completing Units 3 and 4, VCE Physical Education?

Does the school you are currently teaching in offer Units 1 and/or 2, VCE Physical Education?

- Yes
- No

How many Units 1 and/or 2 VCE Physical Education classes are there?

How many students are in each of the Units 1 and 2, VCE Physical Education class?

Does the school you are currently teaching in offer Units 3 and 4, VCE Physical Education?
How many Units 3 and 4 VCE Physical Education classes are there?

How many students are in each Units 3 and 4, VCE Physical Education class?

Does the school you are currently teaching in offer any of the following programs (please select all that apply)

- Year 9/10 Physical Education or Sport Science elective designed to lead into VCE PE
- Units 1 and/or 2 at Year 10 level
- Units 3 and 4 at Year 11 level
- Transition program into Units 3 and 4, eg. Year 12 Orientation period, holiday homework etc.
- Other (please specify)

Don’t know/unsual

None offered

How many days are there in one timetable cycle in the school you are currently teaching in?

How many learning periods in a normal school day?

How long (in minutes) is each learning period?

How many learning periods do you have for Units 3 and 4, VCE Physical Education in one cycle?

Of these learning periods, for Unit 3 and 4, VCE Physical Education, how many in each cycle are single learning periods?

Of these learning periods, how many in each cycle are double learning periods?
Do you have access to any of the following for use with Units 3 and 4 VCE Physical Education within your school? (please select all that apply)

- Gymnasium, hall or stadium etc.
- Weights room
- Designated VCE PE classroom
- Oval
- Basketball and/or netball courts
- Tennis courts
- Hockey and/or soccer pitch
- Swimming pool
- Computer labs
- Laptops
- iPads or tablets
- Digital cameras
- Subject specific software (please specify)

- Heart rate monitors
- Pedometers
- Accelerometers
- GPS units
- Other (please specify)

Of those resources selected, which did you utilise in your teaching of Units 3 and 4, VCE Physical Education? (please select all that apply)

- Gymnasium, hall or stadium etc.
- Weights room
- Designated VCE PE classroom
- Oval
- Basketball and/or netball courts
- Tennis courts
- Hockey and/or soccer pitch
- Swimming pool
- Computer labs
- Laptops
- iPads or tablets
- Digital cameras
- Subject specific software (please specify)

- Heart rate monitors
- Pedometers
- Accelerometers
- GPS units
- Other (please specify)
About your professional learning in 2013

Thinking about the professional learning that you undertook in 2013, please answer the following questions.

In 2013, did you attend or complete any subject specific (VCE Physical Education) professional learning?

- Yes
- No

Why didn’t you attend any subject specific professional learning in 2013? (please select all that apply)

- School wouldn’t grant time release
- School wouldn’t provide funding
- Not aware of the availability of this type of professional learning
- Not interested in attending professional learning
- Don’t see the value in the professional learning offered
- Access and availability (eg. distance, timing)
- Other (please specify)

For the subject specific professional learning you undertook in 2013, which of the following areas did it cover? (please select all that apply)

- Unit 3, Area of Study 1, Monitoring and promotion of physical activity
- Unit 3, Area of Study 2, Physiological responses to physical activity
- Unit 4, Area of Study 1, Planning, implementing and evaluating a training program
- Unit 4, Area of Study 2, Performance enhancement and recovery practices
- Information and communication technology you could use in VCE PE
- Incorporating practical activities and applied learning in VCE PE
- Exam preparation for VCE PE
- Understanding the VCE Physical Education Study design
- Other (please specify)

In what format(s) was the professional learning you attended? (please select all that apply)

- Conference seminars
- Workshops
- Webinars/online tutorials
- School/faculty/department based
- Other (please specify)

Approximately how many hours of subject specific professional learning did you attend in 2013?
Did you attend any other (non-subject specific) professional learning in 2012?

- Yes
- No

Which of the following areas of teaching and learning did the professional learning cover? (please select all that apply)

- Teaching strategies/ pedagogies
- Information and Communication technologies (ICT)
- First aid/CPR/EpiPen training etc
- Student welfare
- Leadership/management
- Staff welfare
- Other (please specify)

About your teaching of Units 3 and 4, VCE Physical Education

The following questions are designed to find out about your teaching practices in Units 3 and 4 VCE Physical Education. Thinking about your most recent teaching of Units 3 and 4, VCE Physical Education please answer the following questions.

How many weeks did you spend teaching Unit 3, Area of Study 1, Monitoring and promotion of physical activity?

How many weeks did you spend teaching Unit 3, Area of Study 2, Physiological responses to physical activity?

How many weeks did you spend teaching Unit 4, Area of Study 1, Planning, implementing and evaluation a training program?

How many weeks did you or will you spend teaching Unit 4, Area of Study 2, Performance enhancement and recovery practices?

How many weeks did you or will you spend on revision and exam preparation?
Approximately how many hours of your teaching in Unit 3, Area of Study 1, Monitoring and promotion of physical activity did you utilise the following teaching pedagogies? (enter hours so total = 20 hours)

<table>
<thead>
<tr>
<th>Pedagogy</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct instruction (teacher centered decisions and teacher directed engagement patterns for learners)</td>
<td>0</td>
</tr>
<tr>
<td>Inquiry based learning (units of instructions based on questioning strategies and when question asking is used early exclusively as the way to develop students abilities)</td>
<td>0</td>
</tr>
<tr>
<td>Peer teaching (students ‘tutors’ are given explicit responsibility to carry out tasks normally assumed by the teacher to help other students learn)</td>
<td>0</td>
</tr>
<tr>
<td>Cooperative learning (grouping of students into learning teams for a set amount of time or assignments where all students are expected to contribute to the learning process and outcomes)</td>
<td>0</td>
</tr>
<tr>
<td>Personalised system of instruction (PSI - students’ progress at their own pace through a sequence of prescribed learning tasks)</td>
<td>0</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
</tr>
</tbody>
</table>

Approximately how many hours of your teaching in Unit 3, Area of Study 2, Physiological responses to physical activity did you utilise the following teaching pedagogies? (enter hours so total = 30 hours)

<table>
<thead>
<tr>
<th>Pedagogy</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct instruction (teacher centered decisions and teacher directed engagement patterns for learners)</td>
<td>0</td>
</tr>
<tr>
<td>Inquiry based learning (units of instructions based on questioning strategies and when question asking is used early exclusively as the way to develop students abilities)</td>
<td>0</td>
</tr>
<tr>
<td>Peer teaching (students ‘tutors’ are given explicit responsibility to carry out tasks normally assumed by the teacher to help other students learn)</td>
<td>0</td>
</tr>
<tr>
<td>Cooperative learning (grouping of students into learning teams for a set amount of time or assignments where all students are expected to contribute to the learning process and outcomes)</td>
<td>0</td>
</tr>
<tr>
<td>Personalised system of instruction (PSI - students’ progress at their own pace through a sequence of prescribed learning tasks)</td>
<td>0</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
</tr>
</tbody>
</table>

Approximately how many hours of your teaching in Unit 4, Area of Study 1, Planning, implementing and evaluating a training program did you utilise the following teaching pedagogies? (enter hours so total = 30 hours)

<table>
<thead>
<tr>
<th>Pedagogy</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct instruction (teacher centered decisions and teacher directed engagement patterns for learners)</td>
<td>0</td>
</tr>
<tr>
<td>Inquiry based learning (units of instructions based on questioning strategies and when question asking is used early exclusively as the way to develop students abilities)</td>
<td>0</td>
</tr>
<tr>
<td>Peer teaching (students ‘tutors’ are given explicit responsibility to carry out tasks normally assumed by the teacher to help other students learn)</td>
<td>0</td>
</tr>
<tr>
<td>Cooperative learning (grouping of students into learning teams for a set amount of time or assignments where all students are expected to contribute to the learning process and outcomes)</td>
<td>0</td>
</tr>
<tr>
<td>Personalised system of instruction (PSI - students’ progress at their own pace through a sequence of prescribed learning tasks)</td>
<td>0</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
</tr>
</tbody>
</table>

Approximately how many hours of your teaching in Unit 4, Area of Study 2, Performance enhancement and
recovery practices did you utilise the following teaching pedagogies? (enter hours so total = 20 hours)

<table>
<thead>
<tr>
<th>Pedagogy</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct instruction (teacher centered decisions and teacher directed engagement patterns for learners)</td>
<td>0</td>
</tr>
<tr>
<td>Inquiry based learning (units of instructions based on questioning strategies and when question asking is used nearly exclusively as the way to develop students’ abilities)</td>
<td>0</td>
</tr>
<tr>
<td>Peer teaching (students ‘tutors’ are given explicit responsibility to carry out tasks normally assumed by the teacher to help other students learn)</td>
<td>0</td>
</tr>
<tr>
<td>Cooperative learning (grouping of students into learning teams for a set amount of time or assignments where all students are expected to contribute to the learning process and outcomes)</td>
<td>0</td>
</tr>
<tr>
<td>Personalised system of instruction (PSI - students’ progress at their own pace through a sequence of prescribed learning tasks)</td>
<td>0</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
</tr>
</tbody>
</table>

What type of practical activities did you use in your teaching of Units 3 and 4, VCE Physical Education? (please select all that apply)

- Games and sports
- Fitness testing
- Activity analysis
- Laboratory activities
- Recreational and lifestyle physical activities
- Visual aids in a theory context (e.g., Lego, playdough, posters, models etc.)
- Role plays and simulations
- Other
- Didn’t do any practical activities

For each Area of Study, please indicate how many hours your students participated in practical activities in your teaching of Units 3 and 4, VCE Physical Education.

<table>
<thead>
<tr>
<th>Area of Study</th>
<th>Greater than 10 hours of practical activity</th>
<th>7 - 9 hours of practical activity</th>
<th>4 - 6 hours of practical activity</th>
<th>1 - 3 hours of practical activity</th>
<th>Never used practical activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 3, Area of Study 1, Monitoring and promotion of physical activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit 3, Area of Study 2, Physiological responses to physical activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit 4, Area of Study 1, Planning, implementing and evaluating a training program</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit 4, Area of Study 2, Performance enhancement and recovery practices</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thinking about the use of practical activities in your teaching of Units 3 and 4, VCE Physical Education. How much do you agree or disagree with the following statements?

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical activities allow for the teaching and learning of key knowledge and skills in VCE PE.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Practical activities allow students to have a break from classroom based instruction.
Practical activities have no purpose in VCE PE.
Practical activities take away from theoretical classroom based instruction.
Practical activities support the learning of theoretical content in VCE PE.
There is not enough time to include practical activities in Units 3 and 4, VCE Physical Education.

Did you use any non-school based activities or external providers in your teaching of Units 3 and 4, VCE Physical Education in the year you most recently taught Units 3 and 4, VCE Physical Education?

- Yes
- No

Which of the following non-school based activities or external providers did you use? (please select all that apply)

- Local parks
- Pool
- Gymnasium
- Other schools
- Universities
- Australian Institute of Sport
- Guest speakers
- Sports association instructors
- Practical class instructors eg. Yoga, Pilates, martial arts etc.
- Student exam preparation sessions
- Other (please specify)

Why didn't you utilise any non-school based activities or external providers in your teaching of Units 3 and 4, VCE Physical Education in the year you most recently taught VCE Physical Education? (please select all that apply)

- School policy
- Cost
- Not aware of these opportunities for students
- Not interested in taking students
- Don't see the value in the programs offered
- Activities are not accessible and/or available in our area
- There is not enough time to include this type of activity
- Other (please specify)

Which type of School Assessed Coursework (SAC) task did you use in Unit 3, Area of Study 1, Monitoring and promotion of physical activity?
When setting and designing the School Assessed Coursework (SAC) task for Unit 3, Area of Study 1, Monitoring and promotion of physical activity, did you:

- Structure and write your own task?
- Use a commercially available product?
- Use a textbook based task?
- Adapt a commercially available or textbook based task?
- Use a task previously used in the school
- Use a task designed by a colleague in another school
- Other (please specify)

Which type of School Assessed Coursework (SAC) task did you use in Unit 3, Area of Study 2, Physiological responses to physical activity, a practical report and a:

- Practical laboratory report
- Case study analysis
- Data analysis
- Critically reflective field study of participation in practical activities
- Visual presentation
- Test

When setting and designing the School Assessed Coursework (SAC) task for Unit 3, Area of Study 2, Physiological responses to physical activity, did you:

- Structure and write your own task?
- Use a commercially available product?
- Use a textbook based task?
- Adapt a commercially available or textbook based task?
- Use a task previously used in the school
- Use a task designed by a colleague in another school
- Other (please specify)

Which type of School Assessed Coursework (SAC) task did you use in Unit 4, Area of Study 1, Planning, implementing and evaluating a training program, a written report and a:

- Case study analysis
- Data analysis
- Critically reflective field study of participation in practical activities
- Practical laboratory report
- Visual presentation
When setting and designing the School Assessed Coursework (SAC) task for Unit 4, Area of Study 1, Planning, implementing and evaluating a training program, did you:

- Structure and write your own task?
- Use a commercially available product?
- Use a textbook based task?
- Adapt a commercially available or textbook based task?
- Use a task previously used in the school?
- Use a task designed by a colleague in another school?
- Other (please specify)

Which type of School Assessed Coursework (SAC) task did you use in Unit 4, Area of Study 2, Performance enhancement and recovery practices, a:

- Practical laboratory report
- Case study analysis
- Data analysis
- Media analysis
- Test

When setting and designing the School Assessed Coursework (SAC) task for Unit 4, Area of Study 2, Performance enhancement and recovery practices, did you:

- Structure and write your own task?
- Use a commercially available product?
- Use a textbook based task?
- Adapt a commercially available or textbook based task?
- Use a task previously used in the school?
- Use a task designed by a colleague in another school?
- Other (please specify)

In preparing your students for the external assessment (end of year examination) in Units 3 and 4, VCE Physical Education, which of the following will you or did you use? (please select all that apply)

- Past VCAA exam papers
- VCAA examiners reports
- Commercially available practice exams
- External providers of student revision and exam preparation seminars
- Other (please specify)

How much do you agree or disagree with the following statements about your teaching and learning program in Units 3 and 4, VCE Physical Education?

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Statement                                                                 | Agree | Agree | Unagree | Disagree | Strongly
<table>
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<th></th>
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</thead>
<tbody>
<tr>
<td>There is sufficient time allocated to the delivery of Units 3 and 4 VCE</td>
<td></td>
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<tr>
<td>Physical Education</td>
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<tr>
<td>Timetabling constraints (such as only single learning periods, classes</td>
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<tr>
<td>timetables after lunch etc) make teaching as I would like more difficult</td>
<td></td>
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<tr>
<td>The number of students in my Units 3 and 4 VCE Physical Education class</td>
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<tr>
<td>is conducive to good teaching</td>
<td></td>
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<tr>
<td>I have limited access to the resources and equipment I need to deliver</td>
<td></td>
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<tr>
<td>Units 3 and 4 VCE Physical Education effectively</td>
<td></td>
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<tr>
<td>Access to adequate funding allows me to provide my students with</td>
<td></td>
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<tr>
<td>experiences that enhance their learning opportunities in Units 3 and 4 VCE</td>
<td></td>
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<tr>
<td>Physical Education</td>
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</tr>
<tr>
<td>Increased access to and the utilisation of ICT has allowed me to engage</td>
<td></td>
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</tr>
<tr>
<td>my students and increase their understanding of key concepts</td>
<td></td>
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<tr>
<td>Limited access to subject specific teacher professional learning has</td>
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<tr>
<td>inhibited my ability to provide students with a deep representation of the</td>
<td></td>
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<tr>
<td>key concepts in Units 3 and 4 VCE Physical Education</td>
<td></td>
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</tr>
<tr>
<td>My level of knowledge and understanding of the key concepts in Units 3 and</td>
<td></td>
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<tr>
<td>4 VCE Physical Education enables me to provide students with a</td>
<td></td>
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<tr>
<td>comprehensive understanding of the content</td>
<td></td>
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</tr>
<tr>
<td>The weighting of the external assessment (end of year examination) in</td>
<td></td>
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</tr>
<tr>
<td>Units 3 and 4 VCE Physical Education impacts on how I teach</td>
<td></td>
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<tr>
<td>In order to prepare students for the external assessment task (end of</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>year examination) in Units 3 and 4 VCE Physical Education I need to focus</td>
<td></td>
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</tr>
<tr>
<td>my teaching on the delivery of theoretical content rather than practical</td>
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<tr>
<td>application of the content</td>
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</tr>
</tbody>
</table>

**To what extent do you feel confident in teaching the key skills and key knowledge in Unit 3 and 4, VCE Physical Education?**

<table>
<thead>
<tr>
<th>Unit 3, Area of Study 1, Monitoring and promotion of physical activity?</th>
<th>Very confident</th>
<th>Quite confident</th>
<th>Fairly confident</th>
<th>Somewhat confident</th>
<th>Not at all confident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 3, Area of Study 2, Physiological responses to physical activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit 4, Area of Study 1, Planning, implementing and evaluation</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Unit 4, Area of Study 2, performance enhancement and recovery practices</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**To what extent do you think your students were engaged in their learning of:**

<table>
<thead>
<tr>
<th>Unit 3, Area of Study 1, Monitoring and promotion of physical activity?</th>
<th>Highly engaged</th>
<th>Neither engaged or disengaged</th>
<th>Somewhat engaged</th>
<th>Not at all engaged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 3, Area of Study 2, Physiological responses to physical activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit 4, Area of Study 1, Planning, implementing and evaluation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit 4, Area of Study 2, performance enhancement and recovery practices</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**How often do you use reflective practices in your teaching of Unit 3 and 4 VCE Physical Education?**

- Never
- Less than Once a Month
- Once a Month
- 2-3 Times a Month
- Once a Week
- 2-3 Times a Week
- Daily
Did you access or were you provided with student performance data (e.g. study scores) provided by the VCAA to inform your teaching of Unit 3 and 4 VCE Physical Education?

- Yes
- No

Which data did you access and utilise? (please select all that apply)

- Mean Study Score for the school
- Mean Study Score for Physical Education
- Examination scores
- Item analysis of examination
- Other (please specify)

How did you use the data to inform and/or modify your teaching for the next year? (please select all that apply)

- Didn’t influence or modify my teaching
- Modified the time spent on a concept or area
- Modified my teaching approach to a concept or area
- Sought further resources/PD/information on a concept or area
- Other (please specify)

Do you know your schools mean Study Score for Physical Education in 2011 and/or 2012?

- Yes
- No
- Unsure or not applicable

Are you able to provide the mean Study Score for VCE Physical Education for the school you are currently teaching at?

- 2011
- 2012
- Prefer not to answer

How much do you agree with the following statements regarding the amount and type of feedback you provide to your students?

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I provide all students with verbal feedback in or after every class.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Numerical scores or letter grade on School Assessed Coursework (SAC) is sufficient for students to identify their strengths and weaknesses.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>I provide students with detailed written feedback after the completion of School Assessed Coursework (SAC) that allows them to identify areas of strengths and weaknesses.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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The following questions are taken from the Teachers’ sense of self efficacy scale (short form) and are designed to help gain a better understanding of the kinds of things that create difficulties for teachers in their school activities. Thinking only about your teaching of Units 3 and 4, VCE Physical Education, please indicate your opinion about each of the statements below.

<table>
<thead>
<tr>
<th></th>
<th>A great deal (9)</th>
<th>Quite a bit (7)</th>
<th>Some influence (5)</th>
<th>Very little (3)</th>
<th>Nothing (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How much can you do to control disruptive behaviour in the classroom?</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
</tr>
<tr>
<td>How much can you do to motivate students who show low interest in school work?</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
</tr>
<tr>
<td>How much can you do to get students to believe they can do well in school work?</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
</tr>
<tr>
<td>How much can you do to help your students value learning?</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
</tr>
<tr>
<td>To what extent can you craft good questions for your students?</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
</tr>
<tr>
<td>How much can you do to get your students to follow classroom rules?</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
</tr>
<tr>
<td>How much can you do to calm a student who is disruptive or noisy?</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
</tr>
<tr>
<td>How well can you establish a classroom management system with each group of students?</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
</tr>
<tr>
<td>How much can you use a variety of assessment strategies?</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
</tr>
<tr>
<td>To what extent can you provide an alternative explanation or example when students are confused?</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
</tr>
<tr>
<td>How much can you assist families in helping their children do well in school?</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
</tr>
<tr>
<td>How well can you implement alternative strategies in your classroom?</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
<td>●●●●●●</td>
</tr>
</tbody>
</table>

Thank you for your time

I would like to be entered in the prize draw to win one of:

- 20 free places at the RMIT University VCE PE Enhancement program for your class in 2014 OR
- a $250 ‘Smash’ Sports voucher for your school AND
- one of 20 x $50 iTunes,Coles Group or Rebel Sports vouchers for yourself?

☐ Yes
☐ No

Click here to enter the prize draw.
APPENDIX E: Focus group interview question schedules

Student focus group question schedule

A qualitative exploration of student perceptions of teacher based factors that influence student academic performance in Units 3 and 4, VCE Physical Education

Please note that demographic data will be collected from participants at the start of the session. See attached questionnaire (for example; school type; sector; age and gender; class size)

Thank you for agreeing to be part of our discussion today. We are interested in your perception of the characteristics of effective teaching and learning practices in Units 3 and 4, VCE physical Education that your teacher may or may not use, which you perceive to influence your understanding of Units 3 and 4, VCE Physical Education. We ask that you think specifically about what your teacher does in Units 3 and 4 when considering your responses to the question asked, and not about the teacher as an individual. For example “Our teacher doesn't allow us to see him/her outside of class which makes it difficult if we have questions about the work we are doing.” Rather than; “Our teacher doesn't care about us and doesn't help.” The session will be recorded using a digital audio recorder, and all contributions will be equally valued.

Students will be given an A3 sheet with a diagram of the ‘Perfect PE’ teacher that they will annotate and then will be collected.

1. On the diagram you have been given, list as many characteristics that you can think of that would make up the ‘perfect’ VCE PE teacher.
   - Types of teaching in the classroom?
   - Beyond the classroom? Availability?
   - Practical activities?

2. Did you do a transition program into Units 3 and 4, VCE Physical Education? (Holiday homework/Year 12 Orientation etc.)
   - When did you do it?
   - Was it helpful?
   - Were you expected to do or attend?

3. Does your teacher have high expectations of you?
   - Amount of work you do?
   - How well you succeed in Units 3 and 4, VCE Physical Education?
   - Your behaviour/attitude?

4. What does your teacher do to help you learn in Units 3 and 4, VCE Physical Education?
   - Explain things in different ways?
   - Question you to get you to think about the content more deeply?
   - Use demonstrations/activities?

5. What areas of the course do you consider to be the most challenging to understand?
   - What strategies does your teacher use to teach these areas?
Does you teacher do other things to help you overcome the difficulties you have?
- Do you have an example of an activity that your teacher has used to help you understand a difficult concept?

6. I am going to show you five different cards that show different ways of teaching, from these descriptions, consider the following questions:
- Does your teacher use these teaching strategies?
- In which areas of study do they use them?
- How often do they use each of these strategies?
- Are there other strategies that your teacher uses in class?

7. What types of practical activities does your teacher use?
- Games/sports?
- Laboratories?
- Recreational/lifestyle activities?

8. How do practical activities help you to understand in Units 3 and 4, VCE Physical Education?
- What sorts of things do you learn from practical activities?
- Does practical work make things easier to understand?

9. What does your teacher do beyond classroom instruction to help you succeed in Units 3 and 4, VCE Physical Education?
- Are they available for you to access?
- Extra tutoring/homework clubs/study sessions?

10. Does your teacher provide you with opportunities to access external providers of information relevant to your studying of Units 3 and 4, VCE Physical Education?
- Do they provide information but leave it up to you to access?
- Do they facilitate you attending external sessions? For example. Organise transport, payment etc.

11. What does your teacher do to help you prepare for School Assessed Coursework (SAC) tasks and the end of year examination?
- Revision in class?
- Practice SAC’s?
- Past VCAA examination papers and examiners reports
- Practice exams?
- External revision sessions?

12. Are there any other things that your teacher does that supports you in your learning of Units 3 and 4, VCE Physical Education?
- Use of social media or ICT?
- Extra work provided?
- Breakfast club or similar?
- Access to facilities outside of class time?
- Library resources?
13. Is there is anything else you would like to add to our discussion today?

Thank you for sharing your experiences in Units 3 and 4 VCE Physical Education Your time and valuable contributions to today’s discussion are much appreciated.
Teacher focus group question schedule

A qualitative exploration of teacher perceptions of modifiable factors that influence student academic performance in senior secondary physical education.

Focus group discussion questions and prompts:

Please note that demographic data will be collected from participants at the start of the session. See attached questionnaire (school; sector; teaching experience; classes)

Thank you for agreeing to be part of our discussion today. We are interested in your perception of the modifiable factors, those that you, as a teacher, have control over, which you perceive to influence the academic performance of your students. We ask that you think specifically about Units 3 and 4, VCE Physical Education when considering your responses to the question asked. The session will be recorded using a digital audio recorder, and all contributions will be equally valued.

14. What is it that you, as a teacher, can do to make a difference to your student's academic performance in Units 3 and 4, VCE PE?
   - In the classroom?
   - Beyond the classroom?
   - Planning?

15. What are some of the variables that influence the way you teach?
   - Modifiable/non-modifiable?
   - Topic or content?
   - Student cohort?

16. What areas of the course do you consider to be the most challenging to teach?
   - What strategies do you use to teach these areas?
   - Do you have an example of an innovative or effective strategy that has worked for you?
   - Use of practical activities?

17. Are the areas that are challenging to teach the same as those that are challenging for students to understand?
   - Why/why not?
   - How do they differ?
   - Does this impact on how you teach these areas?

18. What does ‘practical work’ mean to you in Units 3 and 4, VCE PE?
   - Sports and games?
   - Laboratories?
   - Applied learning activities within and external to the classroom?

19. What do you think the role or purpose of practical activities is in VCE PE?
   - If you don’t use practical activities, why not?
   - Consolidate learning or understanding?
   - The kinaesthetic learner?

20. Do you use any information and communication (ICT) in your teaching of VCE PE?
- What types of ICT?
- How do you utilise the technology?
- Do you use technology to communicate with students?
- How does this impact on their learning?

21. How do you use student performance data to inform your teaching?
- VASS reports – are you aware of the data available?
- Now that you do, how could you use it?
- SAC tasks?
- Other reflective practices?

22. Where do you go to access information or seek support for your teaching of VCE PE (assessment/content/other areas)?
- Mentor/other staff/colleagues/within or outside the school?
- Networks?
- The VCAA? Study design?
- External providers?

23. What would assist you to improve the effectiveness of your teaching of VCE PE?
- Professional learning?
- Resources?
- What would you do with more funding/resources?
- What would you do differently as a pre-service teacher and as an in-service teacher to improve the effectiveness of your teaching?

24. What other strategies beyond your class time teaching, do you use with students to support them in their learning?
- Access and availability of you?
- Study days/breakfast club?
- Use of social media or ICT?
- Use of external providers?

25. How do you prepare your students for SAC's and the end of year examination?
- Practice SAC tasks?
- Past papers and examiners reports?
- Trial examinations?
- Revision/intensive sessions?

26. Is there is anything else you would like to add to our discussion today?

Thank you for sharing your experiences in teaching Units 3 and 4 VCE Physical Education and for your valuable contributions to today’s discussion. Your time, expertise and experience are very much appreciated.
## A qualitative exploration of student perceptions of teacher based factors that influence student academic performance in Units 3 and 4, VCE Physical Education

### A FEW QUESTIONS ABOUT YOURSELF

1. Are you currently completing Units 3 and 4, VCE Physical Education?
   - Yes [ ]
   - No [ ]

2. What is your gender?
   - Male [ ]
   - Female [ ]

3. What is your age in years?

4. Did you complete Units 1 and 2, VCE Physical Education?
   - Yes [ ]
   - No [ ]

5. Did you participate in a transition program (for example; Year 12 Orientation, holiday homework) prior to starting Units 3 and 4, VCE Physical Education?
   - Yes [ ]
   - No [ ]

6. How many students in your Units 3 and 4, VCE Physical Education class?

7. What is the gender of your Units 3 and 4, VCE Physical Education teacher?
   - Male [ ]
   - Female [ ]

8. Which sector best describes the school and campus you are currently teaching in?
   - Government 7 -12 [ ]
   - Independent school F – 12 [ ]
   - Independent school 7 – 12 [ ]
   - Catholic school F – 12 [ ]
   - Catholic school 7 – 12 [ ]
   - Other (please specify) [ ]
Teacher focus group demographic questionnaire

A qualitative exploration of teacher perceptions of modifiable factors that influence student academic performance in post-compulsory physical education.

A FEW QUESTIONS ABOUT YOURSELF

1. Have you taught, or are you currently teaching Units 3 and 4, VCE Physical Education in 2011, 2012 and/or 2013? (please tick all that apply)
   - 2013 [ ] 2012 [ ] 2011 [ ]

2. What is your gender?
   - Male [ ] Female [ ]

3. What is your age in years?
   - [ ]

4. What is your highest level of education?
   - Bachelor degree (4 Year Education degree)
   - Bachelor degree (3 year degree plus Diploma of Education)
   - Honours degree by research
   - Masters degree by research
   - Masters degree by coursework
   - PhD
   - Other (please specify)
   - [ ]

5. How many years have you been teaching?
   - [ ]

6. How many years have you been teaching Units 3 and 4, VCE Physical Education?
   - [ ]

7. Which sector best describes the school and campus you are currently teaching in?
   - Government 7 - 12
   - Independent school F – 12
   - Independent school 7 – 12
   - Catholic school F – 12
   - Catholic school 7 – 12
   - Other (please specify)
   - [ ]

RMIT University
A qualitative exploration of teacher perceptions of modifiable factors that influence student academic performance in post-compulsory physical education.