Title: The relationships among first year Bachelor of Nursing students' entry characteristics, self-regulated learning and academic performance for their science and nursing practice courses

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The relationships among first year Bachelor of Nursing students' entry characteristics, self-regulated learning and academic performance for their science and nursing practice courses

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THE RELATIONSHIPS AMONG FIRST YEAR BACHELOR OF NURSING STUDENTS' ENTRY CHARACTERISTICS, SELF-REGULATED LEARNING AND ACADEMIC PERFORMANCE FOR THEIR SCIENCE AND NURSING PRACTICE COURSES

A thesis submitted in fulfilment of the requirements for

the award of the degree

DOCTOR OF PHILOSOPHY

from

UNIVERSITY OF WOLLONGONG

by

SHARON ANDREW

MSc (Honours), BAppSc, RN

FACULTY OF EDUCATION

2002

To David, George, Jack, Laura and Michelle

THESIS CERTIFICATION

I, SHARON ANDREW, declare that this thesis, submitted in fulfillment of the requirements for the award of Doctor of Philosophy, in the Faculty of Education, University of Wollongong, is wholly my work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Signature

25 October 2002

Date

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ABSTRACT

This thesis used a multimethod approach and an adapted version of the Pintrich and Schrauben (1992) model of cognition and motivation in the classroom to examine the relationship among students' entry characteristics, self-regulated learning (cognition and motivation) and academic performance for Nursing Practice and Science courses in first year Bachelor of Nursing programs.

Students from three universities were surveyed, by structured questionnaire, in the first and second semesters of their Bachelor of Nursing program. The questionnaires contained questions about students' entry characteristics—age, mode of entry, academic background, nursing as a first choice, ethnicity—and research instruments—SEFS, NCSES, NASES, and selected MSLQ scales (SELAP, TV, MSCR, CT). Scores and grades for their Science and Nursing Practice courses were used as measures of students' academic performance. High and Low Achiever categories were used to categorise students' performance.

Structured telephone interviews were conducted, in the first semester, with a purposeful sample of 40 students and 19 of these students were interviewed again at the end of the first year. The first interview established students' self-beliefs about science, their expectations about their courses, perceptions of the relevance of the courses, and learning strategies for their Science and Nursing Practice courses. The second interview sought to identify changes in their learning strategies that students may have made during the year. Semi-structured face-to-face interviews were conducted with 10 academics involved in teaching the Science and Nursing Practice courses. The academics were asked to identify student entry characteristics linked to academic success in their respective course areas. The results from the questionnaires, and student and academic interviews were triangulated.

Age, ethnicity, nursing as a first choice, TER scores and HSC Science background were identified by academics as factors influencing academic performance. Academics described students aged 20+ years as self-regulated learners who, despite having low self-efficacy expectations for science and academic learning and performance, become empowered once they have been successful in their first semester courses. Students from a NESB were described as having difficulties with their first year courses. Three themes were identified from academics' comments

about students from a NESB: language skills, help-seeking and cultural specific approach to study.

Students who questioned the relevance of their Science courses to clinical nursing practice tended to be Low Achievers. Students used general and course-specific learning strategies when studying for their Science and Nursing Practice courses. Eight categories of learning strategies—organisation, reading, elaboration, rehearsal, metacognitive self-regulation, study environment and help-seeking—were used by students when studying for their Science courses. Six categories were identified for the Nursing Practice courses—workbook, reading, elaboration, clinical skills practice, metacognitive self-regulation and help-seeking. High Achievers reported using more and a wider variety of learning strategies than Low Achievers. Low Achievers were consistent over the year in the number and type of strategies they used.

Hypothesised models for students' first and second semester Science and Nursing Practice courses were tested and refined using AMOS. In all final (trimmed) models, cognition (metacognitive and self-regulated learning strategies and critical thinking) had direct effects on motivation (self-efficacy measures and task value). Motivation had direct effects on academic performance. Ethnicity and nursing as a first choice had direct effects on Sc1 academic performance and ethnicity and age had direct effects on NP1 academic performance. In the second semester age had a direct effect on Sc2 academic performance and ethnicity and age had direct effects on NP2 academic performance. Age had direct effect on cognition. Goodness-of-fit indices for the final (trimmed) models were: Sc1: AGFI=0.94, RMSEA=0.04, TLI=0.98, CFI=0.99; NP1: AGFI=0.91, RMSEA=0.07, TLI=0.90, CFI=0.94; Sc2: AGFI=0.90, RMSEA=0.08, TLI=0.93, CFI=0.97; NP2: AGFI=0.92, RMSEA=0.06, TLI=0.94, CFI=0.97.

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GLOSSARY

Term	Definition
Course	A unit or subject in a specified area which generally has a title and code and for which a student is awarded a grade. The courses of interest in this thesis were the Science and Nursing Practice courses.
Program	Required number of courses studied to complete a Bachelors (baccalaureate) degree. Students in this thesis were studying courses in a Bachelor of Nursing program.
Semester	One session of study, with Semester one or first semester referring to the March-July semester, also known as the Autumn Semester. Semester two, or second semester, refers to the July-December semester also known as the Spring Semester.
Clinical skills	Nursing skills practised by nurses or nursing students that are associated with the delivery of client care.
Clinical practice	Delivery of the client care (and includes the use of nursing clinical skills) that may be undertaken in a variety of places including the community and hospital. Often abbreviated to simply clinical.
Academic Performance	Students' academic results for a course. May include mark/score and/or grade awarded.
TER Score (Tertiary Entrance Rank)	Score derived from students' academic performance in their final high school year subjects for the High School Certificate. The score may vary from 0-100 with 100 indicating high academic performance and 0 poor academic performance.

ABBREVIATIONS

α	alpha
AGFI	Adjusted Goodness-of-Fit Index
AIN	Assistant in Nursing
ANOVA	Analysis of Variance
ASI	Approaches to Study Inventory
Aust	Australia
β	Standardised path coefficient
BN	Bachelor of Nursing
C	Credit grade
CFI	Comparative Fit Index
Chem	Chemistry
CR	Critical Ratio
CT	Critical Thinking
CT-N	Critical Thinking for Nursing Practice course
CT-S	Critical Thinking for Science course
D	Distinction (Academic) grade
DF	Degrees of Freedom
EN	Enrolled Nurse
ESB	English Speaking Background
F	Fail Grade
GPA	Grade Point Average
HA	High Achiever
HD	High Distinction grade
HSC	High School Certificate
LA	Low Achiever
lab	laboratory
LSI	Learning Style Inventory
M	Mean
MAE	Mature-Age Entry
MCSR	Metacognitive Self-Regulation
MCSR-N	Metacognitive Self-Regulation for Nursing Practicecourse
MCSR-S	Metacognitive Self-Regulation for Science course
MSLQ	Motivated Strategies for Learning Questionnaire
n	number (sample)
NASES	Nursing Academic Self-Efficacy Scale
NCSES	Nursing Clinical Self-Efficacy Scale
NESB	Non-English Speaking Background
NP	Nursing Practice
NP1	Nursing Practice course semester one
NP2	Nursing Practice course semester two
NZ	New Zealand

p	probability
P	Pass grade
pracs	practical component of course
Q	Questionnaire item
RMSEA	Root Mean Square Error of Approximation
RN	Registered Nurse
Sc1	Science course semester one
Sc2	Science course semester two
SD	Standard Deviation
SE	Standard Error
SEFS	Self-Efficacy for Science
SELAP	Self-Efficacy for Learning and Performance
SELAP-N	Self-Efficacy for Learning and Performance for Nursing Practice course
SELAP-S	Self-Efficacy for Learning and Performance for Science course
SEM	Structural Equation Modeling
SRLIS	Self-Regulated Learning Interview Schedule
SS	Sum of Squares
t	Computed Value of T-Test
TAFE	Technical and Further Education
TER	Tertiary Entrance Rank
TIS	Telephone Interview Schedule
TLI	Tucker-Lewis Index
tuts	tutorials
TV	Task Value
TV-N	Task Value for Nursing Practice course
TV-S	Task Value for Science course
UK	United Kingdom
uni	university
USA	United States of America
χ^2	Chi-Square

Chapter 1

INTRODUCTION

1.1 Introduction

Technological and informational systems are evolving with such rapidity that occupations challenged by these developments require the preparation, by educational institutions, of learners who are capable of adapting to these changes. Nursing is one occupation where technological, informational and social changes require participants who can self-regulate their learning, not only for the formal educational years, but also during their lifetime.

Students who engage in self-regulated learning may be those best prepared to meet these challenges for the future as they are proactive learners (Zimmerman, 1989a) who are "metacognitively, motivationally, and behaviorally active participants in their own learning process" (Zimmerman, 1986, p. 308).

The preparation of nurses capable of self-regulated learning requires an understanding of issues, such as, what constitutes effective self-regulated learning in a nursing program, how self-regulated learning relates to academic performance, what changes may occur in self-regulated learning as a student progresses through a program and lastly, what characteristics does a student have on entering a program that may influence their subsequent development of self-regulated learning behaviours in that program.

In this thesis a multi-method approach was used to examine nursing students' entry characteristics, self-regulated learning (motivation and learning strategies) and academic performance for their Science and Nursing Practice courses of first year Bachelor of Nursing programs. To examine the interrelationships among these areas an adapted version of the Pintrich and Schrauben (1992) model of motivation and cognition—two key elements of self-regulated learning—was used in this study. This research may lead to the planning and development of educational strategies to assist students to achieve academic success and to become self-regulated learners not only for their Bachelor of Nursing program but also for their lifetime in the nursing discipline.

1.2 Background to the Problem

Since the late 1980s, NSW (New South Wales) pre-registration nursing education programs have been conducted in universities. Prior to this, nursing education was conducted in hospital-based Schools of Nursing and then Colleges of Advanced Education. To register as a nurse, students study for three years in Bachelor of Nursing programs and must be successful in the academic courses, achieve a satisfactory level of clinical performance, and acquire competency in specified nursing clinical skills. There are three components, therefore, of a nursing program: theoretical knowledge, clinical skills and clinical experience.

The first component—theoretical knowledge—is taught primarily in the academic courses of a Bachelor of Nursing program. A first year Bachelor of Nursing program may include introductory nursing courses, Science, Sociology and Psychology courses. Nursing is a discipline that is still developing the distinctive "body of knowledge" thought to define a profession (Trnobranski, 1993). Whilst the introductory nursing courses studied in the first year of a Bachelor of Nursing program may be based on nursing knowledge, the extent to which the other courses may have been adapted from their respective disciplines and applied to nursing, particularly the science, may be dependent upon the nature of the curriculum or the skill of the persons involved in the courses.

First year Bachelor of Nursing Science courses may have been derived from disciplines such as chemistry, physics, and the bio-sciences (biology, physiology and biochemistry). Whilst suggestions have been made for the development of a bionursing approach by the integration of the science to nursing practice (Akinsanya, 1987; Akinsanya & Hayward, 1980), the science in nursing may still reflect the discipline from which it is drawn (Trnobraski, 1996; 1997).

The merging of science (physics, chemistry and bio-sciences) has been problematic in nursing programs (Akinsanya, 1987; Akinsanya, & Hayward, 1980; Trnobranski, 1996; 1997) and nursing students have consistently been reported as having difficulties with this area of their programs irrespective of the type of course or institution conducting the program (Caon & Treagust, 1993). These difficulties are not uniquely Australian, but have also been reported by researchers from the United Kingdom (see for example Akinsanya & Hayward, 1980; Trnobranski, 1993; 1997) and the United States of America (Campbell & Dickson, 1996; Lenehan, Dunn, Ingham, Signer & Murray, 1994). Curriculum changes or courses aimed at reducing students' difficulties with the science content of the curriculum have met with modest success (Gillies & Soars, 1992; Nicoll & Butler, 1996).

Among the issues discussed in the literature as possible contributors to students' difficulties with the science in nursing programs has been students' limited science background (Akinsanya & Hayward, 1980; Bishop, 1990; Caon & Treagust, 1992; Kershaw, 1989). Nursing students are more likely to have studied biology than physics or chemistry in their final year at high school (Andrew, 1998), yet first year, and particularly first semester Australian Bachelor of Nursing Science courses, may contain a significant amount of physics and chemistry. This may partly explain why students' science background has been an unreliable predictor of academic performance in nursing programs (Caon & Treagust, 1992 ; Kershaw, 1989).

Some of the other areas investigated in relation to the Science courses in nursing have been relevance (Thornton, 1997), nursing curricula (Jordan 1998; Wharrad & Chapple, 1994) and gender (Andrew, 1994). A few studies have incorporated qualitative aspects in their research (Jordan, Davies & Green, 1999; Thornton, 1997), but more qualitative research is required to fully understand why students have difficulties with their science courses.

The second component of a nursing program—clinical skills—includes the specialist skills performed by nurses or student nurses in the delivery of client care, for example measuring a client's temperature, or administering a prescribed medication. These skills are taught in academic courses with students having the opportunity to practise these skills in nursing laboratories before obtaining further experience in these skills when participating in the third component of nursing programs—clinical experience. Clinical experience may be undertaken in hospitals or the community. In the first year of Bachelor of Nursing programs, clinical skills are taught in academic courses that also have a theoretical component of nursing knowledge. The clinical experience component may be administered by the same academic course involved with the teaching of the clinical skills. As the clinical experience component is not conducted in the academic institution and may involve very specific self-regulatory behaviours, this component was not examined in this thesis. In this thesis, the first year Bachelor of Nursing courses that incorporate nursing theoretical knowledge, clinical skills tuition and administer students' clinical experience are called Nursing Practice courses. Full-time nursing students enroll in a Nursing Practice course each semester of the first year of their Bachelor of Nursing programs.

Whilst there is literature pertaining to the clinical skills component of nursing courses (see for example Nolan, 1998), there is a paucity of Australian research about first year Nursing Practice courses. This may possibly be because Nursing Practice courses cause students less difficulties than the Science courses (Jordan et al., 1999) and students report spending less time studying for them than for their Science course (Davies, Murphy, & Jordan, 2000). Yet for students entering nursing programs, particularly those coming directly from high school, studying courses that have a theoretical and practical component may be a new experience and require students to develop specific self-regulatory strategies, if they are to be successful in this area.

A meta analysis of 47 American studies relating to prediction of academic success in nursing, found that science and nursing grade point averages (GPA) were the best cognitive predictors of overall academic success in their nursing registration examination (Campbell & Dickson, 1996).

Traditionally, Australian nursing students were a very homogeneous group— aged 17-20 years, female, single and Anglo-Saxon (Neill & Barclay, 1989)—but nowadays, students entering nursing may have widely varying backgrounds. Whilst some students will have the traditional entry characteristics, others may be mature age and married (Andrew, 1995). Some may be from a Non-English speaking background (Zollo, 1998), and the percentage of males entering nursing programs has steadily increased (Lawler, Ahern, Stanley & West, 1997).

To prepare students who are self-regulated learners, educational institutions conducting Bachelor of Nursing programs need to be aware of how the diversity in the student population and the varied nature of first year curricula interact and how they in turn relate to academic performance, if they are to develop educational strategies to assist students to develop self-regulated learning strategies and be academically successful in those programs.

1.2.1 Background to thesis: research by author

My Masters (Honours) in Nursing research degree forms the genesis of the research topic for this thesis. For this research I used a quantitative approach and surveyed, by questionnaire, 81 Bachelor of Nursing students at one university in the second semester of their first year of that program. In this research I examined the relationship between non-academic factors and academic performance in the first year of a Bachelor of Nursing program. For this research I developed a research instrument, called the Self-Efficacy for Science (SEFS), to measure students' self-efficacy for first year Bachelor of Nursing Science courses. This self-efficacy research instrument was found to be a significant predictor of students' academic performance in the Science courses (Andrew, 1998). The SEFS has been used in this thesis, giving me the opportunity to examine this research instrument with a larger and more varied group of nursing students than those used in my Masters research.

The results from my Masters thesis are discussed in the appropriate sections of the literature review.

1.3 Justification for the Research

By combining the nursing literature, with the self-regulated learning literature, four areas were identified as justification for the research.

First, students entering a discipline have academic and demographic characteristics (Pintrich & Schrauben, 1992; Garcia, Yu & Coppola, 1993) and knowledge and beliefs (Boekaerts, 1997) that may influence their self-regulatory learning behaviours in that discipline. The self-regulated literature suggests, for example, that there may be cultural (Chye, Walker & Smith, 1997; Purdie & Hattie, 1996; Purdie, Hattie & Douglas, 1996), gender (Zimmerman & Martinez-Pons 1990) and age (Spitzer, 2000) differences in self-regulatory behaviours although there is still a need for more research in this area. As Australian nursing students are heterogeneous, the characteristics that they bring on entering a nursing program cannot be ignored, particularly as they may influence their self-regulatory behaviours and subsequent academic performance in that program.

Whilst some research pertaining to students' entry characteristics and self-regulation has been conducted overseas (House, 2000; Niemivirta, 1997; Zimmerman & Martinez-Pons, 1990), there has not been any specifically Australian research in this area. In fact, very few Australian studies have examined aspects of nursing students' self-regulated learning in Bachelor of Nursing courses (Cantwell & Moore, 1998). The Pintrich and Schrauben (1992) model predicts how students' entry characteristics may interact with constructs such as motivation and cognition (self-regulated learning) and academic performance. No Australian studies were identified in the literature, where the Pintrich and Schrauben (1992) model was used in relation to nursing students. Therefore in this thesis, the Pintrich and Schrauben (1992) model was used to examine the interrelationships among students' entry characteristics, self-regulated learning and academic performance in first year Bachelor of Nursing programs.

Secondly, as discussed in section 1.2, in a nursing program students may study courses that may vary in their nature, from those that are largely theoretical, for example Science, to others that may have combined theoretical and practical (physical) aspects, for example Nursing Practice. These courses may require very different learning strategies and students' motivation for these courses may vary. Whilst domain and disciplinary differences in self-regulated learning have been investigated (Donald, 1994; Wolters, Yu & Pintrich 1996), studies have not specifically examined the self-regulated strategies that students may require to be successful in a course like Nursing Practice which has a combined theoretical and practical element. Therefore in this thesis the interrelationships among students' entry characteristics, self-regulated learning and academic performance were examined in relation to the Science and Nursing Practice courses of first year Bachelor of Nursing programs.

Thirdly, although Wolters et al. (1996) found consistency and similarity, over a year, in the relationship between high school students' goal orientation, motivation and self-regulated learning for three different academic subject areas, more research is required in the area of the changes that may occur as a student progresses through a learning environment (Zeidner, Boekaerts & Pintrich, 2000). No Australian studies have examined the changes that occur in students' self-regulated learning as they progress through the first year of a Bachelor of Nursing program. Therefore in this thesis the interrelationships among students' entry characteristics, self-regulated learning and academic performance were examined in the first and second semester of first year Bachelor of Nursing programs.

Lastly, there have been recommendations for the inclusion of qualitative aspects to self-regulatory research (Hofer, Yu & Pintrich, 1998; Zeidner et al., 2000; Zimmerman, 1994) as although some researchers have used qualitative methodology (Evensen, Salisbury-Glennon & Glenn, 2001; Pressley, Van Etten, Yokoi, Freebern & Van Meter, 1998), quantitative methods have been the favoured approach in the study of self-regulated learning (Schunk & Zimmerman, 1994). Quantitative methods have also been the dominant methodology used in the investigation of the first year Bachelor of Nursing programs. Therefore in this thesis a multimethod approach was used, that is it incorporated questionnaires (quantitative) and interview (qualitative) methodology in the research design. The questionnaires enabled the researcher to survey a significant number of students from three university campuses and to examine statistically the research areas central to this thesis, whereas the interviews enabled the researcher to talk to students and academics involved in the Science and Nursing Practice courses to identify specific areas not covered in the questionnaires and to expand our understanding of the research results/findings.

1.4 Aims of the Study

The overall aim of this study was to examine the interrelationships among nursing students' entry characteristics and self-regulated learning (motivation and cognition) and academic performance in their Science and Nursing Practice courses for the first year of their Bachelor of Nursing program. An adapted version of the Pintrich and Schrauben (1992) general social cognitive model of motivation and cognition was used to guide the examination of these interrelationships.

Additional aims of the study included:

- To identify and understand students' entry characteristics that are related to students' self-regulated learning and academic performance in their first year Science and Nursing Practice courses.
- To examine and understand students' motivation—self-efficacy, and value/relevance—for their first and second semester Science and Nursing Practice courses.
- To measure and to identify the learning strategies students report using for their Science and Nursing Practice courses and to identify changes, if any, that students report making to these strategies.

1.5 Research Questions

From the research aims six research questions were formulated. Question 1 is based on the overall aim of the study and is therefore the pivotal question in this thesis. Based on the literature, some of the results to these questions can be anticipated, and these are called research expectations and can be found in the appropriate results chapters.

Overall Aim 1

To examine the interrelationships among nursing students' entry characteristics and self-regulated learning (motivation and learning strategies) and academic performance in their Science and Nursing Practice courses for the first year of their Bachelor of Nursing program.

Main Research Question 1

1) What are, and what can we understand about the interrelationships among students' entry characteristics, self-regulated learning and academic performance for their first year Science and Nursing Practice courses.

Aim 2

To identify and understand students' entry characteristics that are related to students' self-regulated learning and academic performance in their first year Science and Nursing Practice courses.

Research Questions

2) What student entry characteristics are related to students' self-regulated learning and academic performance in their first year Science and Nursing Practice courses?

3) What can we understand about students' entry characteristics and their relationship to students' self-regulated learning and academic performance for their first year Science and Nursing Practice courses?

Aim 3

To examine and understand students' motivation—self-efficacy and value/relevance—for their first and second semester Science and Nursing Practice courses.

Research Questions

4) What are, and what can we understand about, students' motivation (self-efficacy/self-beliefs/expectations and value/relevance perceptions) for their first semester Science and Nursing Practice courses?

Aim 4

To measure and to identify the learning strategies students report using for their Science and Nursing Practice courses and to identify changes, if any, that students report making to these strategies.

Research Questions

5) What is the relationship between students' cognition (MCSR and CT) and their academic performance for their first year Science and Nursing Practice courses?

6) What are the learning strategies students report using for their first Science and Nursing Practice courses?

7) What changes, if any, do students report making in the second semester when studying for their Science and Nursing Practice courses?

1.6 Brief Overview of Method

In this thesis the interrelationships among students' entry characteristics, self-regulation and academic performance for the Science and Nursing Practice courses of first year Bachelor of Nursing programs are examined. A multimethod approach, that is, one that combined survey and interview methodology was used, with the results triangulated where possible. Students from three university campuses were surveyed, by questionnaire, early in the first semester and at the end of the second semester of their first year. The structured questionnaire contained several research instruments pertaining to self-efficacy and self-regulated learning, and items relating to students' entry characteristics. The questionnaire had a consent form and students were asked to give permission for the collection of their academic marks/grades for their first year courses. Students were also asked to provide their telephone number and a sample of these students was interviewed, by telephone, in the first semester and at the end of their second semester. The telephone interviews were semi-structured and students talked about the learning strategies they use for their Science and Nursing Practice courses and their self-beliefs/expectations for these courses and their perceptions of their relevance to clinical practice.

To expand our understanding of the research results pertaining to students' course entry characteristics, face-to-face semi-structured interviews were conducted with ten academics involved in the teaching/tutoring of the Science and Nursing Practice courses. The research design and method used in the study are discussed in detail in Chapter 4.

1.7 Limitations of the Study

- Whilst nursing students from three university campuses were examined in this study, caution should be taken in making generalisations of the results/findings to other nursing students.

- Although the Cronbach alphas calculated for this study indicated that the Motivated Strategies for Learning Questionnaire scales had good internal consistency, it should be remembered that the scales were designed to be used by American college students.

- Not all students gave consent for the collection of their academic marks/grades and therefore results pertaining to academic performance only represent a sample of the students enrolled in those courses.

- The telephone interview sample of students was chosen to be as representative of the questionnaire sample as feasible but caution should be made when making generalisations from this sample of students to other student cohorts.

- Not all academics involved in the Science and Nursing Practice courses were interviewed and care should be taken in generalising the findings to all academics.

- The subject numbers used in the structural equation modeling were in the minimum range acceptable (see 4.7.3) and caution should be used in the interpretation of these results.

1.8 Outline of the Thesis

In this chapter the research background, problems, aims and limitations of the study have been introduced. In Chapter 2 the theoretical framework of the study is discussed and in Chapter 3 the literature relevant to this thesis is reviewed. The research method for the study is outlined in Chapter 4, with an emphasis on the quantitative method. Chapter 5 outlines the qualitative methods (interviews) used in the thesis. Chapters 6, 7 and 8 contain the results for the study. Chapter 6 is concerned with the results for students' entry characteristics, Chapter 7 with the results for motivation and Chapter 8 contains the results regarding students' cognition for their Science and Nursing Practice courses. Models of the interrelationship among students' entry characteristics, motivation, cognition and academic performance can be found in Chapter 9. A discussion of all the results, is contained in Chapter 10 which also contains the conclusions and recommendations arising from the study reported in this thesis.

Chapter 2

THEORETICAL FRAMEWORK

2.1 Introduction

In chapter one self-regulation was defined as students who are "metacognitively, motivationally and behaviorally active participants in their own learning process" (Zimmerman, 1986, p. 308). These three components—metacognition (or cognition), motivation and behaviour—are found in a variety of models of self-regulated learning (Hofer, Yu & Pintrich, 1998; Zeidner et al., 2000). Models of self-regulated learning can provide a basis for understanding how these components of self-regulation and the various constructs within them may interact and influence students' academic performance in university courses.

One model of self-regulation found in the literature is a general social cognitive model of motivation and cognition described by Pintrich and his colleagues (Garcia & Pintrich, 1994; Pintrich, 1988; Pintrich, 1994b; Pintrich & De Groot, 1990; Pintrich & Garcia, 1994; Pintrich & Schrauben, 1992). This conceptual viewpoint encompasses various cognitive and motivational constructs emphasising the self to explain self-regulation at the classroom level (Pintrich & Schrauben, 1992). In the model students' motivation and learning are not seen as global learning behaviours (cf Kolb) or traits (cf Myer-Briggs) but as "situation-specific" (Pintrich &

Schrauben, 1992, p. 153) with all students having the potential to develop self-regulation, irrespective of their personal, social or academic background (Pintrich, 1995).

The general model (Pintrich, 1988; Pintrich & De Groot, 1990; Pintrich & Schrauben, 1992) has evolved in the literature and various adaptations have been presented—for example the inclusion of self-schemas (Garcia & Pintrich, 1994)—although motivation and cognition continue to be integral components of the models. In this chapter the motivational and cognitive components of the general social cognitive model of motivation and cognition (self-regulated learning) as proposed by Pintrich (Pintrich, 1988; Pintrich & De Groot, 1990; Pintrich & Schrauben, 1992) are outlined (2.2 and 2.3). The Motivated Strategies for Learning Questionnaire is an instrument that has been used in research to examine the interrelationships between social cognitive constructs and academic performance and this instrument is briefly discussed in 2.4. In this thesis the Pintrich and Schrauben (1992) model was adapted to assist in the examination of students' self-regulated learning in Science and Nursing Practice courses. The Pintrich and Schrauben model is discussed in 2.5 and the adapted model used in this thesis is given in 2.6. The literature pertaining to the model constructs, including that pertaining to self-regulated learning and nursing, is contained in Chapter 3 (Literature Review).

2.2 General Social Cognitive Model of Student Motivation

2.2.1 Introduction

In a general social cognitive model, students' motivation is based on a general expectancy-value model (Pintrich, 1988) and is considered to consist of expectancy, value and affective components (Pintrich & De Groot, 1990; Pintrich & Schrauben, 1992).

2.2.2 Expectancy

Expectancy, from a general social cognitive perspective, is comprised of self-efficacy and control beliefs (Pintrich & Schrauben, 1992) with the pivotal concern being students' responses to the question "Can I do this task?" (Pintrich & Schrauben, 1992).

Self-Efficacy Beliefs

Aspects of self-efficacy (Bandura, 1986) and expectancy for success (Eccles, 1983) theories are incorporated into the area of self-efficacy beliefs in a general social cognitive model, with self-efficacy defined as students' beliefs about their ability to learn and understand the course material in order to be successful in that class (Pintrich & Schrauben, 1992). This definition of self-efficacy differs from the social cognitive perspective where self-efficacy may be defined as students' beliefs about their capabilities to perform a task (Bandura, 1986).

Control Beliefs

Control from a general social cognitive perspective is based on Connell's (1985) measure of internal control with course outcomes considered to be influenced by a student's personal effort (Pintrich & Garcia, 1991). For example, nursing students who believe that their assignment or course grades are a result of their own effort will perform better in their nursing program than students who believe that the academics marking the assignment or teaching the course are responsible for their performance (Pintrich & Schrauben, 1992).

2.2.3 Value Components

Value components from a general social cognitive viewpoint, includes two areas—goal orientation beliefs and task value—with students' responses to the question "Why am I doing this task?" (Pintrich, 1994b; Pintrich & Schrauben, 1992) the major concern of this component.

Goal Orientation Beliefs

In a general social cognitive model, students' goal orientation beliefs are indicative of their reasons for participating in a course (Pintrich & Schrauben, 1992). There are two types of goal orientations—intrinsic and extrinsic. Students who participate in a course for external reasons, such as grades or to please others such as family, are thought to have extrinsic goal orientation beliefs, whilst those who participating in a course for learning and mastery reasons have intrinsic orientation beliefs (Pintrich & Schrauben, 1992). For example, a nursing student with an extrinsic orientation may be participating in a Nursing Practice course so that the student can get the grades necessary to register as a nurse. On the other hand, a student who wants to understand and master the course material in order to be a well prepared and efficient nurse is considered to have an intrinsic goal orientation. The two types of goal orientations are not considered to be mutually exclusive as students may hold both orientations simultaneously, although the strength of the goals may vary (Pintrich & Garcia, 1991).

Task Value

Task value is concerned with students' responses to the overall question "What do I think of this task?" (Pintrich, Smith, Garcia & McKeachie, 1991). It is comprised of three components which have been adapted from those proposed by Eccles (Eccles, 1983) and include perceptions of the interest ("How interesting is the task to me?"), importance ("How important is the task to me?"), and utility of the task ("How useful is the task to me?") to a student (Pintrich, 1994b).

The interest component, is concerned with a student's personal "attitude or liking for a task" (Pintrich, 1994b, p.32) although it may be influenced by the situational aspects of the task (Pintrich & Schrauben, 1992).

The importance component is concerned with students' perceptions of the "importance, significance, or salience" of the task to them (Pintrich & Schrauben, 1992, p.158). The importance that a student assigns to a task may influence the student's degree of involvement in that task.

Utility refers to a student's perceptions of the usefulness of the task to them which may be in the immediate or future situations (Pintrich, 1994b). Utility has been described as being aligned to students' "extrinsic beliefs". For example, nursing students may judge whether a university course will help them achieve their goal of becoming a nurse (Pintrich & Schrauben, 1992).

2.2.4 Affective Component

The affective component is concerned with students' responses to the question "How do I feel about this task and my performance?" (Pintrich & De Groot, 1990; Pintrich & Schrauben, 1992). In a general social cognitive model the affective component includes areas such as test anxiety, attributional theories (Weiner, 1986) and emotional needs such as self-esteem (Pintrich, 1994b). The affective component is not a focus of this thesis and therefore the reader is advised to refer to Pintrich (1994b) for a more detailed discussion of this aspect from a general social cognitive viewpoint.

2.3 General Social Cognitive Model of Student Cognition

2.3.1 Introduction

A general social cognitive model of student cognition, contains three components—knowledge, learning strategies and thinking strategies (Pintrich, 1988; Pintrich & Schrauben, 1992).

2.3.2 Knowledge

From a general social cognitive perspective, knowledge refers to students' cognitive organisation of the "content and structure" (Pintrich, 1988, p.66) of a course. For example, students studying in a Science course in a nursing program, will be expected to learn the content knowledge of that course. However, to retain this knowledge after the course has been completed students need to integrate it with their prior knowledge, that is, they need to create cognitive structures (Pintrich, 1988).

2.3.3 Learning Strategies

Learning strategies can be defined as "any thoughts, behaviors, beliefs, or emotions that facilitate the acquisition, understanding, or later transfer of new knowledge and skills" (Weinstein, Husman & Dierking, 2000, p.727). Incorporating the work of Weinstein and Mayer (1986), a general cognitive model of cognition includes three categories of learning strategies—cognitive, metacognitive, and self-regulatory and resource management strategies (Pintrich, 1988; Pintrich & Schrauben, 1992). Explanations and examples of the strategies found within these categories are shown in table 2.1.

2.3.4 Thinking Strategies

From a general social cognitive perspective thinking strategies are those strategies used by students when they apply knowledge they already have to problem solve or critically evaluate a new or different situation (Pintrich et al., 1991). In nursing, for example, the performance in the clinical setting, of the clinical skills that students have been taught in a nursing laboratory in their Nursing Practice course, may require problem solving or critical thinking strategies if those skills are to be performed effectively.

Table 2.1

Explanations and examples of learning strategies

Cognitive Strategies	Assist with encoding of new material to be learnt, integration of new material with previous knowledge, organisation of memory, promotion of long-term memory storage and retrieval of material from memory.
Rehearsal Strategies	Repetition of material to be learnt (may be verbal, written or imagery) which keeps the information in short-term memory. a) *recitation* ie saying material to be learnt over and over again b) *underlining/highlighting* material to be learnt without reflecting on the material being learnt c) *copying material*, eg from a book, without reflecting on the material being copied d) *rewriting* notes from books or lectures without reflecting on the notes being rewritten
Organisation Strategies	Assist students to select appropriate material to be learnt and make connections among them. a) *clustering* eg drawing together related points in material being learnt b) *identifying main ideas* from material being learnt c) *outlining* material being learnt d) *networking* eg making a map, network or chart of the important points/areas being learnt (cf concept maps) e) *making diagrams* of material being learnt f) *mnemonics* eg using a rhyme to learn material
Elaboration Strategies	Assist students to organise and incorporate new material being learnt with prior knowledge resulting in the promotion of long-term memory storage of material. a) *summarising* material being learnt b) *paraphrasing* ie putting material being learnt into own words c) *making analogies* of material being learnt d) *generative note-taking* eg organising and relating concepts in material being learnt to make notes e) *imagery* eg creating pictures of material being learnt f) *question asking and answering* eg answering questions, asked by a friend, about material being learnt g) *explaining material being learnt to someone else* eg a friend

Reference: Pintrich, 1988; Pintrich & Schrauben, 1992; Weinstein & Mayer, 1986

Table 2.1 (cont)

Explanations and examples of learning strategies

Metacognitive and Self-Regulation Strategies	Assist students to prepare to learn new material, and to check their understanding of that material and to adjust their strategies accordingly. Includes planning, monitoring and regulating strategies.
Planning Strategies	Assist students to judge appropriate cognitive strategies to be used when learning new material and activate recall of relevant stored knowledge. a) *setting goals* of material to be learnt b) *skimming* text before reading it in detail c) *question generation* eg formulating questions before reading a text d) *analysing task* first before beginning task
Monitoring Strategies	Assist students to track their comprehension and understanding of material being learnt and alert student to discrepancies that may need self-regulation. a) *self-testing* eg using questions to determine level of comprehension/understanding of material being learnt. b) *attention awareness* eg monitoring level of attention when reading a text c) *test-taking strategies* eg monitoring time allocated to answering questions in an exam and adjusting pace as necessary
Regulating strategies	Assist students to adjust study behaviour and attend to discrepancies in comprehension or understanding of material being learnt. a) *reviewing knowledge/strategies* eg re-reading a text if a students has recognised that they have not understood some of the material being read b) *adjusting strategies* eg modifying or changing strategies to improve comprehension and understanding of the material being learnt such as decreasing reading pace if the material being read is difficult.

References: Pintrich, 1988; Pintrich & Schrauben, 1992; Weinstein & Mayer, 1986

Table 2.1 (cont)

Explanations and examples of learning strategies

Resource Management Strategies	Assist students to control resources available including time, environment, effort and support from others to maximise learning.
Time Management	Assist students to manage their time to maximise learning. b) *making study plans* to maximise use of available time b) *setting goals* of material to be learnt in allocated study time
Environment Management	Assist students to manage their study environment to maximise learning a) *study area* ie choosing suitable area in which to study material being learnt
Effort Management	Assist student to control their effort to maximise learning. a) *attributions* ie considering learning due to own effort b) *persistence* ie adhering to study irrespective of the nature (eg boring, difficult, tedious) of the material being learnt c) *self-reinforcement* eg rewarding self for effort in learning
Support from others	Assist students to seek and control support from appropriate "others" eg lecturers, tutors or peers to help with their understanding or learning. a) *seeking help from lecturers, tutors and or peers* to assist with learning or the understanding of material being learnt b) *group/peer learning* ie studying material being learnt with group of peers c) *receiving tutoring* for material being learnt

References: Pintrich, 1988; Pintrich & Schrauben, 1992; Weinstein & Mayer, 1986

2.4 The Motivated Strategies for Learning Questionnaire

Developed by Pintrich and colleagues (Pintrich, Smith, Garcia & McKeachie 1993), and based on a general social cognitive view of motivation and learning strategies, the Motivated Strategies for Learning Questionnaire (MSLQ) "is a self-report instrument designed to assess college students' motivational orientations and their use of different learning strategies for a college course" (Pintrich et al., 1993, p.801). The MSLQ has played an important research role, with the development and refinement of general social cognitive models of motivation and cognition, as it has given researchers a means of examining the relationship between students' motivation and their learning strategy use (Pintrich & Schrauben, 1992). It is not surprising, therefore, that the MSLQ has been a popular instrument for research purposes (Winne & Perry, 2000).

The development of the MSLQ began formally in 1986 and refinement and testing of the items and psychometric properties of the instrument continued for a number of years (Pintrich et al., 1993). For a discussion of the development and a description of the MSLQ see the manual (Pintrich et al., 1991) or Pintrich et al. (1993). Other sources of discussion about the MSLQ recommended include Pintrich (1988), Pintrich and Schrauben (1992), Garcia and Pintrich (1996) and Winne and Perry (2000). The final version of the MSLQ has 81 items and is divided into two sections—motivation and learning strategies (Pintrich et al., 1991). The motivation section contains a value component with intrinsic and extrinsic goal orientation scales and a task value scale (Pintrich et al., 1991). It also contains an expectancy component with control of learning beliefs, and self-efficacy for learning and performance scales, and an affective component with a test anxiety scale (Pintrich et al., 1991). The learning strategies section contains cognitive and metacognitive strategies with rehearsal, elaboration, organisation, critical thinking and metacognitive self-regulation scales (Pintrich et al., 1991). This section also contains resource management strategies with time and study environment, effort regulation, peer learning and help seeking scales (Pintrich et al., 1991).

2.5 Pintrich and Schrauben Model (1992)

In 1992, Pintrich and Schrauben (1992) proposed a model for motivation and cognition in the classroom context (see Figure 2.1). The model is based on the general social cognitive framework which has already been presented (2.2, 2.3). However, in addition to motivational and cognitive components, this model also includes student entry characteristics, task characteristics and instructional processes and student involvement in learning components. This conceptual model (Pintrich & Schrauben, 1992) includes the framework for the predicted interrelationships among the model components and academic achievement in the classroom.

In this model (Figure 2.1) students' entry characteristics are thought to include students' "demographic characteristics, personal beliefs, motivational beliefs, prior knowledge, cognitive strategies, prior achievement levels" (Pintrich & Schrauben, 1992, p.152) and these are perceived as interacting with all of the models' components except for student involvement in learning.

The task characteristics component includes the content, product, procedures and resources related to the task and instructional processes in the classroom and is thought to include the teaching methods, teacher behaviour, and grading practices in the classroom. Task characteristics and instructional processes are thought to interact with each other, to be influenced by students' entry characteristics, and to interact with motivation, cognition and academic achievement.

The component on student involvement in learning is conceptualised as being influenced by the motivation and cognitive components of the model and, in turn, to influence academic achievement.

Motivation and cognition are thought to interact with each other and to be influenced by student entry characteristics, task characteristics and instructional processes and to influence students' involvement in learning and academic achievement.

Academic achievement is conceptualised as being influenced by students' entry characteristics, motivation, cognition and involvement in learning.

As Pintrich and Schrauben (1992) were primarily concerned with the motivational and cognitive components, including their relationship to academic performance, the first other components (student entry characteristics, task characteristics and instructional processes and student involvement in learning) are only briefly mentioned (Pintrich & Schrauben, 1992). Pintrich (1994b) and Pintrich and Garcia (1994) have also proposed models based on a general social cognitive view of motivation and cognition, however, these models exclude students' entry characteristics. As student entry characteristics is one of the areas of concern in this thesis and as the Pintrich and Schrauben (1992) model includes this area, it was chosen to assist in the examination of the interrelationships among students' entry characteristics, motivation, cognition and academic performance with respect to first year Science and Nursing Practice courses.

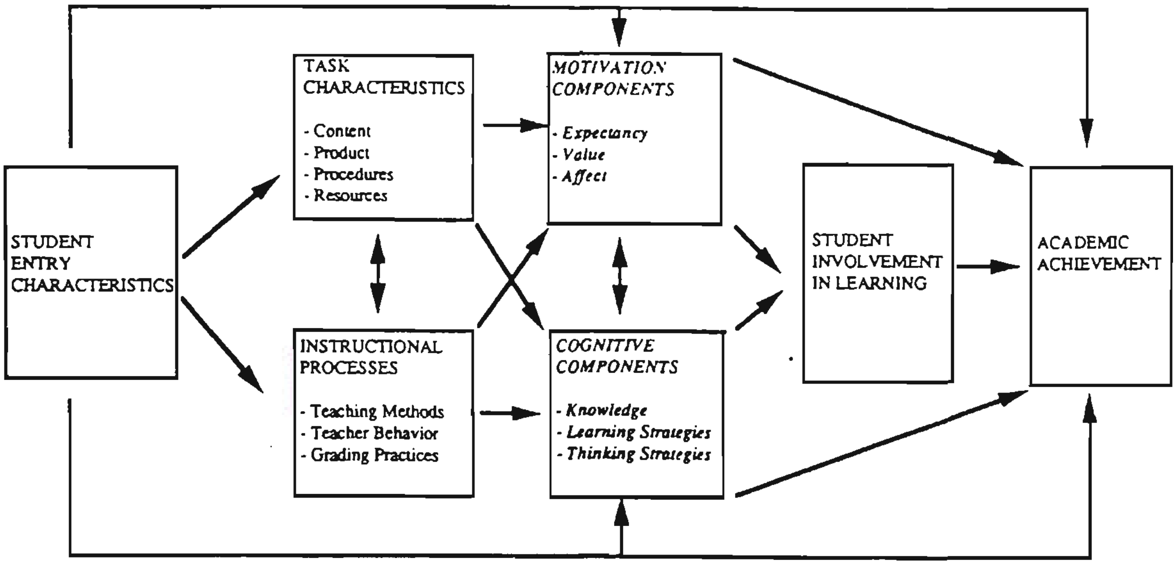


Figure 2.1 *"Conceptual framework for motivation and cognition in the classroom context" from Pintrich and Schrauben (1992, p. 82)*

2.6 Model for this Thesis

This thesis proposes to examine the interrelationships among nursing students' entry characteristics, motivation (self-efficacy, value/relevance), learning strategies and academic performance for their first year Science and Nursing Practice courses. The model used in this thesis was adapted from the Pintrich and Schrauben (1992) general social cognitive model of motivation and cognition in the classroom context.

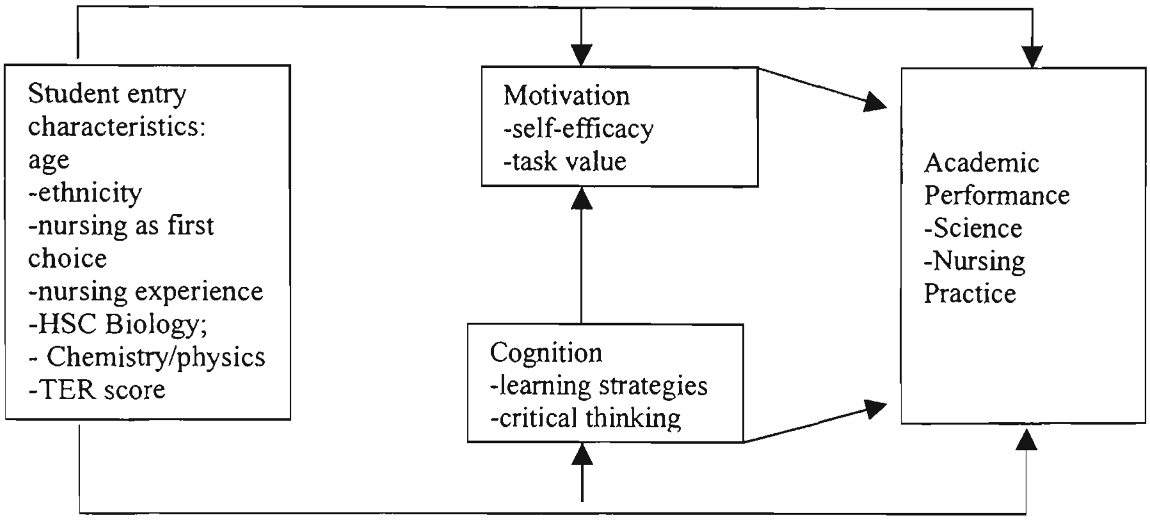


Figure 2.2 *Proposed model of self-regulated learning in first year Science and Nursing Practice courses adapted from Pintrich and Schrauben (1992, p. 82)*

The model used in this thesis is shown in Figure 2.2. Student entry characteristics refers to those characteristics that students have on entry to their Bachelor of Nursing program. In Chapter 1 the heterogeneity of Australian nursing students was discussed, and it was decided to include this area of the model in this thesis to investigate the relationship between students' entry characteristics and their self-regulated learning and academic performance in their nursing program. Based on the literature, the characteristics chosen to be examined were: whether nursing was a student's first choice, prior nursing experience, and students' demographic/academic/ethnicity characteristics and their beliefs about nursing and science. It is proposed to examine whether these characteristics are related to motivation and cognition and academic performance.

The motivation components of the Pintrich and Schrauben model (1992) included expectancy (self-efficacy and control beliefs) and value components (goal orientation, task value beliefs) and affect, with the expectancy component referring to students' beliefs about their capability to do the course, value to the goals (goal orientation) and "importance, utility or interest of a task" (task value) (Pintrich & Schrauben, 1992, p.155) and affect to students' personal feelings about the task and their behaviour. In this thesis, self-efficacy and task value were examined, but affect was not examined. Self-efficacy relates to students' self-perceptions of their ability to perform a task or behaviour (Bandura, 1986). In the Pintrich and Schrauben (1992) model, self-efficacy is defined in a broad manner to encompass students' capabilities to understand and learn the course material. As broad measures of self-efficacy may be predictive of more generalised self-efficacy than specific measures, discipline-specific self-efficacy measures were also used in this thesis (Bandura, 1986; Pajares, 1996). Self-efficacy has been found to be related to academic performance in nursing courses (Chacko & Huba, 1991) and Science courses (Andrew, 1998) in nursing programs. Task value includes issues of relevance in this thesis and was included as students have been found to judge the relevance/task value of a course based on their beliefs about the applicability of its contents to nursing practice (Jordan et al., 1999; Thornton, 1997). The proposed model for this thesis suggests that students' motivation is influenced by their entry characteristics and is related to students' learning strategy use and academic performance for their Science and Nursing Practice courses.

The cognitive components of the Pintrich and Schrauben (1992) model include knowledge (about content and strategy use) and learning and thinking (for example critical thinking) strategies. Pintrich and Schrauben (1992) concentrate on the learning strategies area of this component, which is further subdivided into cognitive (rehearsal, elaboration, organisation) and metacognitive and self-regulatory learning strategies (planning, monitoring, self-testing, resource management). Cognition in the model proposed for this thesis concentrates on learning strategies (cognitive, metacognitive and self-regulatory), although it includes critical thinking. Cognition is predicted to be influenced by students' entry characteristics, and to be related to motivation and students' academic performance for their first year Science and Nursing Practice courses.

The task characteristics and instructional processes found in the Pintrich and Schrauben (1992) model, were not included in the proposed model for this thesis, however, in order to understand the first year Science and Nursing Practice courses, aspects of these processes can be found in Chapter 4.

In summary, in this thesis an adapted version of the Pintrich and Schrauben model (1992) was used as a guide to examine how nursing students' entry characteristics, self-regulated learning (motivation and cognition) and academic performance are interrelated with respect to the Science and Nursing Practice courses of first year Bachelor of Nursing programs.

Chapter 3

LITERATURE REVIEW

3.1 Introduction

In the previous chapter the Pintrich and Schrauben model (1992) of motivation and cognition, which provides the conceptual framework for this thesis, was introduced and discussed including the areas of this model that this thesis proposes to examine. In this chapter, literature drawn from educational psychology both general and specific to self-regulation, nursing and science literature are used to discuss the various aspects of the proposed model for this thesis in an effort to justify their inclusion or exclusion from the model. Much of the nursing literature in this chapter relates to the Science courses as there is little nursing literature pertaining specifically to Nursing Practice type courses. Where possible Australian nursing literature has been included in this chapter.

3.2 Students' Entry Characteristics

3.2.1 Introduction

In Chapter 1, the heterogeneous nature of nursing students' backgrounds nowadays was introduced. This is not specific to the Australian nursing scene as similar findings have been reported for the UK (Kinsella, Williams & Green, 1999; Ofori, 2000) and USA (Griffiths & O'Connor, 1995). In this section, some aspects of students' background will be examined namely: age, gender, academic entry characteristics including TER Score, and ethnicity.

3.2.2 Age

Whilst nursing students in Australia were traditionally aged 17-20 years (Neill & Barclay, 1989; Wright, 1988), nowadays, from 30 to approximately 50% of nursing students may be older than 17-20 years (Andrew, 1995; Lawler et al., 1997; Wright, Frew, Hatcher & Mok, 1996). Many of these "older" students may have obtained entry into nursing programs via special schemes such as mature age entry and therefore may not have the same educational background as younger students (Lawler et al., 1997).

It has long been recognised that mature age or older students have had a tendency to perform well in nursing courses (Petrie & Powell, 1951) and this trend appears to have continued (Houltram, 1996; Murray-Harvey, 1993; Ofori, 2000). Moreover, older students may out-perform academically younger students, irrespective of whether or not they have the same academic entry characteristics as younger students (Houltram, 1996; Ofori, 2000).

Houltram (1996), for example, examined the academic background of students enrolled in a nursing program and found that, irrespective of whether older (22+ years) students had the requisite academic entry qualifications, they were academically more successful in their courses than younger (17-21 years) students.

Ofori (2000) compared age and entry qualifications of pre-registration diploma of nursing students in relation to their academic performance in the biological, sociological and behavioural modules. The students in the study were divided into five age groups with the youngest (non-mature) age group (<20 years) more likely, than the oldest (very mature) group (>34 years), to have studied Biology to "O level" at high school (Ofori, 2000). The results indicated, however, that this academic qualification did not give the non-mature students an advantage in the biological module, as the very mature students obtained statistically significantly higher grades than the non-mature students, in this module (Ofori, 2000).

In a study that concentrated on only a Science course in a nursing program, Caon and Treagust (1992) found that older students were more successful in these courses although they have not studied Biology at HSC (or equivalent) level. Similarly, another study of science courses in a first year nursing program found that older students were less likely than younger students to fail their science courses (Khytense & Beanland, 1994). The maturity and intrinsic motivation that older students possess on entry to nursing programs have been recognised as factors in these students' academic behaviour in nursing programs (Lowry, 1992).

3.2.3 Gender

The majority of students entering nursing courses in Australia are likely to be female (Andrew, 1994; Department of Education, 2000; Lawler et al., 1997). In 1999, the percentage of males who commenced nursing courses was 14.8% for NSW and 13.5% for Australia, with ACT (21.4%) having the largest intake and Western Australia (10.1%) the lowest (Department of Education, 2000).

Gender differences may influence students' motivation in science. In the educational psychology literature DeBacker and Nelson (1999), for example, examined the motivation, effort, persistence, achievement and gender differences of high school students enrolled in a biology class. Whilst for males, higher academic achievement was influenced by their learning goals and values, for females, academic achievement was particularly influenced by their beliefs about their perceived ability which was also strongly related to effort and persistence (DeBacker & Nelson, 1999). The authors suggest that one way of assisting female students with their science courses is to help them to "identify and become committed to goals and values related to science learning" which is necessary "to defuse the very strong and debilitating link between perceived ability in science and science effort, persistence and achievement" (DeBacker & Nelson, 1999, p. 90). Differences, related to gender, have also been found in students' self-regulated learning (Niemivirta, 1997; Zimmerman & Martinez-Pons, 1990), nursing students' attitudes (Lumb & Strube, 1993) and self-efficacy for science (Andrew, 1994). Andrew (1994) found that not only females, but also male nursing students who had more feminine characteristics, had lower self-efficacy for science. This indicates that some males in Science courses may have similar self-perceptions in science as female nursing students.

The small percentage of males in nursing courses and the fact that some may have similar difficulties with science as female nursing students indicates that it may be difficult to examine gender differences in self-regulated learning in nursing programs.

3.2.4 Academic Entry Characteristics

TER Score

Discussions about students' academic entry characteristics in nursing may centre around their TER score or the individual subjects that students have studied at high school. Students entering Australian nursing programs may be selected on the basis of a composite score of their final high school academic performance. In NSW this score, which is out of 100, is called the TER with a low score indicating poor performance and a high score indicating a stronger academic performance. Results for relationship between students' TER scores (or equivalent) have been variable as predictors of students' academic performance in first year nursing programs. Both students' TER scores and academic entry characteristics have been discussed in detail in Andrew (1995).

Nursing students generally have low TER scores with 68.25% of nursing students applying to a NSW pre-registration nursing program in 1997 having TER scores less than 50 (Lawler et al., 1997, p. 9). Some early research (Chang, 1978) found that students with high entry scores (TER equivalent scores) were always successful in their nursing examinations and those with lower entry scores tended to fail a majority of their examinations. Later research, however, has had variable results, for example, whilst some researchers have found students' TER scores predictors of their academic performance in nursing programs (Burgum, Martins & Northey,

1993) others have not found them to be predictors of academic performance (Andrew, 1995; Khytense & Beanland, 1994).

Science Background

Many nursing students begin their nursing courses with a limited science background (Nicoll & Butler, 1996). In Australia, many students entering nursing programs may have studied Biology (Andrew, 1995; Bishop, 1990; Kershaw, 1990) but although they may have studied Biology, their academic performance in it may have been modest (Bishop, 1990; Chang, 1978; Kershaw, 1990). Few nursing students are likely to have studied chemistry or physics at high school (Andrew, 1998; Bishop, 1990; Kershaw, 1990) and therefore there have been few Australian studies examining these high school subjects in relation to nursing students' academic performance in their Science courses in nursing programs.

The modest performance of nursing students in their HSC Biology courses may help to explain why, in keeping with the results for students' TER scores, the results pertaining to its relationship to students' academic performance in their science courses have also been variable (Caon & Treagust, 1992; Kershaw, 1989; 1990). In 1978, Chang found that students who had obtained less than 43% in their HSC Biology tended to fail their first year Anatomy and Physiology courses and recommended that this percentage be set as a minimum entry requirement. Some researchers suggest that HSC Biology is a predictor of nursing students' academic performance in first year science courses (Caon & Treagust, 1992) whilst others disagree (Kershaw, 1990).

Students in the UK, like Australia, may have varying backgrounds in high school science (Trnobranski, 1993), and students with a degree or science background (A levels or GCSE in science) were found less likely to describe having difficulty with their bioscience courses in the first year of pre-registration nursing courses and academic courses (Jordan et al., 1999).

In a USA nursing study, pre-nursing biological science GPA was found to be a strong predictor of students' GPA and also of their performance in their registration exam (NCLEX-RN) (Yang, Glick & McClelland, 1987). Griffiths and O'Connor (1995) formulated an anatomy and physiology screening test which they administered to students transferring to their nursing program. They found that the score on this test was weakly related to students' GPA. The authors suggest that the relationship was weak because students may not have had an adequate background in science to begin with, or, that they had not had a chance to apply the knowledge since completing their science courses (Griffiths & O'Connor, 1995).

In addition to its possible relationship with academic performance, students' science background may have an influence on students' anxieties and self-efficacy for their Science courses in their nursing programs. Students who had not studied science at high school have been described as more likely to experience anxiety with the biological sciences in their nursing programs (Akinsanya & Hayward, 1980).

Andrew (1998) found that nursing students were more likely to have studied biology than chemistry or physics in their final year at high school and that students who had studied some science (chemistry, physics, biology or general science) had higher self-efficacy for science than those who had not studied any science in their final year at high school.

3.2.5 Ethnicity

General

There has been a tendency for self-regulated learning research to focus on Western culture (Purdie et al., 1996; Zeidner et al., 2000) but a number of studies have sought to address this situation (Chye, Walker & Smith, 1997; Purdie & Hattie, 1996; Purdie et al., 1996; Rao, Moely & John, 2000).

To determine students' learning strategy use and conceptions of learning, Purdie et al. (1996) surveyed, by questionnaire, Australian and Japanese high school students studying in their respective countries. Researchers (Purdie et al., 1996) used a modified form of the Learning and Strategy Interview Schedule (Zimmerman & Martinez-Pons, 1988) to determine strategy use, and open-ended questions to investigate students' conceptions of learning. Using phenomenographic (qualitative) analysis, nine categories of students' conceptions of learning were identified with learning seen as: increasing one's knowledge; memorising, reproducing and studying; a means to an end; understanding; seeing something in a different way; a duty; personal fulfilment; process not bound by time or context; and developing social competence (Purdie et al., 1996, pp. 93-94). Whilst these categories were common to both cultural groups, Japanese students mainly saw learning as increasing one's knowledge and as a personal fulfillment, but Australian students saw learning as memorising, reproducing and studying first, then as understanding (Purdie et al., 1996). The strategies most frequently reported to be used by both cultural groups were environmental structuring and self-evaluating (Purdie et al., 1996). Japanese students were more likely, than Australian students, to report using rehearsing and memorising strategies, but less likely to use the "seeking teacher assistance" strategy (Purdie et al., 1996). Australian students were more likely than

Japanese students to report using the goal setting and planning strategy and students from both cultural groups who had a conception of learning as understanding reported using more learning strategies than those who did not hold this conception of learning (Purdie et al., 1996).

Whereas the above study by Purdie and colleagues (1996) used open-ended questions to examine cultural differences in learning strategies used by two groups of high school students studying in their respective countries, the study by Purdie and Hattie (1996) included a third group of students—Japanese students studying in Australia—and employed interview methodology to examine these differences. This study also examined students' strategy use in relation to academic achievement.

The type of strategies used by each group were the same although the frequency that these strategies were used varied between groups (Purdie & Hattie, 1996). For example, whilst environment structuring and self-evaluation were amongst the three main learning strategies used by each of the groups of students, for the Japanese students memorisation was another main strategy used, whereas goal setting and planning and reviewing notes were important, respectively, for the Australian and the Japanese students studying in Australia (Purdie & Hattie, 1996). There were more differences in strategy use between the Japanese students studying in Australia and the Japanese students studying in Japan than between the former group of students and the Australian students, indicating that Japanese students studying in Australia appeared to have made changes to the way they studied (Purdie & Hattie, 1996). Purdie and Hattie (1996) found that, irrespective of the cultural group, high achieving students used more strategies.

Using a modified version of the MSLQ to survey three groups of tertiary students—Australian, Singaporean and Singaporean students studying in Australia—Chye et al. (1997), like Purdie and Hattie (1996), found that there were more similarities between Australian and Singaporean students studying in Australia than between Australian and Singaporean students studying in their home country. Chye et al. (1997) also examined the interrelationships between self-efficacy, self-regulated learning and academic achievement and found that students with strong self-efficacy beliefs used more learning strategies and had higher academic performance than those students whose self-efficacy beliefs were not as strong. With regard to culture, Chye et al. (1997) found that whilst it was related to strategy use, the relationship between self-efficacy and the utilisation of learning strategies was stronger, with the researchers concluding that "...individual differences such as self-efficacy, seem to be a better predictor of strategy use than are group differences like culture" (Chye et al., 1997, p. 11). Others have also found that students' academic background, motivation and learning strategy use were better predictors of students' academic achievement in a first year organic chemistry course than students' ethnicity (Garcia, Yu & Coppola, 1993).

Nursing

Australia is a nation made up of people from many different countries around the world. In the last twenty years there have been concerns in Australia that the cultural needs of persons from non-Western cultures were not being met by the predominantly "Anglo-Australian" health system (Blackford & Street, 2000; Kanisaki, 1983; 1998) and that one of the ways to meet these needs was to increase the participation rates of nurses, who come from a non-English speaking background (NESB), in the delivery of nursing care (D'Cruz & Tham, 1993; Zollo, 1998).

Whether due to active recruitment policies or other factors, the number of students entering nursing in NSW from a NESB may have increased over time, as a sample of students enrolled in NSW nursing courses in 1986 found 14.3% of the students came from a NESB (Wright & Sumar, 1996), and a similar percentage of NESB students (14.7%) was found to be enrolled in nursing in Victoria in 1988-1990 (D'Cruz & Tham, 1993). In 1997, however, 32% of applicants to nursing courses in NSW were from a NESB (Lawler et al., 1997).

NESB students in nursing courses are most likely to have an Asian or European background (D'Cruz & Tham, 1993; Lawler et al., 1997) which is reflective of Australian migration patterns (Australian Bureau of Statistics, 2000) although some ethnic language groups may be under represented in nursing (D'Cruz & Tham, 1993; Tang, Duffield, Choucair, Chen, Creegan, Mak & Leslie, 1996).

Whereas students from a NESB may perform better academically than Australian-born students in some university courses (Birrell & Khoo, 1995), this may not apply to students in nursing courses (Andrew, 1995; Zollo, 1994; 1998). Zollo (1994; 1998) found that NESB students were approximately four times more likely, than students from an ESB, to fail a first year Nursing Practice course. Even after the implementation of strategies designed to assist NESB students to achieve success, the failure rate was still two and half times that of the ESB students (Zollo, 1994; 1998). After consultation with the NESB students in her study, Zollo (1994; 1998) identified factors associated with language difficulties as the major influences on students' academic success.

If the participation rates of students in nursing from a NESB are indeed increasing then more research is needed about the factors that influence their success in nursing courses.

3.3 Self-Efficacy

3.3.1 Introduction

Self-efficacy is an integral component of self-regulated learning (Schunk & Ertmer, 2000). Self-efficacy has been found to influence students' use of learning strategies: and monitoring (Zimmerman, 1989b), and persistence (Bouffard-Bouchard, Parent & Larivee, 1991; Pintrich & De Groot, 1990; Schunk & Ertmer, 2000). Using the MSLQ, self-efficacy and task value were identified as strong influencers of low achievers' self-regulatory behaviours (VanZile-Tamsen & Livingstone, 1999).

Self-efficacy has also been found to be related directly to academic performance (Bouffard-Bouchard et al., 1991; Chye et al., 1997; Schunk & Ertmer, 2000; Zimmerman & Bandura, 1994) or to function as a mediator of academic performance (Pintrich & De Groot, 1990).

In a general social cognitive model self-efficacy beliefs were conceptualised as containing both the aspects of Bandura's (1986) self-efficacy and Eccles' (1983) expectancy for success. These areas are discussed separately, in relation to nursing, in this section.

3.3.2 Self-Efficacy

There have been some studies that have examined aspects of nursing students' self-efficacy (Andrew, 1998; Chacko & Huba, 1991; Harvey & McMurray, 1994; Harvey, 1995). Several of these studies have been Australian and have included the development and testing of research instruments developed specifically for pre-registration nursing students (Andrew, 1998; Harvey & McMurray, 1994; Harvey, 1995).

The Nursing Academic and Clinical Self-Efficacy research instruments were developed and tested by Valerie Harvey as a major part of her doctoral research (Harvey, 1995). The instruments were designed to measure Australian students' academic and clinical efficacy expectations for pre-registration nursing programs. Whilst the focus of Harvey's research—besides the development of the research instruments—was the relationship of these instruments to persistence in nursing, she did examine their relationship to academic performance (Harvey, 1995). For the first year, strong nursing academic efficacy beliefs were related to better academic performance and to persistence in the nursing programs (Harvey, 1995). Unlike nursing academic beliefs, clinical efficacy beliefs were not predictive of academic performance or of persistence in nursing programs (Harvey, 1995). Unrealistic first year nursing clinical efficacy beliefs held by students, and the absence of a performance measure designed specifically to assess clinical skills performance, were proposed by Harvey (1995) as the reasons for the lack of academic predictability of the Nursing Clinical Self-Efficacy research instrument. Students entering nursing programs may have expectations that the program will not be academically rigorous (Higgins, 1989) and this may be one reason why students had higher efficacy beliefs than would be expected for an area in which they may have had no previous experience.

The Self-efficacy for Science (SEFS), which contains science items related to every-day and nursing-specific tasks, measures the strength of a student's self-efficacy for science, and was designed to assist in the prediction of academic performance in the science areas of first year Australian nursing curricula (Andrew, 1998). The SEFS was found to predict 24% of nursing students' academic performance in a first year physical science course and 18.5% for a Bioscience course of a Bachelor of Nursing program (Andrew, 1998).

Students' past experiences with science may influence their self-efficacy and this aspect was discussed in the sub-section on students' science background. Whilst nursing students' limited science background may contribute to some students' low self-efficacy expectations for science there may be additional factors that influence their self-efficacy beliefs. Educational programs designed to change (lessen) students' attitudes to science have often been unsuccessful as they have used the concept that more knowledge will defuse students' anxieties with science (Gillies & Soars, 1992; Nicoll & Butler, 1996). By suggesting study strategies based on nursing students' learning preferences, Lenehan and colleagues (Lenehan, et al., 1994) were able to reduce students' anxiety, increase their curiosity and improve their academic performance for their science courses. This study (Lenehan et al., 1994), suggests that in accordance with the general self-regulation literature (Bouffard-Bouchard et al., 1991; Schunk & Ertmer, 2000), self-efficacy and learning strategies are linked and related to academic success in nursing courses.

3.3.3 Expectancy for Success

Pre-registration nursing students report spending more time studying for their science courses than nursing theory/practice-type courses (Davies et al., 2000) with these subject areas presenting the greatest dichotomy in students' perceptions of the courses that might result in difficulties in the first year of a nursing program (Jordan et al., 1999).

It should therefore present no surprise to find that nursing students are likely to have unrealistically high self-efficacy expectations for clinical nursing skills (Harvey & McMurray, 1994; Harvey, 1995) and to be over-confident in predicting their academic performance for a nursing theory course (Smukler & Kramer, 1996).

Caon and Treagust (1993) divided students into three academic groups and found that low achievers were over-confident in predicting their success in a first year science course whilst students in the middle were relatively accurate predictors of their academic performance.

Students may base their expectations for success on prior knowledge of a subject but in the case of a first year nursing program the science may vary significantly from high school science and the nursing theory/practice courses may be completely unfamiliar and therefore students may have unrealistic expectations in relation to these subject areas in the first year of their nursing program.

3.4 Task Value/Relevance

3.4.1 Introduction

In the previous chapter task value was described as comprising three components—interest, importance and utility. Whilst nursing may conceptualise interest in a similar way as defined in chapter 2 (How interesting is that task to me?), importance (How important is the task to me) and utility (How useful is the task to me?), however, are more likely to subsumed under the term "relevance". Although the term, relevance, is often used in nursing there is no formal definition of it in the nursing literature, however, it generally incorporates or implies the importance or utility of a course/topic/task/knowledge to nursing clinical practice (Eraut, Alderton, Boylan & Wraight, 1996; McFarlane, 1977). In this section, issues related to task value/relevance for Science and Nursing Practice courses are discussed such as interest, teachers and the issue of relevance, the relationship between task value/relevance and learning and academic performance and the influence of time on task value/relevance.

3.4.2 Interest

Not surprisingly, when nursing courses are compared/contrasted nursing students indicated that they are more interested in Nursing Practice courses, which may be perceived as directly relevant to their career choice of nursing, than Science courses whose relationship to nursing may be more subtle (Andrew, 1995). Interest and relevance may therefore be closely interwoven in nursing. For example, based on students' evaluations of an introduction to nursing course that used an experience-based phenomenological approach, it was found that students' interest in the course was essential initially for their involvement in the learning process, but that involvement would wane if students could not see the relevance of the material being presented to the nursing clinical area (Wilkinson, Peters, Mitchell, Irwin, McCorrie & MacLeod, 1998). This is in keeping with the self-regulation literature as interest has been described as leading students to self-regulate their motivation and strategy use (Hidi, 1990; Sansone, Weir, Harpster & Morgan, 1992).

3.4.3 Teachers and the Issue of Relevance in Nursing

Whilst there can be no doubts that nursing theory/nursing clinical skills (Nursing Practice courses) are important to nursing clinical practice, so too is science (Clarke, 1995). Studies, using pre- and post-registration students, that have examined the relationship between science and clinical practice have found that (bio)science knowledge has an impact on patient care (Eraut et al., 1996; Jordan, 1998; Jordan & Reid, 1997; Prowse & Lyne, 2000).

Although a survey of registered nurses employed in different clinical areas of one NSW hospital found that 63% of nurses rated their science background as helpful to clinical practice, when they were asked to nominate the relevance of 73 physics and chemistry concepts to their clinical practice, they considered 66.46% of these concepts as not relevant to their clinical practice (Graham, Harnett & Kolyshkina, 1996).

The question then is, if science is important for patient care why is relevance an issue in pre-registration nursing courses? To answer this question the literature pertaining to who teaches science in nursing needs to be discussed as it can be shown as an important factor in the issue of relevance.

Those involved in the teaching of science may have varying backgrounds. Some may have a science qualification (eg Physics, Chemistry, Biology) and no nursing qualification (Wharrad et al., 1994) or vice versa, a nursing qualification and no science background or a limited science background (Akinsanya, 1986a; Jervis, 1996; Trnobranski, 1993). A few may have both a nursing and science qualification (Jervis, 1996) and finally some may have a medical, but not a nursing background (Akinsanya, 1984). The issue of relevance has been raised in relation to all the combinations of teachers' background. Although all these references are from the UK, the author's long experience in nursing and teaching can confirm that these teacher background combinations are applicable to the Australian situation.

Those teachers with a science or medical background and without a nursing qualification may have difficulty deciding what science is applicable to nurses (Chapple, Allock & Wharrad, 1993; Jervis, 1996), and in applying the science to nursing (Clarke, 1995) particularly as there is a scarcity of science-based nursing research (Wharrad et al., 1994). Clarke (1995) suggests that when science is taught by persons with science expertise, but no clinical nursing background, then the application of science to nursing is left to the students studying the science courses. Research confirms this as semi-structured interviews with nursing students studying science with medical students, where the science was not taught by staff with a nursing qualification, found that students had difficulty applying and seeing the relevance of the science being taught to nursing clinical practice (Chapple et al., 1993). Nursing students, however, may not have sufficient clinical experience to apply or decide what is relevant to clinical nursing practice (Eraut et al., 1996). The linking of science to nursing clinical practice cannot be left to nursing staff either as they may have been taught science in an applied manner which may be why Eraut et al. (1996) found that few were able to apply biological knowledge to nursing practice.

Nurse teachers with a nursing qualification and a limited science background have also indicated that they have had difficulties linking science (biological) theory to clinical practice (Courtenay, 1991). A study of teachers with this background found that another difficulty they identified which can be related to the issue of relevance was their "lack of guidance with regards to the depth and breadth of knowledge" that they had to teach (Courtenay, 1991, p. 1113). In other words, they had difficulty deciding what was relevant to nursing clinical practice.

Whilst it would be expected that those teachers with a science and nursing qualification would have no difficulties teaching science to nursing students this has not been found to be the case (Trnobranski, 1996). When surveyed by a questionnaire that had quantitative and qualitative (open-ended questions) content, teachers with this background still indicated that the linking of science to nursing clinical practice was a concern to them. This study also found that the science subjects taught were strongly reflective of the discipline of its origin (for example, chemistry) rather than being applied to nursing.

Akinsanya (1984) suggests that the problems with the teaching of science and the determination of what is relevant to clinical nursing can be traced to the fact that science in nursing curricula has been traditionally based on medicine and has frequently been taught by medical staff. Akinsanya (1984) argues therefore that:

> because nursing has derived its knowledge of these sciences second-hand through medicine, teachers and practitioners have not found it necessary to search for a distinctive link between nursing and these subjects in the curriculum (p. 222).

As science knowledge has not been taught in an applied manner Akinsanya (1986b) suggests therefore that theoretical knowledge and clinical nursing practice have remained conceptually separated. Whilst the theoretical and clinical nursing practice remain conceptually separated nursing students will continue to have difficulties seeing the relevance of science to nursing practice (Akinsanya, 1986b).

Akinsanya and Hayward advocates the term "bionursing" as a way of linking nursing and science (1980, p. 30). Akinsanya was criticised by Boore (1997) for not integrating his bioscience model with other nursing models, nor defining the actual science knowledge areas that should be contained within the model. Boore (1997) suggests that first the concepts from the biological sciences considered relevant to nursing must be identified then modified to apply to nursing. Boore (1997) makes a weak attempt to do this through a disjointed literature review of various topics (homeostasis, anaesthesia and pain etc).

Other researchers have also advocated development of teaching methods that integrate or connect scientific knowledge with clinical practice (Davies et al., 2000; Graham et al., 1996; Jordan et al., 1999; Nicoll & Butler, 1996; Trnobranski, 1993). It appears that the teachers best able to do that are those with a science and nursing qualification (Graham et al., 1996; Trnobranski, 1993). For example Trnobranski (1993, p. 499). states that:

> There seems to be an obvious need for nurses with an interest and appropriate academic background in these sciences to explore innovative ways of teaching them and promoting their application to nursing practice.

There have been attempts to do this; for example one study used action research to identify the reasons for students' anxieties with a biology course and to find ways of minimising them (Nicoll & Butler, 1996). Increasing the theory to practice links was one area identified as a reason for students' anxieties and when this was put into action, that is the theory to practice links were increased, it resulted in increasing students' attendance at lectures. The researchers indicate that changes such as the one discussed could be made as the biology teachers were predominantly nurses with biology qualifications (Graham et al., 1996).

More recent literature suggests that nurses are in fact merging bioscience knowledge with clinical judgement and experience to develop a "situated bioscience-based knowledge of clinical practice" (Prowse & Lyne, 2000, p. 72).

In summary whereas nursing theory and clinical skills are taught by nurses and directly applied to nursing situations, science on the other hand has been taught in an "unstructured and somewhat haphazard fashion" (Courtenay, 1991, p. 1115). Science has often not been taught applied to nursing clinical practice and students who may have limited clinical experiences have been left to form the connections themselves. It is not surprising therefore, that students have difficulty in perceiving the relevance of science to nursing clinical practice. Yet if they don't, it has been suggested that it may "engender a downward spiral of demotivation, disinterest in study and increasing difficulty with the subject" (Jordan et al., 1999, p. 221).

3.4.4 Task Value/Relevance and Learning

Task value in self-regulatory literature, has been found to be predictive of students' use of self-regulated learning strategies (Pintrich & De Groot, 1990; Pintrich & Garcia, 1994; Pintrich, Roeser & De Groot, 1994; Pokay & Blumenfeld, 1990; VanZile-Tamsen, 1998; Wolters & Pintrich, 1998). Pokay and Blumenfeld (1990, p. 48) in their study of high school students studying geometry found that:

> Perceived value was influential in determining the degree to which students made use of all types of strategies both early and later in the semester. Students who think the work is important and useful not only are more likely to persist but are more willing to try a variety of strategies.

This may apply to science in nursing. For example, Eraut et al. (1996) used case-studies and mini-studies, of various clinical settings, to investigate the ways theory is taught and linked to clinical practice. They found that nursing students' judgments about the relevance of educational curricula content to nursing practice determined their learning priorities (Eraut et al., 1996). Moreover, material that did not appear to be relevant to the nursing clinical practice was likely to be quickly forgotten and this was frequently the case with scientific knowledge (Eraut et al., 1996).

Similarly, Thornton (1997) using qualitative methodology (focus group, unstructured questionnaires) found that nursing students made assumptions about the relevance of the information being taught to the clinical situation and if they considered it as not relevant then they questioned its inclusion in the curriculum. Secondly, first nursing students were found to have stereotypical views of nursing and therefore they were more focused on acquisition of practical skills rather than theoretical knowledge (Thornton, 1997).

When knowledge is applied to the clinical situation, however, students feel that it assists them to learn (Wilkinson et al., 1998), presumably because it taps into students' interest and value/relevance perceptions.

3.4.5 Task Value/Relevance and Academic Performance

In the self-regulatory literature, task value has not been found to be predictive of students' academic performance (Pintrich & De Groot, 1990; Wolters & Pintrich, 1998) rather that:

> interest and value can help a student to choose to become involved in a task, somewhat like a "starter" for a car, but once involved, the self-regulation ,processes of strategy use and adaptive efficacy beliefs are more important for "steering" and controlling actual performance (Wolters & Pintrich, 1998, p. 44).

Unlike the previous self-regulatory literature, nursing students' perceptions of relevance have been found to be related to academic performance (Caon & Treagust, 1993; Jordan et al., 1999) although for one study this association was not statistically significant (Jordan et al., 1999). Caon and Treagust (1993), for example, used a structured questionnaire and found that high achieving students were more likely, than low achieving students, to indicate that they considered their science courses as relevant to nursing (Caon & Treagust, 1993).

3.4.6 Changes in Task Value/Relevance Related to Time

Research from educational psychology literature indicates that students' value perceptions may change over a semester as in one study these perceptions became a stronger predictor of strategy use later in the semester (Pokay & Blumenfeld, 1990). Another finding regarding value is that even though a student may be achieving poor grades in college material, as long as the material is perceived to have significant relevance to the student then it will continue to be valued by the student (Covington, 1999).

One nursing study was identified where the changes in a students' value/ relevance were mentioned. Jordan et al. (1999) found in their study of staff and students' perceptions of the difficulties and relevance of bioscience to nursing clinical practice that the theory-practice gap (links between theory and clinical nursing practice) narrowed during a nursing program. By the time students reached their final science course they were able to describe situations where they could see the applications between science (pharmacology) and nursing clinical practice (Jordan et al., 1999).

3.5 Learning Strategies

3.5.1 Introduction

In the previous chapter (2.3) the term, learning strategies, was defined and explanations and examples of the various categories of strategies that self-regulated learners may use to help in the acquisition of knowledge or skills were given.

Nursing students' learning styles has been a major area of educational research and interest and some of that literature is introduced in this section (3.5.2). There is a need, in nursing, to shift this emphasis from learning styles to learning strategies and the reasons for this shift are briefly discussed in 3.5.3.

In 3.5.4 academic achievement groups are compared/contrasted as one way of identifying the strategies that may be necessary for academic success. There has been increasing recognition that self-regulated learning may be context, task or discipline specific (Donald, 1994; Pintrich, 1994a; Wolters & Pintrich, 1998) and this issue is discussed in 3.5.5. Specific issues related to science in nursing are then discussed in 3.5.6.

3.5.2 Learning Styles and Nursing

Since the early eighties the learning/teaching process in nursing education has been an area of considerable interest. A number of reviews of studies that incorporate research pertaining to nursing students' reported learning styles have been conducted (see for example Griggs, Griggs, Dunn & Ingham, 1994; Thompson & Crutchlow, 1993). One review identified 47 studies, over a 16 year period, pertaining to learning styles and nurses (Griggs et al., 1994). Kolb's Learning Style Inventory (LSI) has been the research instrument most favoured in assessing nursing students' learning styles (DeCoux, 1990; Griggs et al., 1994) even though it has been suggested that it may not be suitable for use in nursing education (DeCoux, 1990).

Studies using the LSI have shown varied results, as whilst some have found certain learning style categories to predominate such as the Accomodator/Diverger category (Cavanagh, Hogan & Ramgopal, 1995; Hodges, 1988; Laschinger & Boss, 1984), others have found the Assimilator category style to predominate (Highfield, 1988; Kelly, 1997).

It would be expected that congruence between an individual's learning style and the discipline would enhance academic performance but the results in nursing have been disappointing (DeCoux, 1990; Joyce-Nagata, 1996).

Several Australian studies have reported using the Entwistle and Ramsden (1983) Approaches to Study Inventory (ASI) (Stiernborg, Guy & Tinker, 1997; Trigwell & Prosser, 1991a; 1991b). Using the ASI (Entwistle & Ramsden, 1983), Stiernborg Guy and Tinker (1997) found a weak relationship between this measure and nursing students' GPA.

Cantwell and Moore (1998) combined the use of a learning style research instrument —the Study Process Questionnaire (Biggs, 1987)—and the author-developed self-regulatory control instrument—Strategic Flexibility Questionnaire (Cantwell & Moore, 1996)—to respectively measure third year nursing students' approach to learning and self-regulatory control. They found that whilst there was a strong relationship between these two measures they were not linked to academic performance as had been expected based on the authors' past research experience in relation to these measures. The researchers conclude that course influences may be a possible factor for these results (Cantwell & Moore, 1998).

3.5.3 From Learning Styles to Learning Strategies

A central tenent of learning styles research is that by identifying students' learning styles, the teaching process can be optimised, particularly through the matching of teaching and learning behaviours. Students are expected to play "a reactive rather than a proactive role" in learning (Zimmerman, 1989a, p. 3). In other words, the emphasis is on the teacher and not the student.

Trying to match teaching with students' individual learning styles has been criticised as being a "difficult and impractical suggestion" (Pintrich & Garcia, 1994, p. 122). This criticism may apply to nursing as the research findings, discussed in the previous section, indicate that nursing students do not have one dominant learning style making it impossible for educationalists in nursing to meet the learning needs of all students.

From a general social cognitive viewpoint, by contrast, students are considered to have the potential to learn and control their strategy use (Pintrich, 2000; Pintrich & Garcia, 1994; Zimmerman, 1989a). That is, students are expected to take an active part in the learning process.

3.5.4 High and Low Achievers

Comparisons of the type and number of strategies used by high and low achievers is one way of identifying the learning strategies important for success in a task or domain. (Schunk & Zimmerman, 1994). Schunk and Zimmerman (1994) liken this to novice-expert methodology where the pivotal role of the research is to identify differences between these groups.

High achiever students have been identified as using more self-regulated strategies than low achievers (Archer, 1998; Risemberg & Zimmerman, 1992; VanZile-

Tamsen, 1998; Zimmerman & Martinez-Pons, 1986), although these strategies may vary among students (Ablard & Lipschultz, 1998; Zimmerman & Martinez-Pons, 1990).

Zimmerman and Martinez-Pons (1986) developed a self-regulated learning interview schedule (SRLIS) that contained 14 categories of self-regulated learning strategies derived from the literature. The researchers used the schedule to interview high school students in relation to different learning situations (Zimmerman & Martinez-Pons, 1986). Students' prior academic performances were used to categorise students as high or low academic achievers. Analysis of the results indicated that there were significant differences between the achiever groups and that 91% of students could be correctly assigned into an achiever group based on the self-regulated learning measures that they reportedly used (Zimmerman & Martinez-Pons, 1986, p. 619). High achievers used more strategies and were significantly more likely than low achievers to use, in descending order, the strategies "seeking information", "keeping records and monitoring" and "organizing and transforming", "seeking teacher assistance" and "seeking peer assistance", "seeking adult assistance", "self-consequences", "reviewing notes" and "reviewing text" than low achievers (Zimmerman & Martinez-Pons, 1986, p. 62). "Self-evaluation" was the only category that was not significantly different between the achiever groups. Low achieving students reported using more strategies that were not considered self-regulatory than high achieving students (Zimmerman & Martinez-Pons, 1986).

Ablard and Lipschultz (1998) used a written version of the SRLIS to assess the self-regulated strategies used by high achieving school students and to establish the influence of variables such as gender on self-regulated learning. They found that high achieving students used a wide variety of self-regulated learning strategies with self-evaluation goal setting and planning being reported as the most frequently used strategies followed by organising and transforming seeking assistance, and keeping records and monitoring. Ablard and Lipschultz (1998) also identified gender differences in their study, with girls reporting the use of more self-regulated learning strategies for particular areas such as reading or writing.

Australian Bachelor of Education students, from varying education specialties, were interviewed and asked about the strategies they used for tasks associated with a year-long education course (Archer, 1998). The grades students received for the course were obtained and the interviews were analysed with reference to these grades. There were differences in self-regulation with respect to students' academic grades, with the greatest differences between students who obtained a Distinction and those who failed the course (Archer, 1998). Students who obtained a Distinction grade used learning strategies efficiently, read from a wide source of literature, and were self-directed learners and accepted the relevance of the material to their career choice (Archer, 1998). Students who failed the course on the other hand, wanted to be spoon-fed the material, read mainly from the prescribed text, left their studying to the last minute and considered the material being presented as not relevant to their career choice (Archer, 1998). Students who obtained a Pass grade had characteristics that were similar to Fail students and students who obtained a Credit grade reported characteristics similar to Distinction grade students (Archer, 1998).

In another Australian study, university students were asked to define their perceptions of the terms "studying", with their responses being used to divide students into three groups—high, medium and low (Radloff & de la Harpe, 1999). Students tended to define studying by describing learning strategies, with the high category containing self-regulatory strategies such as self-questioning and critical thinking, and studying being performed for intrinsic reasons, whereas, in the low category students studied for extrinsic reasons (Radloff & de la Harpe, 1999).

There is limited Australian research with respect to academic achiever groups and the type of strategies that they use in nursing programs. Caon and Treagust (1993) found—based on one item only in a questionnaire—that high achievers were more likely than middle or low achievers to do the reading prescribed for a first year science course in a nursing program.

3.5.5 Specificity of Self-Regulated Learning

In 3.5.1 it was stated that there has been increasing recognition that self-regulated learning may be context, task or discipline specific (Boekaerts, 1995; Donald, 1994; Wolters & Pintrich, 1998), and the need for more research on self-regulation in different content areas has been identified (Schunk & Ertmer, 2000).

Wolters and Pintrich (1998) found differences in high school students' motivation—value, interest, self-efficacy and test anxiety—for their English, mathematics, and social studies school subjects. The relations for motivation, strategy use and academic performance, however, were similar for the three subjects being examined in the study (Wolters & Pintrich, 1998).

Donald (1994) interviewed academics and students and identified disciplinary differences in knowledge, student expectations, and instructional methods used in physics, engineering and psychology university programs. Physics was found to emphasise knowledge acquisition, whereas for engineering the emphasis was on problem solving and in psychology "thinking" was a major skill gained in psychology (Donald, 1994, p. 102).

Using semi-structured interviews, Sutcliffe (1993) interviewed nurses studying in various specialist post-graduate courses to establish whether there was a relationship between students' preferred learning style, teaching methods and the subject matter being taught. She found that students changed their learning style and preferences for the teaching methods employed, according to the subject area being taught (Sutcliffe, 1993). For example, when anatomy and physiology was being taught students used a passive learning style and preferred material to be presented in the lecture format but when nursing care was being taught, students preferred to take a more active style of learning and preferred seminars and case studies (Sutcliffe, 1993). As science courses in nursing may reflect the discipline from which they are drawn, it may be that like physics (Donald, 1994), the emphasis of science in nursing programs may be knowledge acquisition and therefore students expect the material to be presented in a lecture format.

Related to the issue of the specificity of self-regulation is the nature of the transference of self-regulatory skills from one area to another and whether teaching self-regulatory skills within a context or as separate courses will maximise transfer (Hofer et al., 1998; Schunk & Ertmer, 2000). A meta-analysis of learning skills interventions, undertaken to enhance academic success, found that whilst these types of courses were successful in changing students' attitudes, their effect on performance and subsequent use of the taught skills was marginal and that more success was obtained when the training was specific to a domain (Hattie, Biggs & Purdie, 1996). Others also recommend teaching self-regulatory strategies in this manner (Radloff & de la Harpe, 1999; Zimmerman & Paulsen, 1995). Radloff and de la Harpe (1999, p. 11), for example, suggest that:

> ...lecturers should recognise that, as the subject specialists, they are best placed to provide instructions on how to study as part of their subject teachings.

For a more detailed discussion of this issue about the teaching of self-regulatory skills and transference see Hofer et al. (1998, p. 61-64) or Schunk and Ertmer (2000, p. 644).

The issue of transferability of learning has been discussed in relation to nursing (Cust, 1995; Lauder, Reynolds & Angus, 1999). Lauder, Reynolds and Angus (1999), for example, have summarised the literature pertaining to the transferability of knowledge and skills between the classroom and the clinical situation. A major conclusion they reach is that teaching in nursing should be accomplished in context to the clinical situation (Lauder et al., 1999).

Some students have been found to be consistent in the use of learning strategies (Barnett, 1996; Cantwell & Moore, 1996; Wood, Motz & Willoughby, 1998). When high school and university students were asked to recall the strategies that they used when studying, university students reported using between one to four strategies whilst high school students reported using between one to three strategies (Wood et al., 1998), with repetition being the main strategy reported. Other strategies included summarisation, self-testing, help seeking, mnemonics and elaboration (Wood et al., 1998). Most of these strategies were self-taught and students did not recognise the need to alter them to suit the material being learnt (Wood et al., 1998).

Cantwell and Moore (1996) examined third year Bachelor of Education students' control of self-regulation for three course areas. They also found some students, irrespective of the course they are studying, have a set repertoire of learning strategies which they are unable to change to adapt to meet individual course requirements (Cantwell & Moore, 1996). Other students, however, were able to reflect on the demands of a course and control their self-regulation through planning and monitoring and adjusting their strategies according to demands of a task

(Cantwell & Moore, 1996). Similarly, Wolters (1998) found that some students adjust their learning strategies according to a given learning task. Where material was boring, difficult or irrelevant, Wolters (1998) found that students used strategies to increase their value or interest in the material which included relating the material to personal situations or future use of the material. For suggestions of ways to assist students to change their learning strategies see, for example, Pressley (1995).

3.5.6 Science and Learning

One of the difficulties identified with learning and science is that individuals may have their own alternative conceptions of science constructs which may interfere with their learning of new science material (Nussbaum & Novick, 1982). To change individuals' conceptual beliefs therefore individuals may first need to recognise the need for them to be changed and any new conceptions need to be presented in a logical and plausible manner (Posner, Strike, Hewson & Gertzog, 1982). Alternative conceptions, whilst potentially erroneous, may still demonstrate logical and reasoned thinking (Ault, 1984). Alternative conceptions may be difficult to change (Lonka, Elana & Bryson, 1996). Schoon and Boone (1998) found that "students are still leaving high school and college science students carrying many alternative conceptions with them" (Schoon & Boone, 1998, p. 563). They also found whilst some alternative conceptions may not influence a person's ability to function in their environment or to learn new science material there were other "critical alternative conceptions" that did in fact impede learning and these factors were also related to students' self-efficacy for science teaching (Schoon & Boone, 1998).

Wilkes and Batts (Batts & Wilkes, 1990; Wilkes, 1992; Wilkes & Batts, 1996; Wilkes & Batts, 1998) have written a number of articles based on Wilkes' doctoral research (1992) that have been highly critical of nurses' science knowledge which has led them to accuse nurses of "acting as sub-professional" (Wilkes & Batts, 1996, p. 338). Their criticisms stem from the fact that student nurses' and registered nurses' conceptions of the science principles underlying certain nursing procedures were different to those of scientists (Wilkes, 1992; Wilkes & Batts, 1996; Wilkes & Batts, 1998). These researchers label the nurses' beliefs as "erroneous" and suggest that these erroneous beliefs are "more acceptable to nurses than scientific 'truths" (Wilkes & Batts, 1998, p. 128). Wilkes and Batts (Batts & Wilkes, 1990) believe that the genesis of these "erroneous" beliefs is clinical practice as they found that whilst first year nursing students may espouse the scientific knowledge as taught to them in educational institutions, through exposure to the clinical nursing scene during their nursing program, their scientific knowledge alters. So, by the final year of their pre-registration course students' scientific knowledge has altered, to reflect the "erroneous beliefs" of science reflected in clinical nursing practice (Batts & Wilkes, 1990).

De Berg and Grieve (1998) interviewed second and third year nursing students and asked them about the relationship between pressure and certain devices found in nursing (for example syringes). They found like Batts and Wilkes (1990), that nursing students had perceptions of pressure that varied from that of scientists. When questioned and given explanations for these devices, students often mentioned that "they had never really understood some part of a procedure" (De Berg & Grieve, 1998, p. 13). Similarly, Registered Nurses studying a bioscience course as part of a post-registration diploma felt that "... they had learnt biological science principles alone, suggesting that their pre-registration education input had been unsatisfactory...." (Jordan & Reid, 1997, p. 175).

In the previous section (3.4.2) it was shown that science is often not taught in an applied manner and the applications of science to nursing may be left to the student. Some of the inadequacies in students' science conceptions therefore, may be attributed to the organisation and teaching of the Science courses. It may be that the science taught to the nursing students has not led them to permanently change their conceptions of science and when alternative conceptions, of scientific knowledge, are encountered in the clinical area they may appear to be more logical and plausible (Posner et al., 1982) than that taught in their Science courses.

3.6 Critical Thinking

Critical thinking has been identified as important in nursing practice (Chenoweth, 1998; Daly, 1998; Facione & Facione, 1996) although the definition of it and the processes involved may vary in the literature (for example see Daly, 1998; Duchscher, 1999). Facione and Facione (1996) suggest that:

> Critical thinking, content knowledge, and practice experiences are the three essential components of expertise in clinical judgement (p. 131).

Using semi-structured questionnaires or interviews, students enrolled in post-registration nursing courses in NSW were asked to define the term "critical thinking" (Chenoweth, 1998). Interestingly, the students' definitions, which were categorised into four areas, were very comparable to items from the MSLQ Critical Thinking scale (Pintrich et al., 1991). For example, one item of the MSLQ Critical Thinking scale is "I often find myself questioning things I hear or read in this course to decide if I find them convincing" (Pintrich et al., 1991, p. 24). By comparison, one category arising from the nursing students' definition of critical thinking was "To question, assess and analyse the truth or validity of statements" (Chenoweth, 1998, p. 286). To develop critical thinking Chenoweth suggests certain teaching strategies such as "focussed assignments, focussed readings, discussions and teacher instruction, modelling, encouragement and feedback" (Chenoweth, 1998, p. 287). Facione and Facione (1996) also advocate educators use modelling to teach the discipline-specific applications of critical thinking to nursing practice.

3.7 Summary

In this chapter the literature pertaining to the model presented in the previous chapter was reviewed with an emphasis on the areas selected to be examined in this thesis. The nursing literature concentrated on the science courses in nursing programs as this area was well documented in comparison to the nursing theory/practice type courses. This imbalance may be partly explained by the fact that nursing students expect to have the most difficulties with their science courses and the least with their nursing theory/practice type courses (Jordan et al., 1999). Nursing students are not the only students to have difficulties with the science areas of university courses. Nist, Holschuh and Sharman (1995) studied students enrolled in a Biology course:

> ...at the request of a biology professor who was frustrated with student performance and what seemingly was a lack of self-regulated active learning in his introductory biology courses. (p. 4)

Goglin and Schwartz (1992) found that students who were doing a science course to fulfill a program requirement had very different attitudes, were more likely to have a restricted home and school background in science, less interest and more anxiety in relation to science than students enrolled in a science major.

Nursing students' science background was discussed by way of an explanation of students' anxieties, their low self-efficacy beliefs and expectations and interest in relation to their science courses in their nursing programs.

The ethno-demographic and academic characteristics students have on entry to a nursing program such as age, gender, TER score and ethnicity were discussed in this chapter. Older students entering nursing programs were described as consistently having a tendency to perform in nursing courses (Houltram, 1996; Ofori, 2000; Petrie & Powell, 1951) and this is irrespective of their entry characteristics (Houltram, 1996; Ofori, 2000) including science background (Caon & Treagust, 1992; Khytense & Beanland, 1994). Nursing students were described as entering nursing programs with predominantly low TER scores (Lawler et al., 1997) and limited science background (Nicoll & Butler, 1996). The number of NESB students entering nursing programs has increased (Lawler et al., 1997) and it appears that these students may be at risk of being unsuccessful in these programs (Zollo, 1994; Zollo, 1998).

Australian nursing researchers have developed the few specifically nursing designed self-efficacy research instruments (Andrew, 1998; Harvey & McMurray, 1994; Harvey, 1995) that have been published and some of these research instruments have been found to relate to students' academic performance in their nursing programs.

The area of task value/relevance is a significant one in nursing programs especially in relation to Science courses. Particular emphasis was placed on teachers and the issue of relevance in nursing as this was found to be an area that had occupied a significant amount of nursing research. The pivotal issue in this area was the fact that the integration/connection of science topics/principles to nursing clinical practice, by those involved in science teaching, has been variable (Akinsanya, 1986a; 1986b; Davies et al., 2000; Jordan et al., 1999) and studies have particularly focused on teachers' academic backgrounds (Chapple et al., 1993; Clarke, 1995; Courtenay, 1991; Jervis, 1996; Wharrad & Chapple, 1994). It has been suggested that teachers with science and nursing qualifications may be those best able to integrate science knowledge and nursing clinical practice (Graham et al., 1996; Trnobranski, 1993). Whilst the nursing research is limited, it appears to indicate that task value may be related to academic performance in nursing programs (Caon & Treagust, 1993; Jordan et al., 1999) and may change as students progress through their nursing program (Jordan et al., 1999).

Omnibus measures of students' learning styles have been popular in the nursing literature (see for example Griggs et al., 1994 for a review), with the assumption that nursing students have one predominant method of study and by identifying this style teachers can adopt teaching methods to suit this style. Not surprisingly nursing students have not been found to have one predominant learning style, and it may be time as Pintrich and Garcia (1994) suggest, to investigate students' learning strategies and to teach students to learn to adapt to the many and varied learning situations in nursing programs.

Students use a varied amount of strategies in learning situations (Zimmerman, 1986) and high achieving students are likely to use more strategies than low achievers (Archer, 1998; Risemberg & Zimmerman, 1992; VanZile-Tamsen, 1998; Zimmerman, 1986). No nursing studies were identified that examined the type of strategies that students use in pre-registration Australian nursing courses although there was one study of post-registration nursing students which suggested that nursing students may change their strategies according to the subject areas in a nursing curriculum (Sutcliffe, 1993). Although its relationship to academic performance or self-regulated learning, critical thinking has been examined in nursing literature with its definition (Chenoweth, 1998) being found to be similar to that described in the previous chapter.

In the next chapter the quantitative and qualitative methods used in this study are outlined.

Chapter 4

METHOD

4.1 Introduction

A multimethod approach, that is, one that combined qualitative (interviews) and quantitative (structured questionnaires) methods, was used in this study to examine nursing students' entry characteristics, self-regulated learning and academic performance in their first year Science and Nursing Practice courses of Bachelor of Nursing programs.

There has been longstanding and vigorous debate about the mixing of qualitative and quantitative method and there are those in education (see for example Lincoln & Guba, 1985) and nursing (Leininger, 1994) who are opposed to the mixing of qualitative and quantitative paradigms. There are others, however, who believe that a combination of both methods can increase our understanding of the research phenomena being investigated (Miles & Huberman, 1994; Rossman & Wilson, 1985). Miles and Huberman (1994, p. 239) state that:

> The question, then, is not whether the two sorts of data can be linked during study design, but whether it should be done, how it will be done and for what purposes.

Three questions can be identified in this statement as relevant to this thesis—Why use a multimethod approach? How was the multimethod approach undertaken? and What was the purpose of the multimethod approach?

4.1.1 Why Use a Multimethod Approach?

In the preceding chapters the predominance of quantitative methods and the need for more qualitative research in self-regulation and the Science and Nursing Practice courses of Bachelor of Nursing programs was discussed. The review of the nursing literature revealed that there have only been a few studies of the Science courses that have combined qualitative and quantitative research methods. A study that combines quantitative methods to collect "numbers" and qualitative methods to collect "words" (Greene, Caracelli & Graham, 1989; Miles & Huberman, 1994) may give a more comprehensive picture of students' self-regulated learning and increase our understanding of the many factors that cause students difficulties with their Science courses. A multimethod approach would also allow for flexibility in the method and enable the researcher to capitalise on the strengths and weaknesses of the different approaches (Bryman, 1995; Sommer & Sommer, 1997). Whilst quantitative questionnaires, for example, may provide information from a large number of respondents (Marshal & Rossman, 1995) they have been criticised because they often force a respondent to choose from a limited number of responses (Polit & Hungler, 1999). Winne and Perry (2000) suggest that often inherent in questionnaires used to measure self-regulated learning is the assumption that students have an awareness of the learning strategies that they are being asked to respond to. This may not be the case and some participants may not be aware of a particular learning strategy. It is also possible, that a participant may be aware of a particular learning strategy but may not use it in the context of the situation that is being assessed.

Qualitative interviews, on the other hand, may allow a participant to report the actual strategies that they use in a particular context. Qualitative interviews can also provide meaning and understanding of why a participant has a particular belief or attitude (Bogdan & Biklen, 1992; Dreher, 1994), but like questionnaires, they have limitations which may include factors such as a participant's vocabulary, honesty and rapport with the interviewer (Dreher, 1994; Marshal & Rossman, 1995).

A multimethod approach has been recommended in education because of the complexity of the relationships involved in education (Cohen & Manion, 1994) and in nursing to give a holistic picture (Begley, 1996) and in science to increase understanding (Herbert, Lee & Williamson, 1998).

4.1.2 How was the Multimethod Approach Done?

Interviews and questionnaires are the most commonly used methods from their respective paradigms (Cohen & Manion, 1994; Sommer & Sommer, 1997). By combining both, Sommer & Sommer state that (1997, p. 6):

> The questionnaire which can be given to many people quickly, can be supplemented by detailed interviews with a few people to probe more deeply into significant issues.

In this study, surveys by structured questionnaires of students enrolled in first year Bachelor of Nursing programs formed the quantitative aspect of the research method. Semi-structured telephone interviews of a purposeful sample of students who completed the questionnaires and face-to-face semi-structured interviews of academics involved in the Science and Nursing Practice courses were the qualitative aspect of the study. The purposeful sample of students who were interviewed in semester one and two was chosen from those who gave consent for an interview on the semester one questionnaire. The method pertaining to the interviews is discussed in Chapter 5.

The qualitative and quantitative data collection methods then proceeded independently but the results were combined (see Chapters 6-8) to give a comprehensive picture of students' entry characteristics, self-regulated learning and academic performance in their Science and Nursing Practice courses.

4.1.3 What was the Purpose of the Multimethod Approach?

A study of 57 mixed method (multimethod) research studies found that the use of these mixed methods may have one or more purposes such as triangulation, complementarity and expansion (Greene et al., 1989).

Triangulation

There are those who define triangulation broadly (cf multimethod) as:

> ... the use of two or more methods of data collection in the study of some aspects of human behaviour (Cohen & Manion, 1994, p. 233).

Others, however, view triangulation as the seeking of the "convergence, corroboration, correspondence of results from the different methods" (Greene et al., 1989, p. 259). This latter definition is used in this thesis. The advantage of triangulation of the results is that it can assist establish their credibility or validity (Brewer & Hunter, 1989; Cohen & Manion, 1994; Dreher, 1994; Glesne & Peshkin, 1992; Miles & Huberman, 1994; Rossman & Wilson, 1985). Triangulation of the results was sought for certain areas of the research in this thesis, for example, the issue of relevance and academic performance.

Complementarity

Complementarity can be defined as the seeking of "elaboration, enhancement, illustration, clarification of the results from one method with the results from the other method" (Greene et al., 1989, p. 259). Various aspects of the research aimed at this, for example, the questionnaire served to measure, quantitatively, students' science self-efficacy whereas the telephone interviews allowed the students to talk about the nature of their beliefs, thereby elaborating and enhancing our knowledge and understanding of students' science self-efficacy beliefs.

Expansion

Expansion can be undertaken in multimethod research to "extend the breadth and range of inquiry by using different methods for different inquiry components" (Greene et al., 1989, p. 259). In this study, the questionnaire only surveyed students' use of certain learning strategies, but in the telephone interviews students were able to talk about a range of strategies that they use for different aspects of their Science and Nursing Practice courses, thereby expanding our knowledge about the learning strategies they use when studying for these courses. The methods and analyses of the study are discussed in detail in this and following chapters.

4.1.4 Outline of the Chapter

The discussion of the proceeding sub-sections provide justification for the research design used in this thesis. The next three sections of the chapter are concerned with the context of the study with the universities involved in the study discussed in 4.2, ethics in 4.3 and the content and assessment of the Science and Nursing Practice courses discussed in 4.4.

Then the quantitative (questionnaires section 4.5) methods including data collection (4.6) and statistical analyses (4.7) are discussed with the qualitative method discussed in Chapter 5.

4.2 Universities Involved in the Study

The conduct of this study required the support and participation of academic institutions that conduct Bachelor of Nursing programs, thereby enabling the researcher access to first year nursing students.

It was decided that two universities should be selected for the study to be prepared for several eventualities such as denial of permission to conduct the research, or withdrawal, at a late date, of permission to conduct the research.

4.2.1 Factors Considered in the Selection of the Universities

Curriculum

To allow comparisons of students in the two course areas—science and nursing practice—and aggregation of data, it was crucial that there was as much similarity as possible, in the first year curricula of the universities to be used in the study. To establish similarities, the curricula of various New South Wales (NSW) universities conducting Bachelor of Nursing programs were examined. This was done by consulting university undergraduate calendars, to see what courses were taught in the first year and the content of those courses.

Science and Nursing Practice courses are generally core first year courses, therefore it was not surprising to find considerable similarities between the curricula of several university Bachelor of Nursing programs. The two universities eventually chosen conducted similar courses in first and second semester of their Bachelor of Nursing program, with the content of the courses also being closely related to each other. Further discussion of the curricula of the chosen universities is given in section 3.4.

Student Numbers

The second consideration in the selection of the universities was the number of students entering Bachelor of Nursing programs at the universities involved in the study, in an effort to maximise the number of participants available to participate in the study. As the study would continue for the whole of the first year of a Bachelor of Nursing program it was necessary, for example, to consider the withdrawal of students from the program and its effect on the participant numbers in the study. Both universities had target intake numbers of more than 200 students.

4.2.2 Some Characteristics of the Universities Selected

After studying factors related to the curricula, student numbers and location, two NSW universities were considered for this study. Both universities conducted Bachelor of Nursing programs and their first year curricula, discussed in section 4.5 were comparable. Assurances were given that the universities' identities would be kept confidential in the study as required by one of the universities participating in the study. Thus the characteristics of the universities selected in the study are given in general terms so as to protect their confidentiality.

To maintain confidentiality of the universities involved in the study, the universities were labelled X and Y. Both universities had well established nursing programs. University X conducted its Bachelor of Nursing program at two campuses with the student intake numbers being approximately similar at both these campuses. Both campuses at University X were included in the study. University Y also had two campuses with a main campus and a second smaller, regional campus which had a much smaller intake of students than the main campus. Only the main campus at University Y, which had student intakes similar to the combined campuses for University X, was used in the study. Therefore the study was conducted at three university campuses conducting Bachelor of Nursing programs in NSW. In the study, to maintain confidentiality, the campuses were labelled 1, 2 and 3.

4.2.3 Liaison with Universities

Liaison between the universities chosen to participate in the study and the researcher began in August 1997 and continued into 1998 with University X giving permission for the researcher to distribute the questionnaire during tutorial time for the Science course. Whilst University Y was still supportive of the research, time constraints were raised as a reason that the questionnaire could not be administered during tutorial/laboratory time but permission was granted for the questionnaire to be given out immediately after the science lecture.

4.3 Ethics Approval

Formal ethics approval, for the conduct of the study, was obtained from the University of Wollongong Human Research Ethics Committee with the stipulation that letters from the universities participating in the study be obtained and forwarded to this Committee (see Appendix 1).

One university was concerned about the possibility of comparisons between the universities involved in the research and requested that, where possible, combined statistical analyses of the data be performed and that the university be kept informed of the results of the study, and the manner in which the results were to be used. All possible measures were taken to adhere to this request.

During the conduct of the research, steps were taken to maintain the confidentiality and anonymity of the participants in the research. One of these steps included the coding of all data collected from participants. Another included using codes for the university campuses participating in the research. Further details about steps taken in relation to students and academics are given in the appropriate chapter sections or sub-sections.

4.4 First Year Bachelor of Nursing Curricula and Assessment

Irrespective of the educational institution conducting a Bachelor of Nursing program, the first year curriculum must contain some introductory theoretical knowledge and clinical skills, before more advanced knowledge and skills can be taught in subsequent years of the program. There was great similarity, therefore, in the courses offered and the content of these courses for the first year Bachelor of Nursing programs conducted by universities participating in the study.

In the first year of the Bachelor of Nursing programs, for these universities, full-time students were expected to study eight courses—four each semester. Each semester contained a Science, Nursing Practice and Nursing Theory course. In semester one students also studied a Psychology/Sociology course. The fourth course studied in semester two varied between the universities.

An overview of the content and methods of assessment used for the Science and Nursing Practice courses, studied each semester during the first year of students' Bachelor of Nursing program, is given in the following sub-sections.

This information was obtained by consulting the appropriate university calendars, course outlines and by talking to some of the Academics involved in these courses.

4.4.1 Science Courses

Students studied a Science course each semester. The suffix 1 or 2 is used to denote whether the course was studied in the first or second semester respectively (also applied to Nursing Practice courses). The Science courses had a lecture component along with a tutorial and/or laboratory (lab) component. In the lecture component, theoretical knowledge was taught. In the laboratory component of the course, students could be required to conduct experiments, manipulate equipment or visualise materials taught in the lectures. As the tutorial component was not common to both universities this aspect was not examined in this study.

Science 1

In this first semester Science course (Sc1), students were introduced to the scientific principles considered necessary for the basis of clinical practice. At both universities these courses had a strong chemistry component, although they also contained some physics, biology and biochemistry principles. An examination of 50% or more, held in the end-of-semester examination period, was the assessment method common to both universities. The examinations were reported to consist of mainly multiple choice questions, but they may have also contained some short answer questions and diagrams to be labelled. Other methods of assessment included assignments or weekly tests.

Science 2

This second semester course (Sc2) focused more on human biology/bioscience than Sc1 and also covered some human physiology and biochemistry concepts. The same assessment methods used by the universities in Sc1, were also used in this course, that is, end-of-semester multiple choice/short answer examinations of 50% and assignments or weekly tests.

4.4.2 Nursing Practice Courses

The Nursing Practice courses in this study, were those courses in which introductory nursing practice was taught, including the teaching of nursing clinical skills. Thus for these courses there were lectures and tutorials/nursing laboratories. The required clinical experience (practice) component was incorporated into these courses. In the clinical experience components of the courses, which were compulsory, students were required to practise, under supervision, the clinical skills taught in their Nursing Practice courses.

Students were not given marks for their clinical practice but were expected to attain a Satisfactory/Pass level for specific clinical skills and their overall clinical performance. The specific clinical skills students were expected to undertake each clinical practice and the assessment criteria for these skills were found in the Nursing Practice workbook. In addition to the clinical skills students were to undertake during the semester, the workbook also contained specific information about the course, the assignments (for assessment) and a study guide that was comprised of weekly or fortnightly readings and activities related to the knowledge/skills being taught in the course. In the first semester, completion of these activities formed a major part of the assessment method.

Nursing Practice 1

In this semester one Nursing Practice (NP1) course, the knowledge and skills necessary for beginning nursing practice were introduced. For example, students were introduced to communication in nursing, and clinical skills such as taking a client's temperature and attending to a client's personal hygiene. In the first half of the semester students were required to do one week's clinical practice in a community setting, and later in the semester they did one week's clinical practice in a hospital setting. Completion of activities from the workbook was the major method of assessment in this semester. These activities were based on the content covered in the semester one lectures, tutorials and nursing laboratories and included case studies and nursing scenarios which required the students to apply theoretical and clinical knowledge to a client case or clinical activity. Selected activities in the workbook were marked twice during the semester and together they were worth 70% of the overall mark for NP1. The remaining 30% was allocated for an assignment.

Nursing Practice 2

The second Nursing Practice course consolidated and extended students' nursing knowledge and clinical skills, particularly in relation to the surgical client. Students studied microbiology, infection control and aspects of wound management. Students were required to do two weeks clinical practice in a surgical unit of a hospital. At both universities, students were required to do examinations which tested specific knowledge related to the course. These examinations were worth 50% at one university and 60% at the other and the remaining marks were allocated for nursing-related assignments which were contained in the NP2 workbook. At both universities, students were required to pass specific clinical skills which were assessed under examination conditions in the Nursing Laboratories.

4.5 Questionnaire

4.5.1 Introduction

The structured questionnaire, which was given to students in the first and second semester of the first year of their Bachelor of Nursing program, was the research instrument used for the quantitative aspect of this study. The semester one questionnaire (Appendix 2) included various research instruments—Self-Efficacy for Science (Andrew, 1998), Nursing Academic Self-Efficacy Scale (Harvey & McMurray, 1994), Nursing Clinical Self-Efficacy Scale (Harvey & McMurray, 1994), and the Motivated Strategies for Learning Questionnaire (Pintrich et al., 1991) —and items pertaining to students' entry characteristics and a Consent Form. Permission to use the research instruments was sought and obtained from the relevant persons (see Appendix 1). The Self-Efficacy for Science, Nursing Academic and Nursing Clinical Self-Efficacy Scales were developed specifically for use with pre-registration Australian nursing students. Whilst the questionnaire in semester two (Appendix 3) contained the same research instruments as those for semester one there were some modifications (4.5.4).

The questionnaire was given to nursing students early in semester one and late in semester two of the first year of their Bachelor of Nursing program with details of the data collection procedures given in 4.5.5. The data collection methods pertaining to the questionnaire (quantitative data) are discussed in section 4.6. The qualitative methods are discussed in Chapter 5. A variety of statistical techniques including structural equation modeling were used in the thesis and these are summarized in 4.7 and the chapter is summarised in section 4.8.

4.5.2 Purpose of Questionnaires

The purpose of the questionnaires was to:

- Establish students' entry characteristics, and to measure their self-regulated learning for their first year Science and Nursing Practice courses.
- Examine the interrelationships among students' entry characteristics, self-regulated learning (self-efficacy, task value, critical thinking, metacognitive self-regulatory learning strategies) and academic performance for their first year Science and Nursing Practice courses.
- Compare/contrast the course and semester similarities/differences in these interrelationships.
- Examine—for students who complete the semester one and two questionnaire—any changes that have occurred in students' self-regulated learning during the first year of their Bachelor of Nursing program.

It was expected aspects of the interviews would triangulate with the results from the questionnaires such as the relationship between relevance and academic performance and students' self-regulatory learning strategies and academic performance. These expectations are discussed in the results chapters.

4.5.3 Questionnaire: Content and Instrument Scoring/Coding

The summary statistics, including the means and standard deviations for the research instruments and alpha coefficients which are a measure of the internal reliability of a research instrument (Burns & Grove, 1997), were calculated, for each of the research instruments, for each of the semesters and these are given in Chapter 9.

Self-Efficacy for Science (Items 1-21)

The Self-efficacy for Science (SEFS), which measures the strength of a student's self-efficacy for science, was designed to assist in the prediction of academic performance in the science areas of first year Australian nursing curricula (Andrew, 1998). The SEFS contains 21 science items related to every-day and nursing-specific tasks. Students are asked to indicate their confidence in their ability to successfully perform the listed tasks (Andrew, 1998). Responses to the SEFS items are measured on a five-point scale, with one indicating a student was not confident, and five indicating the student was very confident in performing the science task. The SEFS was used to examine students' science self-efficacy in relation to academic performance in the science areas of first year nursing curricula.

SEFS scores for the study were calculated by: summing students' score for the SEFS items and dividing by the total number of items (21). The resulting score was an indication of a student's self-efficacy for science, with a low score indicating low self-efficacy and a high score indicating a strong self-efficacy for science.

Nursing Academic and Clinical Self-Efficacy Scales (Items 22-67)

The Nursing Clinical (NCSES) and Academic Self-Efficacy (NASES) Scales were designed to measure Australian students' academic and clinical efficacy expectations for pre-registration nursing programs (Harvey & McMurray, 1994). The research pertaining to these scales was discussed in Chapter 3 (3.3.2).

Nursing Clinical Self-Efficacy Scale (Items 22-45)

The Nursing Clinical Self-Efficacy Scale (NCSES) contains twenty four items pertaining to nursing skills—client treatment, interpersonal, hygiene and technical—that students may be taught in a nursing program (Harvey & McMurray, 1994). As the NCSES pertains to nursing skills, which are a component of the Nursing Practice courses, this research instrument was used in this study primarily in relation to Nursing Practice courses.

The NCSES contains a ten-point scale and students are asked to indicate how confident they are that they could learn the listed clinical skills, with one indicating low and ten strong confidence in learning the skill.

The NCSES score in this study was calculated by summing a student's score for the items and dividing by the total number of items. The resulting score indicated the strength of a student's self-efficacy for nursing clinical skills. A low score indicated low self-efficacy and a high score high self-efficacy for nursing clinical skills.

Nursing Academic Self-Efficacy Scale (Items 46-67)

The Nursing Academic Self-Efficacy Scale (NASES) contains twenty-two items relating to theoretical areas/topics—chemistry, physics, microbiology, anatomy and nursing constructs—that may be found in first year nursing (Harvey & McMurray, 1994). As the NASES contains many science items, it was anticipated that this research instrument would be related to students' academic performance for their Science courses.

Like the NCSES, the NASES requires students to respond, on a ten-point scale, to their confidence in learning the listed educational requirements and the students' NASES scores were therefore calculated in the same manner as the NCSES. The resulting score indicated the strength of a student's self-efficacy for nursing academic studies with a low score indicating low self-efficacy whereas a high score indicated strong self-efficacy for nursing academic studies.

Motivated Strategies for Learning Questionnaire (Items 68-98)

The Motivated Strategies for Learning Questionnaire (MSLQ) was designed to measure (American) students' motivation and learning strategy use, for a college course, from a general social cognitive viewpoint (Pintrich et al., 1993). For a discussion of the research instrument see Chapter 2 (2.4).

The 1991 version of the MSLQ, used in this study, has 81 items, divided into fifteen scales which were designed to be used singly or together (Pintrich et al., 1991). The scales are divided into either the motivation or learning strategy sections of the MSLQ. In an effort to contain the length, and hence questionnaire completion time and difficulty level, only selected MSLQ scales were used in the study. The scales selected to be used in the study were: Task Value and Self-Efficacy for Learning and Performance from the Motivation section and Critical Thinking and Metacognitive Self-Regulation from the Learning Strategies section of the MSLQ. These scales contributed a total of 41 items to this study's questionnaire. The MSLQ contains statements and students are asked to indicate on the scale how well each of the statements best describes the student.

Students' responses were measured on a seven-point scale, with one indicating the item was not true at all of them, and seven that it was very true of them (Pintrich et al., 1991).

The MSLQ was not designed to be used as a general measure of students' motivation and learning strategies for a program, but rather to assess these attributes at a course level (Pintrich et al., 1991). Whilst this study was concerned with two course areas, it was not feasible to distribute the questionnaire twice in one semester, so the questionnaire was given in the Science courses but students were asked to respond separately to the MSLQ items in relation to their Science and Nursing Practice courses. A similar method has been employed in a study where the MSLQ was used in relation to four different subject areas (Wolters & Pintrich, 1998).

Calculation of the MSLQ Scores

Two items on the MCSR were negatively scored items and for calculation purposes they were changed into positive scores. Students' scores for all the MSLQ scales were calculated, separately, by summing the scores for the items and dividing by the total number of items to give a mean score for the scale.

These calculations were done for both the Nursing Practice and Science courses and therefore, where appropriate, students received two scores—one for Science and one for the Nursing Practice courses—for each of the MSLQ scales used in the study. The symbol S was used to indicate those scores related to the Science courses (TV-S, SELAP-S, MCSR-S, and CT-S) and N to indicate them for the Nursing Practice course (TV-N, SELAP-N, MCSR-N, CT-N). It was possible, for example, for a student to have a low score for a scale in their Science course and a high score for the same scale in the Nursing Practice course.

Task Value (Items 68, 71, 74, 77-79)

The task value (TV) scale contains six items that measure the interest, importance and usefulness students assign to a course (Pintrich et al., 1991).

Self-Efficacy for Learning and Performance (Items 69, 70, 72, 73, 75, 76, 80 & 81)

The Self-Efficacy for Learning and Performance scale (SELAP) measures students' performance expectations and self-judgements of personal capability to master a task (Pintrich et al., 1991). It is therefore a more general appraisal of academic self-efficacy than the other self-efficacy instruments used in the study. The SELAP has been found to be the best, of all the MSLQ scales, at predicting academic course performance (Pintrich et al., 1993).

Critical Thinking (Items 84, 87, 88, 94 & 95)

The Critical Thinking scale (CT) measures the application of prior knowledge to new situations (Pintrich et al., 1991) and as Bachelor of Nursing students are being encouraged to develop critical thinking abilities it was decided to use this scale from the MSLQ.

Metacognitive Self-Regulation (Items 82, 83, 85, 86, 89-93, 96-98)

The Metacognitive Self-Regulation Scale (MCSR) determines students' reported planning (goal setting, task analysis), monitoring (self-testing) and regulating (adjustment/changes) (Pintrich et al., 1991). The MCSR scale was found to be strongly predictive of college students' academic performance (Pintrich et al., 1993).

Students' Entry Characteristics (Items 99-111)

The section of the questionnaire contained 13 items relating to students' entry characteristics.

First Choice (Item 99)

For this item, students were asked whether the nursing program was their first choice of study (Yes/No). Students for whom nursing is their first preference have been found to perform better academically than those for whom it is not a first choice (Andrew, 1995; Bishop, 1990). For SEM purposes the yes response was categorised as 2 and no as 1.

Prior Nursing Experience (Item 100)

To determine students' prior nursing experience, students were asked if they had ever worked in a nursing or nursing-related capacity. Students who indicated that they had prior nursing experience, were asked to specify the experience (not reported in this thesis). Students with prior nursing experience may have higher clinical self-efficacy beliefs than those who do not have any nursing experience (Harvey, 1995). For SEM purposes prior nursing experience were categorised as 2 and no nursing experience as 1.

Demographic Details/Mode of Study (Items 101-103)

The questionnaire contained two demographic items pertaining to gender (Item 101) and age (102) and one item determining students' mode of study (103), that is, whether they were studying full-time or part-time.

Students were divided into two groups according to their age. These groups were 17-19 years and 20+ (20 plus) years.

Males comprised 18.8% (n=57) of the total sample (n=303) in semester one, and females 81.2% (n=246). In the second semester there were 15.8% (n=32) males and 84.2% (n=170) females in the sample (n=202). Whilst the number of males in the questionnaire samples were reflective of nursing programs in general, the numbers enrolled were small, and it was decided not to use gender as a variable to this study.

Most students (n=258; 86%) were studying full-time at university with 14% (n=42) studying part-time. In semester two, a higher percentage of students were studying full-time (n=185; 92%) compared to the first semester, indicating that either some part-time students had changed to full-time, or more likely, had left the program. Students' study mode was not a variable investigated any further in this study.

Mode of Entry (Item 104)

Students were given a list of options in this item, to identify how they gained entry into university. These options included: HSC/TER (or equivalent), TAFE qualifications, Mature Age entry or "Other". The students indicating admission via the "Other" category were asked to specify their answer. The TAFE and "Other" responses were included in the Mature Age entry category (MAE) thus making two categories (HSC/MAE) for this variable.

Academic Entry Details (Items 105-106)

Students who gained entry to university by a HSC/TER or equivalent method were asked two items relating to their academic background. The first item was designed to determine students' approximate TER scores and students were given seven options to choose from. Except for two options, 0-35 and 86-100, all other options were given in intervals of ten for example, option 4 was 56-65. This arrangement was used as it was anticipated that most students would have TER scores in the 36-85 range and few would be likely to have scores significantly below 35 or higher than 86. After examining the summary statistics for students' TER scores it was decided to divide them into three groups. Students with TER scores in the range 1-35 and 36-45 were combined to make a low TER group. The 46-55 range became the medium TER group and all TER scores from 56-100 were combined to make the high TER group. These groups were categorised 1, 2 and 3 respectively for SEM purposes.

The second item (106) was designed to identify whether students had studied subjects considered relevant to this study—particularly Biology, Chemistry and Physics. Students who indicated in item 106 that they had studied Biology, Chemistry (including other Chemistry-based subject), and/or Physics (including Other Physics-based-subject) were combined to form two groups: HSC Biology/No HSC Biology and HSC Chemistry and Physics/No Chemistry and Physics. For SEM purposes HSC Biology/No HSC Biology was categorised 2 and 1 respectively as was HSC Chemistry and Physics/No Chemistry and Physics.

Socio-Economic Status (Items 107-108)

There were two items pertaining to student's socio-economic status (SES). In item 107, students were asked to specify their mothers' and fathers' occupations. In item 108, they were asked to nominate from a list their mothers' and fathers' highest level of occupation. In this study 44% of the students were found to be over the age of 20 years. As parents' occupation and education may not be a factor for these students it was decided not to proceed with this variable.

Ethnicity (Items 109-111)

Ethnicity, can be defined as a group of "people who share characteristics, which give them a distinctiveness and a difference from others" (Price & Cortis, 2000, p. 237). Among the characteristics that may be shared are country of birth and/or language. In this study the term non-English speaking background (NESB) is used to refer to persons born in a non-English speaking country and who speak a language other than English in the home.

In the first semester there were three items in the questionnaire that pertained to a student's ethnicity. In the first item (109) students were asked where they were born. It was anticipated that the first option—Australia/New Zealand/United Kingdom—would identify the students with an English speaking background (ESB) including Australians and those students from the major ESB sources of migration to Australia (Australian Bureau of Statistics, 2000).

It was anticipated that the second option "Other" would identify those students from a NESB. It should be noted that no data in this section were collected on Australians from Aboriginal and Torres Strait backgrounds, for whom English may be a second language, as the number of students with this background tend to be very small and may therefore be insufficient for statistical analysis. For example 0.05% of the registered nurses in Australia are from Aboriginal and Torres Strait backgrounds (Goold, 1995). For SEM ethnicity was categorised as 1 for students with an ESB and 2 for those with an NESB.

In the second item (110), students were asked to indicate whether the usual language spoken at home was English or another language. It was anticipated that students' birthplace and language spoken at home would be closely linked. In the third item relating to students' ethnicity, students were asked to indicate the birthplace of their parents (111) with two options, the same as for item 109, given for both parents.

Consent Form

The consent form, which was incorporated into the questionnaire, consisted of two parts. In the first part of the consent, students' permission to collect their academic grades/mark for all first year courses was sought, with students being asked to give their student identification number, signature and the date (Appendix 2, Q112a).

In the second part of the consent form, students who were interested in participating in a discussion about issues related to the questionnaire were asked to provide their telephone number (Appendix 2, Q112b).

Consent forms were coded, detached from the questionnaire and stored separately from the questionnaire.

4.5.4 Questionnaire: Semester Two

The questionnaire in semester two had fewer items, compared to the first semester questionnaire and was a different colour (blue) to distinguish it from the first semester questionnaire (Appendix 3). Nevertheless, the questionnaire in semester two was very similar to the first semester instrument and contained the same research instruments—SEFS, NASES, NCSES, MSLQ. The introductory statements, for the motivation and attitudes and learning strategies sections of the MSLQ, were modified to include the appropriate second semester nursing and science courses. The item numbers for each of the research instruments were exactly the same for both questionnaires.

There were some changes in the introductory section "What You Need To Do" (Appendix 3). Some additional sentences were included to make students aware that it was not a test of their memory, but rather the questions should be answered according to how the categories apply to them now, or according to what their opinion is now.

Several of the items relating to students' personal details and experiences, were deleted which shortened the completion time. The items retained were those pertaining to students' gender (100), age (101) and Full-time/Part-time status (102).

Only one item pertaining to students' ethnicity was used in the Semester Two questionnaire. In this item (103) students were asked whether they were born in Australia and they could choose from two responses—Yes/No. Students choosing the "No" option were asked to specify where they were born.

On the advice of a statistician from the University of Wollongong Statistical Consulting Service, an item about life changes that students may have encountered over the year was added to the questionnaire. It was felt that this information might add incremental knowledge where a student's responses on the research instruments had altered significantly over the year. Students were required to respond to a list of life-changing situations or to specify their own life-changing situation. These results are not discussed in this thesis.

Consent Form: Semester Two

The consent form was identical to item 112a on the first semester questionnaire. The procedures taken to protect students' confidentiality and anonymity were the same as those taken in semester one and outlined in sub-section 4.5.3.

4.6 Data Collection

4.6.1 Introduction

The principle method of quantitative data collection was the questionnaire which was used to survey first year Bachelor of Nursing students in the first and second semesters of their program. Two universities (three campuses) in NSW were used in the data collection process.

The data collection process started early in semester one of 1998, with the administration of the questionnaire and was not completed until the first semester of 1999 with the final collection of students' academic results for semester two 1998.

Although two course areas were the focus of this study, it was decided for consistency, both between the universities and over the year, to target one course for the questionnaire administration and Science was the course chosen to target.

4.6.2 First Semester

Students were surveyed approximately half way during their thirteen week first semester of their first year Bachelor of Nursing program. As students' first clinical experience may influence their perceptions about nursing, students at all campuses were surveyed by questionnaire before their first clinical placement. The data collection procedures varied at both universities.

University X

Permission was given (see section 4.2.3) to administer the questionnaire at both campuses of University X during tutorial time for their Science course. These tutorials were compulsory and students were expected to attend at least 80% of tutorials (that is, they could only miss a few tutorials) to meet the requirements of the course.

There were five science tutorial groups at both campuses. The questionnaire was administered to the tutorial groups over four consecutive days in week six at one campus and then this procedure was repeated in week seven at the other campus. The time taken to complete the questionnaire took approximately 15-25 minutes.

University Y

It was not possible to survey students during tutorial time at University Y (see section 4.2.3). At the end of a Science lecture a slide prepared by the researcher, was used to introduce the nursing students to the purpose of the research, confidentiality of the questionnaire and the method for collecting the questionnaire. The questionnaires were distributed before students left the lecture theatre. A secure collection box, for the completed questionnaires, remained in a prominent place for two weeks after the questionnaire distribution. One week after the questionnaire distribution, students received a reminder, during another Science lecture.

4.6.3 Second Semester

To be consistent, the Science course tutorials or lectures were again used for the questionnaire survey. The data collection methods used in semester one were repeated in semester two. At all campuses students were surveyed during the last few weeks for the second and final semester of the first year Bachelor of Nursing program. The questionnaire completion time was approximately 12-20 minutes.

4.6.4 Collection of Academic Results

Each semester, after students were surveyed, lists were made of students who gave consent to the collection of their academic results. The academic results of these students were collected from the academic administrators of the respective universities involved in the study. After students' results were collected, the questionnaires were coded to protect students' confidentiality and anonymity. Consent forms were detached from the questionnaire. Students whose first and second semester questionnaires could be matched were given the same code for each questionnaire. This code was used for data entry and any statistical analyses.

4.6.5 Questionnaire Respondents

The semester one and two questionnaire respondents and percentage of students who gave consent for the collection of their academic results are given in Table 4.1. Further discussion of the questionnaire samples and its relationship to power is contained in 4.7.3.

Semester One

For the first semester 93% (n=111) of students at campus 1, 90% (n=129) at campus 2 and 46% (n=85) at campus 3 completed the questionnaire. Of these students, 68% gave consent for the collection of their academic results at campus 1 and 60% from campus 2 and 3 gave their consent.

Semester Two

In the second semester, 91% (n=83) of students enrolled in Sc2 completed the questionnaire at campus 1, 78% (n=86) at campus 2 and 31% (n=33) at campus 3. Of these students 70%, 71% and 88% respectively from campuses 1, 2 and 3 gave permission for the collection of their academic results.

Table 4.1

Semester one and two questionnaire respondents and percentage of students giving consent for collection of academic results

University	Questionnaire Respondents n	Consent for collection of academic results n	%
		Semester One	
Campus 1	102	69	68
Campus 2	116	70	60
Campus 3	85	51	60
Total	303	190	63
		Semester Two	
Campus 1	83	58	70
Campus 2	86	61	71
Campus 3	33	29	88
Total	202	148	73

4.6.6 Academic Performance

There were two measures relating to academic performance used in the study. The first measure was students' academic results, that is mark and grade, for their first year Bachelor of Nursing courses. The collection of these marks/grades has already been discussed. The grades awarded in order of highest to lowest academic performance were: High Distinction (HD), Distinction (D), Credit (C), Pass (P) and Fail (F).

The other measure of academic performance used in the study was the low and high achievement groups. Students were divided into these groups according to their grades, with Fail and Pass grades combined to form the Low Achiever (LA) category, and Credit, Distinction and High Distinction grades combined to form the High Achiever (HA) category.

Academic Fail

Students may fail because their academic performance is below that considered necessary to pass the course. Others are awarded a Fail grade because, although they have withdrawn from either a course or the program, their withdrawal has occurred after the date specified by the university for withdrawal from a course without penalty (that is, no grade is awarded). Other students withdraw informally, that is, they stop attending university, do not attend tutorials or submit required academic work, but do not inform the university that they have withdrawn from a course or the program. Where possible, students who failed because they withdrew (formally or informally) from the course, were not included in the statistical analyses of academic performance.

4.7 Statistical Analyses

4.7.1 Introduction

The quantitative data were coded and initially entered into a SAS™ (1988) computer program. Later the data were transferred to SPSS (2000) and the statistical package AMOS (Analysis of Moment Structures, 1998) was used to assist with structural equation modeling (SEM). This section begins by overviewing the statistical techniques used in the thesis (4.7.2). This overview does not include SEM which is discussed in 4.7.4. The sample size and power of the study reported in this thesis is discussed in 4.7.3. Some results pertaining to students' academic performance are also contained in this section (4.7.5) as they have bearing on the method used in the thesis and help to set the scene for the results chapters.

4.7.2 Statistical Techniques Overview

The statistical techniques used in this study included descriptive statistics, t-test, Analysis of Variance, Chi-Square test and Pearson Product-Moment Correlational Analysis. The rationale for choosing a particular technique and examples of where it was applied is discussed in this sub-section. The results obtained from these techniques appear in the following chapters (5, 6, 7, 8 and/or 9).

Before any advanced statistical techniques were used, descriptive statistics including means and standard deviations (SD) were computed for any of the variables being investigated (see for example Table 4.2).

Where the difference between two groups was being investigated, for example nursing as a first preference, the t-test was used (Burns & Grove, 1997; Tuckman, 1994). Analysis of Variance (ANOVA) was used in the investigation of the relationship between two or more independent variables, for example students' TER and the dependent variables—research instruments and academic performance (Burns & Grove, 1997; Tuckman, 1994).

To examine the statistical relationship among variables, for example the relationship among the research instruments (Table 9.2), Pearson's Product-Moment correlational analyses were computed.

Chi-square analysis was used to determine if variables were related or independent of each other (Burns & Grove, 1997, p. 454), for example, in Table 6.3 the association between students' age groups (17-19 years and 20+ years) and selected entry characteristics were examined.

The significance level of 0.05 was used for all statistical tests in this thesis.

4.7.3 Questionnaire Sample Sizes and Power of the Study

The number of students who completed the questionnaire was n=303 and n=202 for semester one and two respectively. As the questionnaire was administered during tutorial or lecture time for the Science courses these numbers relate to those students enrolled in the Science course at the time of the questionnaire administration. This sample of students is referred to as the questionnaire sample in this thesis.

The percentage of students who completed the questionnaire and gave consent for the collection of their academic results was 63% (n=90) for semester one and 73% (n=148) for semester two. Not all of these students completed their respective courses or had complete questionnaires, therefore the academic results for Sc 1 are based on 143 students, 136 for NP1, 128 Sc2, and 124 for NP2.

Sample size is important in any study as it influences power, and this is particularly applicable in SEM which requires large sample sizes (Norris, 2001b). The minimum size for SEM has been suggested as 100-200 subjects (Hair, Anderson, Tatham & Black 1995; Norris, 2001b). Other authors suggest that the model complexity should be taken into account and that power should be calculated accordingly (Floyd & Widaman, 1995).

It has also been suggested that studies should aim for alpha levels of 0.05 with power levels of 80% (Cohen, 1977). In this study, the Sc1 hypothesised model has the most paths and to produce a power of 80% with an alpha of 0.05 and medium effect size of 0.30 a sample of 130 students is required (Tabachnick & Fidell, 1996). With 143 subjects, it can be stated that Sc1 hypothesised model achieves this power level. The sample sizes in the other courses are slightly below those for Sc1, but as they have less variables/paths, power analysis indicated that they have the same power in this study as that for Sc1.

4.7.4 Structural Equation Modeling

Structural equation modeling (SEM) enables a researcher to hypothesise and then analyse the relationships in a theoretical model (Byrne, 2001; Ewert & Sibthorp, 2000; Mulligan, 1998; Norris, 2001b). One of the advantages of SEM is that it can assess both a measurement model and structural (path) model simultaneously (Bryne, 2001; Mulligan, 1998), and there is a variety of computer programs to assist in this statistical analysis. In this thesis, as stated in 4.7.1, the AMOS (1998) computer program was used to analyse the variables in the conceptual model presented in Figure 2.2. For an indepth discussion of this program see Bryne (2001).

In SEM, a model is comprised of latent variables which are the theoretical constructs of the model and the underlying measured variables called manifest or observed variables (Byrne, 2001; Norris, 2001b). In SEM, latent variables may be termed exogenous variables (cf independent variables) if they influence other variables particularly endogenous variables (cf. dependent variable) and this influence can be direct, indirect or both direct and indirect (Byrne, 2001; Norris 2001b). The latent variables and manifest variables and endogenous and exogenous variables for the proposed model in this thesis are discussed in Chapter 9.

Before conducting SEM the data should be considered (Norris, 2001b). In SEM, data should have a normal distribution and where a non-normal distribution of the data for the study was observed, it was transformed using the procedures found in Tabachnick and Fidell (1996, pp. 81-85). Other preliminary steps in SEM include calculating Cronbach alphas for the research instruments and computing correlations among the data to assess for multicollinearity (Hair et al., 1995; Tabachnick & Fidell, 1996). These statistical techniques were performed and are reported in Chapter 9.

SEM in this thesis included data that were both continuous and categorical/or dichotomous. Whilst it is recommended that data in SEM be continuous (Munro, 2001) others suggest that it is possible to use categorical/dichotomous data without the need for additional statistical techniques if the variables are exogenous (Quintana & Maxwell, 1999). The dichotomous variables used in this thesis—student entry characteristics (for example nursing as a first choice yes/no)—were exogenous. It should be noted that Pearson correlation coefficients may be lower than continuous variables when dichotomous variables are used (Byrne, 2001). It has been suggested that categorical variables which have more than four linear categories may be treated as continuous even if it is an exogenous variable (Bentler

& Chou, 1987; 1988). In this thesis all the categorical variables—SEFS, NASES, NCSES—had more than four linear categories and were therefore treated as continuous variables.

The next step after consideration/preparation of the data is to compute and evaluate the parameter estimates for the model being tested (Hair et al., 1995). An adapted version of the Pintrich and Schrauben (1992) model presented in Chapter 2 is the model being tested. This is termed the hypothesised model in Chapter 9, with models being tested for each of the first and second semester Science and Nursing Practice courses. In this thesis the standardised path coefficients (β), standard errors, critical ratios and statistical significance levels were computed for individual parameters and these results are reported in Chapter 9. The critical ratio is "the parameter estimate divided by its standard error" and for a probability level of 0.05 the statistical result should "be >±1.96 before the hypothesis (that the estimate equals 0.0) can be rejected" (Byrne, 2001, p. 76).

In SEM, to assess the consistency of a set of data with the hypothesised model, goodness-of-fit indices are computed. If these indices are assessed as adequate then the model may be accepted as plausible with the relationship among the variables seen as supported by the statistics (Bryne, 2001; Mulligan, 1998). SEM computer programs, including AMOS, produce a range of goodness-of-fit indices, and authors recommend that a variety of these indices should be used when evaluating the fit of a model (Hair et al., 1995; Norris, 2001b). Moreover it is suggested that the indices chosen should measure different aspects of the fit of the model to the data (Hair et al., 1995; Norris, 2001b).

The goodness-of-fit indices reported in this thesis and found in Chapter 9 include: the Model Chi-Square; Normed Chi-Square; Adjusted Goodness-of-Fit Index (AGFI); Adjusted Goodness-of-Fit Index (AGFI); Tucker-Lewis Index (TLI); Comparative Fit Index (CFI); and, Root Mean Square Error of Approximation (RMSEA). These indices measure different aspects of the model fit and therefore provide the variety of indices recommended when evaluating of the fit of the model (Hair et al., 1995; Norris, 2001b).

The Model Chi-Square is the most common test of fit and measures the difference between two models which in this study are the hypothesised model and the observed data (Byrne, 2001; Hair et al., 1995). A non-significant Chi-Square, which is the desired result, indicates that there is no difference between the data and the model being fitted (Hu & Bentler, 1995; Norris, 200b). Whilst some suggest that the Chi-Square test is overly sensitive to sample size (Hair et al., 1995), others disagree and suggest that the Chi-Square has limitations as a fit index because it "evaluates for an overly restrictive condition" (Quintana & Maxwell, 1999, p. 503). It is suggested therefore that the Chi-Square should be used in conjunction with other measures to determine fit of the model (Hair et al., 1995; Quintana & Maxwell, 1999).

The normed (also called relative) Chi-Square (obtained by dividing the model Chi-Square with its degrees of freedom) may be less influenced by the sample size with results below 3 considered an indication of an adequate fit for the model with the data (Kline, 1998).

The goodness-of-fit (GFI) index measures the "relative amount of variance and covariance" accounted for by a specified model (Byrne, 2001, p. 82) and the AGFI is a version of this index. As the AGFI adjusts for the degrees of freedom (DF) and parameters in a model being examined (Byrne, 2001, p. 82) it may be a useful index to use when sample sizes are small-moderate as was the case in this study. The CFI was included in the study as it accounts for underestimation of fit in small samples (Byrne, 2001, pp. 82-83). The TLI is a recommended fit index for parsimony and over-fitting data (Byrne, 2001; McDonald & Marsh, 1990). The AGFI, CFI and TLI are measured between 0-1 with results 0.90-0.95 indicating a satisfactory fit (Byrne, 2001; Norris, 2001b; Quintana & Maxwell, 1999).

It has been suggested that the RMSEA is an informative goodness-of-fit index particularly as it is less influenced by sample sizes than some of the other goodness-of-fit indices such as the Chi-Square (Quintana & Maxwell, 1999). The RMSEA, measures the discrepancy of fit of the model as per degrees of freedom (Byrne, 2001, p. 84) with values ranging between 0.05-0.08 indicating a reasonable fit (Byrne, 2001, p. 84; Quintana & Maxwell, 1999, p. 503).

After conducting SEM for the hypothesised models for the first and second semester Science and Nursing Practice courses ad hoc modifications of these models were made and the models were retested. The ad hoc trimming of the hypothesised models was guided by theory (Chapter 2), the literature, (Chapter 3), the parameter estimates and the statistics for the goodness-of-fit indices (Byrne, 2001; Norris, 2001b; Quintana & Maxwell, 1999). Residuals and modification indices which may aid the trimming process were also consulted but are not reported in the thesis. The respecified trimmed ad hoc models were then tested using AMOS. For some models this process occurred several times. The results for the hypothesised models, the trimming process and the final (trimmed) models are presented in Chapter 9.

4.7.5 Students' Academic Performance

The summary statistics for students' academic performance and the relationships among them are presented in this sub-section as they both concern the data collection method discussed in this chapter and assist in "setting the scene" for the following results chapters.

The mean (M) academic performance scores (marks) for the Nursing Practice courses were higher and the standard deviations (SD) lower, in both semesters, than the Science courses. Whilst the mean academic performance score for the second semester Nursing Practice course was higher than the first semester course the mean academic performance score for the Science course was lower in this semester.

Table 4.2

Summary statistics for Science and Nursing Practice courses

	M	SD
Sc1 n=143	60.20	15.61
Sc2 n=128	58.91	15.05
NP1 n=136	74.82	12.77
NP2 n=124	78.46	12.81

It was possible to obtain the mean academic performance score, for students who did not give consent on the questionnaire for the collection of their marks/grades. This was performed by removing, from the course list, the marks for students who did give consent, and then calculating the average mean for the remaining students (the overall average was given only to the researcher and hence these students' anonymity was maintained). The mean academic performance score for the first semester Science course, for those students who did not give consent for the collection for their grades, was 61.82 which was slightly higher than the mean for students who did give consent (M=60.20). The mean academic performance for the second semester Science course, however, was 55.77 for those students who did not give consent, which was lower than that for those who did give consent for this semester (M=58.91).

The mean academic performance score for Nursing Practice was only available for two campuses for the first semester. The mean academic performance Nursing Practice score for this semester was 73.26 for those students who did not give consent for the collection of their marks, which was slightly lower than that for those who did give consent (M=74.82). For the second semester, the mean academic performance was higher (M=82.9) for students who did not give consent compared to those who did give consent (M=78.46).

All the first and second semester courses academic performance scores were statistically significantly correlated to each other. As would be expected the correlations were higher between the same course areas than between the different course areas. The interrelationships among the first and second semester Science and Nursing Practice courses are shown in Table 4.3.

Table 4.3

Relationships among Science and Nursing Practice courses

	Sc1	Sc2	NP1	NP2
Sc1	1.00			
Sc2	0.75***	1.00		
NP1	0.43***	0.58***	1.00	
NP2	0.42***	0.48***	0.65***	1.00

***p=0.000.

4.8. Summary

This study used a multimethod approach combining the use of quantitative questionnaires and qualitative telephone interviews of students and face-to-face interviews of academics to examine nursing students' entry characteristics, self-regulated learning and academic performance for their first year Bachelor of Nursing Science and Nursing Practice courses. A multimethod approach was chosen as it was considered that this approach would give a more comprehensive picture of students' entry characteristics, self-regulated learning and academic performance than the use of a single method. In this chapter the method pertaining to the questionnaire is discussed with the method relating to the interviews discussed in the next chapter (5).

Three university campuses, which had similar curricula (two had an identical curriculum), were involved in the study. Approval for the study was sought from the relevant personnel at the universities and ethics approval was granted from the appropriate committee at the researcher's university.

The questionnaire, which was given to students early in the students' first semester and again at the end of their second semester of their first year Bachelor of Nursing program contained various research instruments—SEFS, NASES, NCSES, and selected scales from the MSLQ—and items pertaining to students' entry characteristics and a Consent form. The first semester consent form had two sections—one for providing consent to collect students' academic grades/marks for all their first year Bachelor of Nursing courses and the other related to the provision of their telephone number to discuss various issues arising from the questionnaire. 303 students completed the questionnaire with 190 (63%) giving consent for the collection of their academic grades/marks. A variety of statistical techniques were used in the analyses of the quantitative data including structural equation modeling. The results for these analyses are contained in Chapters 6-9. Qualitative data were also collected for this thesis and the method pertaining to these data is presented in Chapter 5.

Chapter 5

METHOD 2: Interviews

5.1 Introduction

Interviews of students enrolled in first year Bachelor of Nursing programs with academics involved in the teaching/tutoring of the Science and Nursing Practice courses in the Bachelor of Nursing programs were the qualitative methods used in this thesis and are discussed in this second methods chapter. The telephone interviews are discussed in 5.2 including the purpose and content of the interviews, participants, conduct of interviews and data analyses. Discussion about the face-to-face academic interviews is found in 5.3, with the format of the discussion following that for the telephone interviews. Issues relating to reliability, validity and generalisability of the qualitative data can be found in section 5.4. and the summary of the chapter is found in 5.5.

5.2 Telephone Interviews

5.2.1 Introduction

Telephone interviewing was chosen as the method for collecting qualitative data from students as it offered several advantages over conducting face-to-face interviews. One advantage was a potential saving in time and costs, as telephone interviews have been found to be more time and cost efficient than face-to-face interviewing (Burnard, 1994; Lorig, Gonzalez, Ritter & De Brey, 1997; Nay-Brock, 1984; Stetson & Romeo, 1996) particularly if travelling is involved (Barriball, Christian, While & Bergen, 1996; Burnard, 1994; Chapple et al., 1993; Stetson & Romeo, 1996). This would have been the case in this study, as students were spread across three university campuses. Telephone interviews have been found to have high response rates (Nay-Brock, 1984), particularly if the participant has had pre-interview contact (Worth & Tierney, 1993), and as students in this study had contact with the researcher during the questionnaire distribution phase, this was another advantage of choosing telephone interviewing over face-to-face interviews in this study. Thus, on the basis of their time and cost efficiency, anticipated high response rates, and the fact that the quality of data collected by telephone interviews has been found to be, on par, or better than face-to-face interviews (Burnard, 1994; Lorig et al., 1997; Nay-Brock, 1984; Stetson & Romeo, 1996) it was decided that the qualitative data for this study would be collected, from students, by telephone interviews.

When choosing a data collection method it is important to also consider the disadvantages of the method being selected. The main disadvantage of qualitative telephone interviewing identified as relevant to this study, was the lack of non-verbal cues available during the interview (Burnard, 1994; Chapple, 1999), which meant that the researcher had to be attentive during the interview to verbal cues such as tone of voice (Barriball, Christian, While & Bergen, 1996; Chapple, 1999), pauses and expressions (Barriball et al., 1996).

Thus semi-structured telephone interviews of students enrolled in Bachelor of Nursing programs were used to collect qualitative data for this study with the interviews being conducted in the middle of the first semester and at the end of the second semester of the students' first year.

It should be noted that whilst the telephone interview sample was derived from the questionnaire, the telephone interviews then proceeded independently of the questionnaires. The results from the telephone interviews, questionnaires and the academic interviews were combined, however, to give a comprehensive view of first year nursing students' entry characteristics, self-regulated learning and academic performance in their Science and Nursing Practice courses. The results for the telephone interviews can be found throughout Chapters 6-9.

5.2.2 Purpose of Telephone Interviews

The telephone interviews served three purposes:

- To increase our understanding of students' motivation (self-beliefs/expectations, relevance perceptions), for their Science and Nursing Practice courses, including how it relates to academic performance in those courses.
- To identify and compare/contrast the learning strategies students use for their first semester Science and Nursing Practice courses and understand how their strategy use relates to academic performance in those courses.
- To identify and understand any changes that may occur in students' learning strategies and motivation in the second semester of their Science and Nursing Practice courses.

5.2.3 Content of Telephone Interviews

The telephone interviews were semi-structured and the interview schedules are contained in Appendix 4. The telephone interview questions were designed to expand, complement, or triangulate with the questionnaire/academic interview results.

First Semester

The first question on the first semester schedule related to why students choose to study nursing. This question was used primarily to establish rapport with the students being interviewed (see 6.4.5), although it was also anticipated that the results to this question would triangulate with the questionnaire item (Q99 Appendix 2) regarding the program as a first choice (see 6.2 for results).

Students were then asked questions about their Bachelor of Nursing program, whether they expected to study science in the first year of their program, their high school science background, their feelings about their Science and Nursing Practice courses and their expectations for success in these courses (see Appendix 4). These questions were designed to increase our understanding of students' self-efficacy for their Science and Nursing Practice courses.

Students were also asked about the perceptions of the relevance of their Science and Nursing Practice courses to their clinical practice. It was anticipated that students' comments, on this topic, would complement and triangulate with the task value areas of the questionnaire.

Lastly, students were asked a question aimed at identifying the learning strategies they report using for their Science and Nursing Practice courses. This question served to expand our understanding of the strategies students use for these courses, and it was anticipated that the results might also triangulate with aspects of the questionnaire related to learning strategies.

All of the above areas—self-efficacy, relevance and learning strategies—were also examined in relation to students' academic performance in their first semester Science and Nursing Practice courses.

Second Semester

The second semester telephone interview schedule was shorter than that for the first semester. As an introduction, and to determine students' expectations and self-beliefs, students were asked to discuss their second semester Science and Nursing Practice courses. It was anticipated that this question, in addition to establishing rapport with students, would also assist the researcher to understand students' self-efficacy beliefs for these courses.

Like the first semester, students were asked about their perceptions of the relevance of their second semester Science and Nursing Practice courses to clinical practice. These comments served to complement and triangulate with the results from the other data collection methods. The results were also used to examine changes, over the year, in students' relevance perceptions. In the second semester, students were also asked about the learning strategies they used for their Science and Nursing Practice courses and if they had changed the way they had studied for these courses in this semester. It was anticipated that the results from these questions would expand and triangulate with those for the questionnaire, particularly in relation to any changes in students' strategies in this semester.

Both students' comments about their relevance perceptions and learning strategies were examined in relation to their academic performance for their second semester Science and Nursing Practice courses.

5.2.4 Telephone Participants

On the first semester questionnaire consent form, which was distributed in the middle of semester one, was provision for students to provide their telephone number if they were interested in participating in a discussion about issues related to the questionnaire (Appendix 2, 112b).

Of the 190 students who gave their consent to the collection of their academic grades, 80 students (42%) also provided their telephone number. The number of students who provided their telephone number was larger than expected, as research using a similar method (questionnaire incorporating consent for a telephone interview) found that 32% of questionnaire respondents gave consent to be interviewed (Carr, 1999, p. 195).

Due to the nature of the research, including time constraints, it was not possible to attempt to interview all of the students who provided their telephone number and it was decided that a sample of these should be interviewed. As nursing students may have widely varying backgrounds and experiences that may influence, for example, their relevance perceptions and approach to the study of their first year Science and Nursing Practice courses, it was decided to employ purposeful sampling. Purposeful sampling involves the deliberate selection of persons to assist with data collection (Maxwell, 1996; Miles & Huberman, 1994). Purposeful samples may be chosen for different reasons, with the selection of persons for the sample varying according to those reasons (Maxwell, 1996). In this study, students were selected to represent the heterogeneity of the student questionnaire population, as this would ensure that variations in students' backgrounds, as identified by the questionnaire and considered relevant to the present study, would be represented in the telephone interview sample (Maxwell, 1996).

The selection of the purposeful sample of students presented some difficulties as the sample needed to be selected relatively quickly to enable the interviews to be proceed, as planned, during the middle of the first semester. To assist with the selection of the purposeful sample, the questionnaires of students who had agreed to a telephone interview were scrutinised to identify their demographic/ethnic/academic entry characteristics. On the basis of this scrutiny certain characteristics were chosen and used as a guide for selecting students for the purposeful sample. The characteristics chosen were students' mode of entry (MAE/Other and HSC), ethnicity (ESB/NESB), previous nursing experience, nursing as a first choice, HSC Biology, HSC Chemistry and gender. The results in Table 6.3 show that a number of these characteristics are statistically related, but at this stage of study, these results were not known.

A purposeful sample of 40 students was interviewed by telephone in the middle of their first semester of their Bachelor of Nursing program, and 19 of these students were interviewed again at the end of their second semester. Of the students interviewed in the first semester, 21 students were not interviewed a second time as 10 students had left the program, and 11 students had either moved (established by phoning original number and talking to persons at that phone number), or could not be contacted after repeated telephone calls (reason unknown).

5.2.5 Characteristics of the Telephone Interview Sample

The characteristics used to select the telephone interview sample were listed as: students' mode of entry into university (MAE/Other and HSC), ethnicity (ESB/NESB), previous nursing experience, nursing as first choice, HSC Biology, HSC Chemistry and gender. These characteristics were chosen to reflect the heterogeneity of the student questionnaire population. A comparison of the characteristics of the telephone interview and the questionnaire samples of students is given in Table 5.1. Here it can be seen that both samples are very similar. The interview sample has 10% more mature age entry students and correspondingly less high school leavers than the questionnaire sample. In Chapter 6 (Table 6.3) certain characteristics such as mode of entry, previous nursing experience, HSC Biology and HSC Chemistry are shown to be linked. The telephone interview students were slightly more likely to be mature age entry students, which probably accounts for the fact that the telephone interview sample is also slightly more likely to have previous nursing experience, and less likely to have HSC Biology and HSC Chemistry than the questionnaire sample. Mature age entry students were more likely to be at home, than high school leavers, when contacted and as the males were more likely to be high school leavers this accounts for the smaller percentage of males in the telephone interview sample (7.5%) as compared to the questionnaire sample (18.2%). Overall, however, the telephone interview sample of students can be seen to be reflecting the heterogeneity of the questionnaire sample of students.

Table 5.1

Comparison of students' background details: questionnaire and telephone interview samples

Details	Questionnaire Sample % n=303	Telephone Interview Sample % n=40
Mature age entry	45	55
High School Leaver	55	45
NESB	30	30
Previous Nursing Experience	36.5	42
HSC Biology	37	30
HSC Chemistry	25	17.5
Gender-Female	81.2	92.5
Gender-Male	18.8	7.5

Of the variables discussed in relation to the telephone interview sample of students, in the semester two questionnaire only students' age, birthplace and gender were obtained. In semester two: 54% were aged 20+, 32% were from a NESB and 8% were male compared to 43% 20+, 31% NESB and 15% males for the questionnaire sample of students in this semester.

5.2.6 Conduct of Interviews

The researcher conducted the telephone interviews and was responsible for the questionnaire distribution. This presented two advantages. Firstly, it avoided the need for interviewer training, and other standardisation procedures that are necessary when more than one interviewer is used in telephone interviewing (Frey, 1983). Secondly, as the researcher had contact with the students during the questionnaire phase, it seemed to help in the establishment of rapport during the telephone interview. Other researchers (Worth & Tierney, 1993) have also found that pre-interview contact with participants has aided rapport. Rapport is important in interviewing, because it leads to “more informed research” (Fontana & Frey, 1994, p. 397).

Both telephone interviews started with an easy question/topic as starting with an easy, interesting and relevant question has been recommended when conducting telephone interviews (Dillman, 1978) particularly as it may help with the subsequent development of rapport between the researcher and the telephone interview participant (Frey, 1983, p. 105).

The telephone interviews were semi-structured—in that they were guided by a schedule—to focus the areas of discussion. The interviews were primarily concerned with increasing our understanding of the data and therefore strict adherence to the schedule may have compromised this reason for conducting the interviews (Bogdan & Biklen, 1992) hence students were not discouraged from talking about an area that they considered relevant to the question.

During the interview the researcher recorded students’ comments by hand. To ensure accuracy, the interviews were transcribed onto computer files as soon as possible after the telephone interview. This usually occurred the same day or the day following the interview. To maintain confidentiality during analysis, interview transcripts were coded using the codes from students' questionnaires.

A record sheet was used to keep record of the day and time each student was called and, if interviewed, the length of the interview. These sheets were used for both semesters and for all students contacted by phone.

First Semester

The first telephone interviews were conducted over a period of two weeks which was approximately the middle of the first semester. Telephone interviews were conducted on weekday and Sunday evenings, afternoons on the weekend and daytime on Fridays. These times and days were selected after consulting the academic timetable and hypothesising about students' possible family, study and work commitments. When students were telephoned, the researcher introduced herself, reminded them that they had put their name on the questionnaire, established whether they were still willing to participate in the study and asked if they had time to answer some questions. Most students were willing to talk, only one declined to be interviewed. If the time was not convenient they were contacted again at a mutually suitable time. If a student could not be contacted after 4 telephone calls the next student on the list was telephoned. At the end of the interview, which ranged in time from 15-40 minutes (average 25 minutes) the student was asked if she/he were willing to be interviewed again in the second semester.

A total of 109 telephone calls was made, with 36% of calls unsuccessful, and 56.8% resulting in a student interview. Of the students interviewed, 67.5% were contacted on the first call, 25% on the second telephone call, 2.5% on the third call, and 5% on the fourth call. The average number of calls per person was 1.55. 8.75% of the telephone calls could not be connected because of some difficulty with the telephone number. This percentage is in keeping with research findings regarding telephone interviews (Barriball et al., 1996).

Second semester

Students were interviewed again in the last few weeks or study recess of the second semester. A total of 43 telephone calls was made in this semester. Of the students interviewed, 75% were contacted on their first call, 15% on the second call and 10% on the third call. Whilst the conduct of the second interview was similar to the first semester interview, the length of the interview was shorter—average 15 minutes. Students were thanked for their participation in the research at this interview and informed that this was their final telephone interview.

5.2.7 Data Analyses

To facilitate analysis, the data from students' answers to the same questions or related topic areas were first copied into separate computer files. This process enabled the data relating to one question/area to be viewed in its entirety and was a preliminary step, albeit elementary, in the analysis process (Burnard, 1994). For all segments of data the individual student identification codes were retained. This enabled the researcher to keep track of the data for individual students, allowed for comparisons of students' comments on different topics and for the researcher to assign the data according to students' academic achievement group (see academic performance).

The data were analysed by the researcher, which as for the conduct of the interviews, meant that this avoided the need for standardisation. The analysis process was checked by another person to see that the interpretations derived from the data reflected students' viewpoints found in the data (Maxwell, 1996).

The data pertaining to the students' telephone interviews were analysed using the method adapted from Coffey and Atkinson (1996, p. 26-53). The steps in this analysis process are outlined in steps 1-3 with examples used to illustrate the process.

Step 1

In step 1, preliminary codes were generated from the data, as this enabled the researcher to identify data related to a common idea, concept or topic (Coffey & Atkinson, 1996). For example, the preliminary codes generated from students' responses to the question "Why did you chose to do nursing?" are given in Table 5.2.

Table 5.2

Preliminary codes for "Why I chose to do nursing"

No	Code	No	Code	No	Code
1	personality	2	work with patients	3	nursed parent
4	nursed grandparent	5	family/relatives nurses	6	nursed offspring/sibling
7	been nursing/nurse	8	interrupted nursing career	9	like practical things
10	like working with people	11	nursing interesting	12	in allied field
13	TER too low	14	don't like present job	15	really wanted to do x
16	always wanted to do	17	enjoy helping people	18	available
19	job change	20	didn't like present course	21	parent's wishes
22	work experience	23	overseas trained	24	better future/security
25	Friends' influence	26	travel	27	upgrade qualification

Step 2

These preliminary codes were then compared, the data re-examined, and then the codes were revised if necessary. Using the example from Table 5.2 the codes were reduced from 27 to 13 as shown in Table 5.3

Table 5.3

Revised codes for "Why I chose to do nursing"

Revised Code	Preliminary Code
Nursed somebody close	3, 4, 6
Working/worked in nursing	7, 8, 22, 23
Seen nursing in action	12
Influence of Family/relatives/friends	5, 21, 25
Always wanted to do nursing	16
Like working with people	2, 10, 17
Nursing is interesting/practical	9, 11
Personal characteristics	1
Future/career prospects	18, 24, 26, 27
Nursing not my first choice	13, 15
Career change	14, 19
Course change	20

Other Steps/Analyses

Step 3

Where necessary these revisions continued, until finally categories or themes appeared in the data. The four themes that emerged from students' responses to the question "Why did you chose to do nursing?" are given in Table 5.4.

Table 5.4

Themes for "Why I chose to do nursing"

Theme	Revised Codes
Experience with nursing	Nursed somebody close Working/worked in nursing Seen nursing in action Influence of Family/relatives/friends
Characteristics of Nursing	Like working with people Always wanted to do nursing Nursing is interesting/practical Personal characteristics Future/career prospects
Nursing not my first choice	Nursing not my first choice
Change in Direction	Career change Course change

For some of the data, additional steps were taken, such as counting the number of responses with a similar code or theme to determine the percentage of responses in the code or theme. Other steps included sorting data into students' achievement group, so that the relationship between the data and students' academic performance could be examined, for example for students' responses to the relevance of science to nursing (7.5.2).

5.2.8 Academic Performance

Where possible the relationship between the qualitative data and students' academic performance for their first year Science and Nursing Practice courses were examined. This process was undertaken after the data had been analysed qualitatively as already described. Students' academic grades for their first year Science and Nursing Practice courses were obtained (see 4.6.6) and students were divided into Low or High Achiever categories according to their academic grades. Students who obtained a Fail or Pass grade were assigned to the Low Achiever category and those who obtained a Credit, Distinction or High Distinction were categorised as High Achievers.

Students' comments within a code or category were separated into their appropriate achiever category and the data were then examined for patterns associated with these achiever categories.

For the area regarding students' learning strategies used for their Science and Nursing Practice courses, the frequency with which a strategy was mentioned by students was summed and divided by the total number of students in an achiever group to obtain a frequency measure (cf Zimmerman & Martinez-Pons, 1986) for each category of strategy for the two achiever groups for Science and Nursing Practice (Table 8.6 and 8.10 respectively).

Semester One

In semester one, 40 students were interviewed about their Science course. Two of these students subsequently withdrew from the course during the semester so the academic results for this course is based on 38 students. For the Science course 45% of the students were categorised as Low Achievers and 55% as High Achievers as shown in Table 5.5. From this table it can be seen that the interview sample of students contained more High Achievers and less Low Achievers than the questionnaire sample.

Four of the students interviewed were not enrolled in the Nursing Practice course as they were Enrolled Nurses and were granted an exemption in semester one for this course. The academic results for Nursing Practice were based on 36 students in semester one with 47% of students categorised as High Achievers and 53% as Low Achievers with both percentages slightly less than that for the questionnaire sample.

Semester Two

In the second semester some students obtained a higher or lower grade than for the first semester, however, the majority of students (73%) who were interviewed obtained the same academic grades for their first semester Science course which is in keeping with the results for the questionnaire sample. In the second semester 36% of the students interviewed were Low Achievers in their Science courses and 64% were High Achievers.

Compared to the Science courses, there was more movement between the grade levels and achievement groups in the second semester Nursing Practice courses as in semester two only 36% of students obtained the same grade as they had in semester one. In the second semester, 25% of Low Achievers moved into the High Achiever group for Nursing Practice and 14% of High Achievers moved into the Low Achiever group. So in second semester, the achiever categories for Nursing Practice were comprised of 46% Low Achievers and 54% High Achievers.

Table 5.5

Comparison of telephone interview sample (TIS) and questionnaire sample (QS) High (HA) and Low (LA) Achiever categories for first and second semester Science and Nursing Practice courses

	Science %				Nursing Practice %			
	Semester One		Semester Two		Semester One		Semester Two	
	TIS	QS	TIS	QS	TIS	QS	TIS	QS
HA	55	38	64	39	47	42	54	50
LA	45	62	36	61	53	58	46	50

5.3. Academic Interviews

5.3.1 Introduction

Interviews of academics involved in the teaching/tutoring of first year Bachelor of Nursing Science and Nursing Practice courses was another qualitative method used in this study. The other qualitative method was the student telephone interviews. Ten academics, five from each course area were interviewed during the same year that students were being surveyed by questionnaire and interviewed by telephone.

The literature indicates that persons involved in teaching can readily identify and describe the characteristics of students who are self-regulated learners (Boekaerts, 1997; Zimmerman & Risemberg, 1997). It was therefore anticipated that academics involved in the teaching/tutoring of first year science and Nursing Practice courses would have descriptive data to impart about students' entry characteristics, and how they impact on students' self-regulated learning and academic performance in these course areas. Interviews are the method frequently used in qualitative research to collect descriptive data (Bogdan & Biklen, 1992).

Due to the number of academics interviewed and the fact that the interviews took place over a year meant that, unlike the student interviews, savings in time and cost were not an important issue in this data collection method. In fact many of the interviews were arranged to coincide with visits, by the researcher, to the universities for matters relating to the study, hence minimising the need for additional visits to conduct the academic interviews. Face-to-face interviews were therefore the method chosen to collect qualitative data from the academics. As some of the academics had contact with the interviewer during the questionnaire distribution/collection phase of the study, it was felt that they would have some rapport with the interviewer, and be comfortable with the fact that they would not be anonymous to the researcher during an interview. This was a disadvantage of this method and the academics were assured that their comments would remain confidential.

The findings from these interviews were primarily about students' entry characteristics and hence their results are mainly contained in Chapter 6. Where possible, academics' comments were triangulated with the quantitative results for the study in an effort to increase the understanding of the results.

5.3.2 Purpose of the Academic Interviews

- To identify and understand academics' perceptions about students' entry characteristics and how they might relate to students' self-regulated learning and academic performance in their first year Science and Nursing Practice courses.

5.3.3 The Interview: Participants, Conduct and Content

During the questionnaire survey phase of the study the researcher had contact with many of the academics involved in the teaching and or tutoring of the Science and Nursing Practice courses at the campuses participating in the study. This gave the researcher the opportunity to discuss the research broadly and assisted with the establishment of rapport with these academics.

Many of the academics were involved in the teaching/tutoring of respective courses in both of the semesters of students' first year Bachelor of Nursing programs. It was therefore decided that academics would only be interviewed once during the year and that five key academics—that is those involved in the majority of the teaching/tutoring—from each of the Science and Nursing Practice courses would be approached and asked to participate in a face-to-face interview about issues relevant to this study. Many of the academics were approached during the questionnaire survey phase whilst others were contacted by phone or e-mail. The purpose of the study was explained and a day and time convenient to the academic and researcher was established for the interview. Most academics were supportive of the research and gave their consent to be interviewed. The interviews were conducted in the academics' university offices and were taped with the academics' consent. The academics were requested to sign a consent form as shown in Appendix 1.

The interviews were semi-structured with most interviews taking an hour to conduct. Just as the researcher did during the telephone interviews, the face-to-face interviews with the academics began with an easy question which allowed the academic to relax and enabled the researcher to establish/re-establish rapport with the academic. This question pertained to the academics' course and they were asked to discuss the content and assessment of the course. Aspects of academics' responses to this question were used to assist the researcher to write section 4.4.

Apart from the initial question described above an interview schedule was not used and the academics were encouraged to talk about student entry characteristics and to discuss their views on how they impact on self-regulated learning and academic performance. Any questions asked by the researcher were related to asking the academic to clarify a point or to expand on their viewpoint on a particular area.

The interviews were transcribed onto a computer file and coded to maintain the confidentiality of the academics. Most of the academics interviewed in relation to the Nursing Practice courses were female whilst most of those from the Science courses were male. To protect the confidentiality of academics, female pseudonyms were used in the coding of the Nursing Practice courses and male pseudonyms were used for the Science courses. Where necessary, the academics were contacted to discuss any points pertaining to their interview that needed clarification and were kept informed about the study.

5.3.4 Analyses of Academic Interviews

A constant comparative method was used in the data analysis of the interviews (Glaser & Strauss, 1967). This meant that academic interviews were analysed soon after their conduct and the interviews were compared with each other and areas of importance to the study that were identified from one interview were pursued during other academic interviews.

Academics discussed students' entry characteristics including: nursing as a first choice, prior nursing experience, mature age/high school leavers, students' academic entry characteristics (HSC science/TER) and students' ethnicity. Areas that were not central to this study, such as students' difficulties with academic writing, were set aside and not analysed for this thesis.

Like the student telephone interviews, academics' comments were grouped together according to their topic areas and then coded. Some of the results from the analysis of the data from the academic interviews is presented in descriptive style and was based on data contained in these codes. The data analysis relating to ethnicity is presented as themes (see 6.7.4) which emerged after the data had been analysed using the steps outlined in 5.2.7.

5.4 Reliability, Validity, and Generalisability of Qualitative Data

Reliability in qualitative research is concerned with:

> ...demonstrating to others that—that your data generation and analysis have been not only appropriate to the research questions, but also thorough, careful, honest and accurate.... (Mason, 1996, p. 146).

Mason suggests that one way of doing this is by providing:

> ... some sort of account of exactly how you achieved the degree of reliability and accuracy you claim to be providing (1996, p. 146).

In sections 5.2 and 5.3 the researcher has discussed the data collection and analysis processes and the care taken with both the telephone interviews and academic interviews. This care may be judged as an indication of the reliability and accuracy of the qualitative data and subsequent analysis in this study.

Another area to consider when discussing reliability is the stability of the data over time (Punch, 1999). The stability of the data will be shown in the following chapters which contain results for the telephone interviews. The stability of the data is particularly pertinent to those results concerning students' learning strategies, where there was consistency over the year in students' reported use of these strategies. With the academic interviews there was stability in the areas discussed by academics over the year.

The validity of the study, like reliability, is demonstrated by the accounting of the qualitative process, undertaken by the researcher and documented in this thesis. Judgments of the validity of the study can be based on the response to the question "Did the study measure or explain what it set out to do?" (Mason, 1996; Punch, 1999). Judgments of the validity of the study can be divided into two areas: the validity of the data collection/generation and validity of data interpretation/analyses (Mason, 1996; Punch, 1999). The first area can be judged by referring to 5.2.3 and 5.3.3 which outline the data collection process used in the telephone and academic interviews respectively and indicates that the data collected were relevant to the study (Mason, 1996; Punch, 1999), with steps taken to "maximise the quality of the data" (Punch, 1999, p. 256), including the plausibility of the interview responses (Mason, 1996; Punch, 1999). The second area can be judged by referring to 5.2.6 and 5.3.4 where the methods used in the data analyses are discussed. The results from the telephone and academic interviews, where appropriate, were triangulated with each other or the results of the questionnaires (see Chapters 6-8), providing additional evidence to support the validity of the data collected and results generated from these data.

In this study, a purposeful sample of students was interviewed with the aim of obtaining a sample that was representative of the students who completed the first semester questionnaire, and with the exception of males who were under-represented, this aim was achieved. This indicates that the results from the telephone interviews may be generalised to the questionnaire sample of students, although the results for male students need to be considered cautiously. Whilst there is some similarity between what is happening in this study and the literature, particularly in relation to the Science courses, external generalisations (Maxwell, 1996), that is, generalisations outside of the questionnaire sample should be made with caution, as the students in this sample may or may not be representative of the students enrolled in Bachelor of Nursing programs at other universities.

Effort was made to interview both the key personnel and selected others involved in the lecturing/tutoring of the Science and Nursing Practice courses at all campuses involved in the study. Whilst the results from these interviews triangulate with the other data sources used in this study and are consistent with the literature sources, generalisations outside of this study should be made with caution.

5.5. Summary

The first semester questionnaire contained a consent form where students were asked to provide their telephone number if they were willing to discuss various issues arising from the questionnaire. Of the 303 students who completed the questionnaire in semester one 80 (42%) gave consent for a telephone interview. A purposeful sample of 40 of these students was interviewed by telephone in the middle of the first semester and 19 of these students were interviewed again at the end of the second semester. The interviews were semi-structured and students were asked questions to determine their self-efficacy, perceptions of relevance and learning strategies for their Science and Nursing Practice courses. The interview data were analysed using the qualitative methods described by Coffey and Atkinson (1996, pp. 26-53). An example of the steps used to analyse the data are given in 5.2.6. After the final step and the themes had been identified the data were further examined again in relation to their achiever categories.

Additional qualitative data were obtained by face-to-face interviews with ten academics; five involved in the teaching/tutoring of students in each of the first year Science and Nursing Practice courses. These interviews were conducted during the year. These interviews were semi-structured and academics were encouraged to discuss students' entry characteristics and academics' perceptions of students' beliefs, motivation and learning strategies for the course that the academic was employed to teach. The analyses of the data were conducted in a similar manner to that for the student telephone interviews. Steps were taken to determine the reliability, validity and generalisability of the data.

The results from the student and academic interviews are discussed in the next three chapters with Chapter 6, the next chapter, containing those pertaining to students' entry characteristics.

Chapter 6

RESULTS 1

Students' Entry Characteristics

6.1 Introduction

The results in Chapter 6, which is the first results chapter for the thesis, have been derived from the questionnaires and interviews which have been triangulated to give a comprehensive view of the students' entry characteristics and their relationship to self-regulated learning and students' academic performance for their Science and Nursing Practice courses.

Students' entry characteristics that have been examined include: nursing as a first choice (6.3), nursing experience (6.4), age/mode of entry (6.5), academic entry characteristics (6.6) and ethnicity (6.7). A summary of the results are found in section 6.8.

The interview results presented in this chapter are primarily those from the academic interviews although students' views on why they chose their nursing program and their expectations regarding nursing based on its TER requirements are discussed in this chapter. Most of the results from the student interviews, and some additional academics' interview results are contained in the following two chapters which contain the results that are specific to students' motivation (Chapter 7) and cognition (Chapter 8).

6.2 Research Questions and Expectations

There are two research questions (1.5 questions 2 and 3) that were specific to this chapter and the results to these questions can be found in this chapter. Based on the literature some of the results to question 2 can be anticipated and hence the research expectations relating to this question are listed following the research question. Question 3 related primarily to the qualitative data and as the researcher approached the analysis without any expectations regarding the results there are no expectations listed after this question.

Research Question

2) What student entry characteristics are related to students' self-regulated learning and academic performance in their first year Science and Nursing Practice courses?

Expectations

- It was anticipated that the entry characteristics—nursing as a first choice, age, mode of entry and TER score—would be related to students' self-regulated learning and academic performance for their Science and Nursing Practice courses.

- It was anticipated that students who enter their Bachelor of Nursing program with nursing experience would have stronger motivation (NCSES, SELAP-N, TV-N), and academic performance, than students without prior nursing experience, for their first semester Nursing Practice course.

- It was anticipated that students' TER scores would be related to students' self-regulated learning and academic performance for their first semester Science course.

- It was anticipated that students who have studied HSC Biology, or Chemistry/Physics would have higher self-regulated learning and academic performance for their first semester Science course.

Research Question

3) What can we understand about students' entry characteristics and their relationship to students' self-regulated learning and academic performance for their first year Science and Nursing Practice courses?

6.3 Nursing as a First Choice

6.3.1 Introduction

In this section the results for the questionnaire item "nursing as a first choice" are given. This includes those pertaining to the relationship between this variable and students' self-regulated learning and academic performance for their first year Science and Nursing Practice courses (6.3.2) and students' views on why they chose to do a nursing program (6.3.3) and academics' views on nursing as first choice (6.3.4).

6.3.2 Nursing as a First Choice

For 96 (32%) of the questionnaire sample of students, nursing was not their first career choice, whilst it was a first choice for 207 (68%) students. Whilst nursing is more likely to be a first choice for 90% of mature age students (20+ years), it is only the first choice for 51% of 17-19 year old students. The association, between students' age and nursing as a first choice, as shown in Table 6.3, was statistically significant: $\chi^2(1, n=303) = 50.32$, $p=0.000$.

Table 6.1

Nursing as a first choice: summary statistics and t-test results

Variable	First Choice	n	M	SD	SE	t
Sc1	Yes	100	63.08	13.88	1.21	2.25**
	No	43	58.36	12.39	1.72	
NP1	Yes	95	73.02	11.76	1.15	1.13
	No	41	70.69	12.23	1.71	
SEFS	Yes	206	3.80	0.58	0.04	-2.00*
	No	96	3.94	0.55	0.05	
NASES	Yes	206	7.69	1.86	0.13	-1.13
	No	96	7.94	1.59	0.16	
NCSES	Yes	206	7.85	2.13	0.15	1.50
	No	96	7.45	2.19	0.22	
TV-N	Yes	185	6.18	0.87	0.06	2.40*
	No	86	5.88	1.06	0.11	
TV-S	Yes	205	5.78	1.06	0.07	0.92
	No	96	5.66	1.05	0.11	
SELAP-N	Yes	185	5.28	1.10	0.08	-0.55
	No	86	5.37	0.95	0.10	
SELAP-S	Yes	205	4.47	1.33	0.09	-2.17*
	No	96	4.81	1.16	0.12	
MCSR-N	Yes	182	4.63	1.00	0.07	0.99
	No	84	4.50	0.98	0.11	
MCSR-S	Yes	205	4.60	1.03	0.07	1.42
	No	96	4.43	0.99	0.10	
CT-N	Yes	182	4.34	1.29	0.09	-0.17
	No	84	4.16	1.45	0.12	
CT-S	Yes	205	4.02	1.36	0.09	0.69
	No	96	3.95	1.24	0.13	

*p<0.05. **p=0.00.

As anticipated, students for whom a nursing program was their first choice, had higher academic scores for Sc1, and NP1, than those for whom it was not a first choice, although the difference was only statistically significant for Sc1 ($t=2.25$, $p=0.00$; Table 6.1). Also as expected, students for whom a nursing program was their first choice had a statistically significantly higher TV-N mean score ($t=2.40$, $p=0.02$) than students for whom nursing was not a first choice. Students for whom nursing was not a first choice, had statistically significantly higher means for two self-efficacy instruments, the SEFS ($t=-2.00$, $p=0.05$) and SELAP-S ($t=-2.17$, $p=0.03$), as shown in Table 6.1. This result can be partly explained by consulting

Table 6.3 where students' age, and science background are shown to be statistically associated. Nursing is not a first choice for almost half (49%) of the 17-19 year old students, who are likely to have studied some HSC science, whilst nursing is the first choice of the 20+ age group, who have often not studied HSC science. The science background of some of the 17-19 (high school leaver) group of students, coupled with the fact that they had more recent study experiences than the 20+ (mature age entry) age group, may explain why these students had higher mean scores for the SEFS and SELAP-S as shown in Table 6.1. The variable, nursing as a first choice, was not examined in the second semester.

6.3.3 Students' Views on "Why I Chose to do Nursing"

It was anticipated that students would find this topic familiar and easy to answer as they may have already been asked by friends, family or acquaintances why they had decided to do nursing. Starting with an easy, interesting and relevant question has been recommended when conducting telephone interviews (Dillman, 1978), particularly as it may help with the subsequent development of rapport between the researcher and the telephone interview participant (Frey, 1983, p. 105).

It was also anticipated that students' responses to this telephone interview question would triangulate with students' responses to the semester one questionnaire item (Q99 Appendix 2) regarding the program as a first choice. The results indicated that they did as 94% of the students interviewed who responded affirmatively, indicating that nursing was their first program choice, also gave positive reasons for choosing nursing. Only two students (6%) gave reasons that seemed contradictory to their response to the questionnaire item. For example, one student who responded affirmatively on the questionnaire in fact indicated in the interview that nursing was not her first choice:

> I liked the idea of nursing, but I really wanted to do science. (*216 20/5/98*)

The themes that were identified from students' interview responses are shown in Table 5.4. Most students gave more than one reason for choosing nursing, however the most frequent responses were in the theme "Experience with nursing" indicating that many students had some prior experience with nursing or nurses. This experience included nursing a family member (parents, grandparents, offspring, siblings) or contact with nurse/hospital because of an illness of a family member, personal work experience in nursing (Enrolled Nurse, Assistant in Nursing or work experience through the school), or experience because family/other relatives or friends are in nursing:

> It's something I've always wanted to do. My grandma was a nurse. My mum started [nursing] and didn't finish. I guess it's the family influence. (*175 5/6/98*)

> I've always wanted to do nursing. My sister was often sick and in hospital in the past and I saw nurses. (*235 12/6/98*)

Other themes (see 5.4) were the "Characteristics of nursing" which included areas such as "Like working with people", "Always wanted to do nursing", "Nursing is interesting/practical", "Personal characteristics" and "Future/career prospects". Another theme was "Change in direction" where students who had careers in fields other than nursing reported entering a nursing course because they wanted to change their career or change program (that is they were already studying in another field).

Five of the telephone interview students indicated on their questionnaire that nursing was not their first program choice. Except for one student who made an evasive comment, the other four students made comments that fully supported or triangulated with their questionnaire response. These students' comments were found in the theme "Nursing not my first choice" for example, one student said:

> My first choice was teaching, but my TER was too low [to get into teaching]. (*12 24/5/98*)

6.3.4 Academics' Views About Nursing as a First Choice

In keeping with the quantitative results, academics from both course areas felt that students for whom nursing was not a first choice questioned the relevance of their courses to nursing, found their courses uninteresting and had difficulties academically with their courses.

For a Science course, Brian said:

> We had a lot of students at that stage for whom nursing was not their first choice of career. And because they'd ended up here when they wanted to do something else um they weren't particularly interested in it [science course]. They had this perception that science wasn't relevant to nursing. They thought it [Science course] was too hard and they just didn't try. (*Brian 16/11/98*)

Julie, said that she used to ask students "Who really wants to be here?" and although she stopped asking that question in the Nursing Practice course she taught, she found:

> But it comes out [that nursing was not their first choice]. Sometimes it comes out just before clinical, when they're really frightened and you talk to them about it. Or it can come out with their first assessment and you ask them why they want an extension and what's happening and are they dealing with the rest of the work ok. And it spills out that they don't want to be here and they have been trying but they don't find it interesting and they can't understand it. (*Julie 13/7/98*)

Table 6.2

Nursing experience: summary statistics and t-test results

Variable	Experience	n	M	SD	SE	t
NP1	No	90	72.48	11.94	1.12	0.28
	Yes	48	71.66	12.23	1.93	
NASES	No	191	7.66	1.75	0.13	-1.46
	Yes	110	7.97	1.83	0.17	
NCSES	No	191	7.44	2.20	0.16	-2.95**
	Yes	110	8.19	2.00	0.19	
TV-N	No	177	6.12	0.92	0.07	0.69
	Yes	93	6.03	0.99	0.10	
SELAP-N	No	177	5.35	0.95	0.07	0.88
	Yes	93	5.23	1.24	0.13	
MCSR-N	No	177	4.59	0.98	0.07	-0.04
	Yes	89	4.59	1.03	0.11	
CT-N	No	177	4.09	1.13	0.08	-0.79
	Yes	89	4.23	1.45	0.15	

**p=0.003.

6.4 Nursing Experience

Thirty seven percent of the semester one questionnaire sample of students indicated that they had worked in a nursing or nursing-related capacity. Students who responded affirmatively to the question about nursing experience were asked to specify their nursing/nursing-related experience. It was anticipated that students' replies would indicate their nursing or related role, but in fact, 35% of students indicated the place where they obtained the experience. This included: hospital, hostel, nursing home, medical institution, home care, medical laboratory pathology and community service. For the 65% of students who did indicate their role/position: 36% were Enrolled Nurses (EN), 36% Assistants in Nursing (AIN), 18% had work experience in nursing and 10% had either Volunteer, First Aid, Dental Nursing or Wardsmen/Ward Orderly experience.

Students with nursing/nursing-related experience had, as anticipated, statistically significantly higher mean NCSES (t=-2.95, p=0.003), than students without this experience (Table 6.2). Students with nursing/nursing-related experience, however, did not perform better academically in NP1 than those with this experience.

6.4.1 Academics' Views About "Prior Nursing Experience"

Several academics teaching in the Science and Nursing Practice courses talked about students with "prior nursing experience", particularly Enrolled Nurses (ENs). Academics' views triangulate with the qualitative results regarding nursing experience and academic performance—where nursing experience was not related to academic performance—as academics felt the practical experience possessed by ENs did not necessarily give them an advantage academically, in either the Science or Nursing Practice courses. It was also felt that in NP2 (ENs may be exempt from NP1) ENs may have to work hard to change some "habits" that they may have acquired over time.

For example Mary said:

> You've got the ENs, who have been working perhaps for fifteen years maybe and unfortunately they've picked up bad habits. And you then have to say "Well look these things that you've been doing for fifteen years perhaps you need to look again at." And they have to unlearn it, you know. And it's like you know "Wow" this is hard. But for the younger ones where you've got the opportunity to mould and to instill in them the principles, then that's not quite so bad. But it's a little more difficult with the ENs who are the practical nurses. But then we have to go back and look at principles with them. And then they realise perhaps I've got some things to learn here. (*Mary 23/10/98*)

Whilst this group of students may have to struggle, Jack said:

> ...they're a fairly determined group. The ones who survive the year, and they get there, they mostly seem to pass. But they do find it hard because they're practical people as you would realise ....When they get over that first year they really take off. (*Jack 16/11/98*)

So it appears that experience in nursing may lead students to have strong expectations for successfully performing clinical skills in their Nursing Practice course and whilst academics feel this group of students are likely to pass their courses in the first year they may not necessarily be High Achievers.

6.5 Age/Mode of Entry

6.5.1 Introduction

The variable of age was examined in both semesters. The first semester results are given in 6.5.2 and those for the second semester are in 6.5.3. Academics' views about these entry characteristics are discussed in 6.5.4. Students' Mode of Entry was not examined in relation to students' self-regulated learning or academic performance and the reason for this decision is given in 6.5.2.

6.5.2 Semester One

The mean age of the questionnaire sample of students in semester one was 22.2 years with 56% of the students in the 17-19 year age group and 44% in the 20+ age group. Students' "Mode of Entry" into university included: HSC/TER score 55%, Mature Age Entry 32%, TAFE 4% and Other 9%. The latter two groups were combined and added to the Mature Age Entry (MAE) category for statistical analysis, which meant that this category comprised 45% of the students. In the "Other" category, students were asked to specify their method of entry with students indicating a diverse range of methods/reasons for admission including: overseas nursing qualifications or other (EN, Bachelors degree) qualifications, Aboriginal and Torres Strait Islander program and disadvantage entry.

Table 6.3

Profile of students by age group and entry characteristics and association between age groups and students' entry characteristics

Age Groups and Entry Characteristics		
17-19 Years	20+ Years	
HSC/TER 89%	MAE 82%	
NESB 22%	NESB 40%	
Nursing as first choice 51%	Nursing as first choice 90%	
Nursing Experience 25%	Nursing Experience 40%	
HSC Chemistry/Physics 39%	HSC Chemistry/Physics 9%	
HSC Biology 55%	HSC Biology 15%	
Association between Age Groups and Entry Characteristics		
Variables	DF	χ^2
HSC/MAE	1	59.85***
ESB/NESB	1	11.04**
Nursing as First Choice	1	50.32***
Nursing Experience	1	58.44**
HSC Chem/Physics/No HSC Chem/Physics	1	33.57***
HSC Biology/No HSC Biology	1	49.01***

**p<0.005. ***p=0.000.

A profile of the two age groups 17-19 and 20+ years with some entry characteristics is given in Table 6.3. For students who were 20+ years, 82% of students' Mode of Entry into university was likely to have been via the MAE route whereas for students 17-19 years, 89% were likely to have been admitted on the basis of their HSC or TER score. The association between students' mode of entry and the two age groups was statistically significant as shown in Table 6.3 so it was decided to use only one of these variables—students' age groups—in further analyses.

Table 6.4

Semester one: summary statistics and t-test results for students' age

Variable	Age	n	M	SD	SE	t
Sc1	17-19	80	61.37	11.96	1.24	-0.28
	20+	63	61.94	14.47	1.64	
NP1	17-19	76	71.09	11.61	1.22	-1.45
	20+	60	73.88	12.30	1.51	
SEFS	17-19	168	3.94	0.55	0.04	3.27**
	20+	130	3.72	0.61	0.05	
NASES	17-19	168	7.96	1.67	0.20	-0.73
	20+	130	7.68	2.07	0.36	
NCSES	17-19	168	7.50	2.17	0.17	-1.78
	20+	130	7.95	2.13	0.19	
TV-N	17-19	157	6.02	0.98	0.08	-1.34
	20+	109	6.18	0.91	0.09	
TV-S	17-19	168	5.80	0.95	0.07	1.46
	20+	130	5.62	1.19	0.10	
SELAP-N	17-19	157	5.25	1.04	0.08	-1.03
	20+	109	5.38	1.08	0.10	
SELAP-S	17-19	168	4.73	1.17	0.09	2.40*
	20+	130	4.37	1.43	0.12	
MCSR-N	17-19	156	4.47	0.96	0.08	-2.10*
	20+	107	4.72	1.01	0.10	
MCSR-S	17-19	168	4.43	1.01	0.08	-1.88
	20+	130	4.66	1.02	0.09	
CT-N	17-19	156	4.02	1.24	0.10	-1.73
	20+	106	4.29	1.26	0.12	
CT-S	17-19	168	3.92	1.27	0.10	-0.99
	20+	130	4.07	1.36	0.12	

*p<0.05. **p=0.001.

Students who were in the 20+ age group had higher mean academic scores for Sc1 and NP1 as shown in Table 6.4 but the difference was not statistically significant.

Students who were aged 20+ had higher mean scores for the NCSES, TV-N, SELAP-N, MCSR-N, MCSR-S, CT-N, CT-S, although the difference was only statistically significant for the MCSR-N (t=2.10, p=0.04). The difference was close to significance for the NCSES (t=-1.78, p=0.07), MCSR-S (t=-1.88, p=0.06) and CT-N (t=-1.73, p=0.08).

Students in the 20+ age group, as shown in Table 6.4, have statistically significantly lower self-efficacy for the SEFS (t-3.27, p=0.001), and SELAP-S (t=2.40, p=0.02), than younger students, which may be related to the fact that they are less likely to have studied science (including Biology, Chemistry/Physics) at high school, or if they have, it may have been a significant time ago.

6.5.3 Semester Two

The mean age for the questionnaire sample of students in the second semester was 23.1 years (n=202), which was a slight increase from the first semester mean age. The percentages of students in these two age groups, in this semester, were very similar to those for semester one with 56% aged 17-19 years and 43% aged 20+.

Age is a strong predictor of academic performance in semester two, as the academic scores for the 20+ group were statistically significantly higher than the 17-19 year old group, for Sc2 (t=-4.55, p=0.001) and NP2 (t=-2.50, p=0.01) as shown in Table 6.5.

In semester two the 20+ age group no longer had lower self-efficacy scores than the 17-19 year old group of students, as they did in semester one. This group had higher mean scores for all self-efficacy measures, however the difference was only statistically significant for the SELAP-S (t=-3.20, p=0.002). The 20+ group had higher mean TV scores than the 17-19 group and this was statistically significant for TV-S (t=-2.47, p=0.01). The 20+ group also had statistically significantly higher mean scores than the 17-19 year old group for the MCSR-N (t=-2.88, p=0.004), MCSR-S (t=-2.39, p=0.02), CT-N (t=-3.62, p=0.000) and CT-S (t=-3.25, p=0.001).

6.5.4 Academics' Views about Mature Age and High School Leaver Students

Academics are aware of the relationship between students' age and their Mode of Entry into university and they tend to refer to young students as "high school leavers" or "school leavers" and older students as "mature age students". In keeping with the quantitative results, academics are also aware that students' age/mode of entry into university may be related to their self-beliefs, study behaviours and academic performance in first year Science and Nursing Practice courses.

Table 6.5

Semester two: summary statistics and t-test results for students' age

Variable	Age	n	M	SD	SE	t
Sc2	17-19	72	54.94	12.99	1.49	-4.55**
	20+	56	65.19	13.75	1.71	
NP2	17-19	70	77.31	10.44	1.24	-2.50*
	20+	54	81.89	10.23	1.34	
SEFS	17-19	108	4.13	0.53	0.05	-0.23
	20+	83	4.15	0.59	0.07	
NASES	17-19	108	7.59	1.53	0.15	-0.28
	20+	83	7.66	1.66	0.18	
NCSES	17-19	108	7.44	1.72	0.16	-0.82
	20+	83	7.66	2.00	0.21	
TV-N	17-19	108	5.78	1.19	0.11	-1.18
	20+	83	5.97	1.03	0.11	
TV-S	17-19	107	5.57	1.21	0.12	-2.47*
	20+	77	5.98	0.93	0.11	
SELAP-N	17-19	108	5.19	1.12	0.11	-1.70
	20+	83	5.46	1.05	0.12	
SELAP-S	17-19	107	4.48	1.15	0.11	-3.20**
	20+	77	5.02	1.09	0.12	
MCSR-N	17-19	108	4.48	0.98	0.09	-2.88**
	20+	83	4.90	1.02	0.11	
MCSR-S	17-19	107	4.46	0.98	0.09	-2.39*
	20+	77	4.81	1.02	0.12	
CT-N	17-19	108	4.08	1.30	0.13	-3.63***
	20+	83	4.73	1.11	0.12	
CT-S	17-19	107	3.95	1.23	0.12	-3.25**
	20+	76	4.53	1.10	0.13	

*$p<0.03$. **$p<0.005$. ***$p=0.000$.

Mature age students were described, by academics, as conscientious, committed, motivated, organised, willing to ask questions, seek help when required and willing to accept advice. In other words, they appeared to have the characteristics of self-regulated learners/High Achievers which triangulates with the quantitative results particularly for semester two. High school leavers on the other hand, were seen generally to be less willing to ask questions and to seek help, or to seek help at the last minute, and less willing to accept advice. Some of the characteristics of both these groups are outlined in the following discussion.

Academics describe mature age students as more likely to ask questions in lectures and tutorials, and to seek help or advice for an assignment or academic problem. For example David said:

> But certainly the mature age students will interrupt a big lecture if there's something that they haven't followed. And they [mature age students] are certainly less timid about showing that they don't know something and they will come and ask questions and I get the impression that there is a reluctance to admit that you don't know something if you're a sort of eighteen year old. (*David 15/10/98*)

Julie found that when students did seek help for an assignment, mature age students were:

> ...usually here weeks before anything's due, to check up on the info. And it works well. They get, I think much more from it because of that. The other students, the school leavers um are more likely to come just before it's due to be submitted and very often have a major family drama. (*Julie 13/7/98*)

Julie's comments indicate that mature age students may prepare for an assignment well in advance of its due date indicating a degree of organisation of their time.

Other academics also mentioned mature age students' organisations skills. For example, David and Brian said:

> I can almost pick out the mature age students by their degree of motivation and their degree of organisation. They have got to organise the care of children, the home and fit in study as well. So they have to be organised. And they don't say "Oh I can do that tomorrow" or "I'll do that tomorrow" and put off things. They have to do it when they planned to do. (*David 15/10/98*)

> Then you've got the mature age students who've always wanted to do nursing. They've come back in. And they're probably some of the most committed students. And you know a lot of them have got families. They're juggling families, children and they're terrified that they're going to fail. They work extremely hard and do extremely well....but they've got themselves organised. And by and large do very well. (*Brian 16/11/98*)

Brian's comment triangulates with the quantitative data, particularly for semester two, where mature age students did perform better academically than the younger students (17-19 year olds). In addition to mature age students'organisation skills, the effort that they put into their Science courses may also explain why they are more likely, than younger students, to be High Achievers:

> And those [mature age students] are the students that you do tend to find do the work beforehand and certainly put the most effort into doing their assignments and seem to take more pride in the quality of what they're presenting. (*David 15/11/98*)

Julie also found that mature age students were likely to put a hundred percent effort into all areas addressed by this course. Heather found that whilst mature age students were likely to do extra clinical practice, some younger students also did extra practice:

> A lot of mature age students definitely seem to be more conscientious or eager to practice more, but yeah, you do get young ones too who take it all very seriously. (*Heather 2/10/98*)

Julie found overall, however, that:

> School leavers think they know it all. And so they're the ones less likely to use the library, less likely to read wider than suggested, less likely to acknowledge that they're not graduates before they start. (*Julie 13/7/98*)

Susan commented that

> ...the young 18 year olds who are into the university life, so to speak, are less likely to identify areas of weakness I think. (*Susan 11/6/98*)

Academics talked about the anxieties that the mature age students have with the Science courses particularly in semester one and the "very little science background" (Brian) of these students which triangulates with the results for students' age and science background where mature age students (aged 20+) were less likely, than high school leavers (aged 17-19), to have studied science at high school. The limited science background, and the fact that it may have been some time since mature age students had studied at any educational institution, may be factors that are linked to the lower self-efficacy expectations for science and academic performance that mature age students have in semester one.

By semester two, mature age students appear to have strengthened their self -beliefs and academic performance. Jack and George advance reasons that may help to explain these results:

> ...And my experience with a lot of them is that they realise they can do this stuff and they're doing it well and it inspires them. I feel once they get that pass in Sc1 that their whole attitude and approach changes. Particularly if they've done quite well you know. If they haven't just scraped over. Suddenly they're empowered is my feeling with them. (*Jack 16/11/98*)

> But once they get that first lot of exam results and they find that they have survived, that is the real turning point. Sure they have difficulties and insecurities in second semester, but they know that they have done it once. And they don't have that knowledge when they are in first semester. (*George 2/4/98*)

6.6 Academic Entry Characteristics

6.6.1 Introduction

In this section, the results for students' TER scores (6.6.2) and HSC Science (6.6.3) —Biology, Chemistry and Physics—including their relationship to self-regulated learning and academic performance in the Science courses are presented. Academics' views about students' academic entry characteristics are given in 6.6.4 and students' views on TER scores and nursing in 6.6.5.

6.6.2 TER Score

For students who were admitted via their TER score, 31% were in the 0-45 range, 32% were in 46-55 range and 31% had TER scores 56-100. Chi-square analysis between these three TER groups, and academic achievement groups, as shown in Table 6.6 found that the association was statistically significant for students' academic scores for Sc1, $\chi^2(2, n=84) = 12.63$, $p=0.002$, but not for NP1, $\chi^2(2, n=84) = 3.38$, $p=0.18$. ANOVA for these three TER groups with students' scores for the research instruments found that there were no statistically significant relationships.

6.6.3 HSC Science

For HSC/TER students, 68% had studied HSC Biology, 41% HSC Chemistry and 17.5% HSC Physics. Students who have studied HSC Biology or Chemistry and/or Physics have statistically significantly higher SEFS, TV-S and SELAP-S than students without this background as shown in Table 6.7. The strong chemistry and physics content of Sc1 may explain why students who had studied these subjects at high school perform significantly better ($t=-2.94$, $p=0.004$) academically than those who have not studied these subjects. The course content may also explain why students who studied HSC Biology did not perform significantly better academically in Sc1 ($t=-0.43$, $p=0.66$) than those students who had not studied this subject.

Table 6.6

Association between students' TER score and academic achievement groups

	TER Score		
Academic Achiever Group	Low 0-45	Medium 46-55	High 56-100
		Sc1 %	
LA	85	70	45
HA	15	30	55
Total	100	100	100
		NP1 %	
LA	77	56	61
HA	23	43	39
Total	100	100	100
	Association between TER group and Achievement Groups		
Variable	DF	χ^2	
Sc1	2	12.63**	
NP1	2	3.38	

**p=0.004.

6.6.4 Academics' Views About Students' Academic Entry Characteristics

In the qualitative results we saw that students' TER scores were related to academic performance in science, but not Nursing Practice, and therefore it is not surprising that, apart from Julie, an academic involved in a Nursing Practice course, most of the comments about students' academic entry characteristics were made by academics involved in the Science courses.

For various reasons, academics do not have access to students' TER scores and the HSC subjects they studied at school. Academics nevertheless, develop an awareness and have opinions about the relationship between students' TER scores and their HSC subjects to their academic performance in their Science and Nursing Practice courses.

Julie could identify two groups of students with low TER scores in her courses. One group, she felt, only chose nursing:

> because it was the lowest TER [choice available]. So they're usually problematic in class and they definitely complain about how in-depth the subject is. (*Julie 13/7/98*)

Julie found that some of these students would stay and maybe start to enjoy nursing and some would leave. She was worried about the second group of students with low TER scores because:

> And again this is why we lose students. Because they've been accepted with a low TER and they believe it's the acknowledgment that they will pass. And they don't. And it's heart-breaking. Heartbreaking for them and it's really tough for us...(*Julie 13/7/98*)

Jack found that students with a low TER score were "pretty challenging" and he felt that a "good TER" was related to academic performance in the science courses he was involved with. Jack found that he could identify those students with a high TER score because of their behaviour in the classroom:

> I don't know what our average TER for a school-leaver is.... I'm told we don't get a lot of high fliers but anybody who's got a solid TER you tend to know that they're there. You know if somebody's got an eighty plus or something compared to fifty plus because they do tend to be bit of a beacon in the classroom. Particularly as they've often done a bit of Biology with it and they tend to be able to recognise a lot of the things you're talking about so they tend to stand out. (*Jack 16/11/98*)

Jack later commented on high school leavers' background in Biology:

> A lot of them seem to have done Biology—the school-leavers. So anything biological they tend to say "Oh gosh that's easy that's just descriptive there's nothing to understand there." (*Jack 16/11/98*)

Jack's comment indicates that students who have studied HSC Biology have strong self-efficacy for science which supports the quantitative results. From the quantitative results we also know that Biology was not related to academic performance. It seems that students are making their self-efficacy judgements about their first semester science course based on their high school science experience. These judgements may be unrealistic, as whilst the science may appear familiar at first, in fact as the semester progresses it becomes very different to high school science.

Brian seems to concur with this finding when he advanced one theory on why some students with HSC science are not as successful as would be expected:

> ...many of the students who came in here very well prepared. In fact they were quite bored with the level of which we were teaching the science. And as result [they] skipped classes. They figured they knew it all and they didn't bother to attend classes. They missed the application of the science to the nursing framework. So they missed the link between the science and nursing and they didn't actually perform all that well in the exams, despite the fact that they actually had done quite well in science at school, and had reasonable knowledge of science. They just didn't, you know, perform because they'd been skipping classes thinking they knew it all. And they did know the science, but they didn't see the application. (*Brian 16/11/98*)

Whilst HSC Biology was mentioned by several academics, few mentioned HSC Chemistry or Physics in relation to students' academic entry characteristics. An academic from one university felt that a number of his students had studied Chemistry and/or Physics whilst one from the other university felt that few had studied these subjects at high school. In fact, the percentages for both universities were the same and the confusion may have arisen because academics were not formally aware of their students' science entry characteristics, and due to the smaller number of students with these subjects, they were less readily identifiable.

David felt he would like to be informed about students' academic entry qualifications because:

> ...it would be helpful to know which [students] are the ones who are experiencing difficulties because it may be that you can organise your tutorials in such a way that they worked in small groups and you may put the more able together and the less able or you could mix them up so that the more able are able to help the less able. (*David 15/10/98*)

David felt that academics were not informed because "if you know that there are weak students you might prejudice their progression." Academics, however, appear to be able to identify some characteristics of High and Low Achievers in their courses.

Table 6.7

Semester one: summary statistics and t-test results for HSC Biology, Chemistry and Physics

Variable		n	M	SD	SE	t
				HSC Biology		
Scl	Yes*	54	62.08	12.25	1.52	-0.43
	No*	89	61.17	13.75	1.33	
SEFS	Yes	113	3.94	0.55	0.05	-2.34*
	No	190	3.78	0.59	0.04	
NASES	Yes	113	7.84	1.62	0.15	-0.51
	No	190	7.73	1.86	0.13	
TV-S	Yes	113	5.93	0.94	0.09	-2.46*
	No	190	5.62	1.12	0.08	
SELAP-S	Yes	113	4.87	1.19	0.11	-3.10***
	No	190	4.40	1.32	0.09	
MCSR-S	Yes	113	4.51	1.07	0.10	0.51
	No	190	4.57	0.99	0.07	
CT-S	Yes	113	3.88	1.34	0.13	1.17
	No	190	4.07	1.29	0.09	
				HSC Chemistry &/or Physics		
Scl	Yes**	36	66.49	12.68	1.93	-2.92**
	No**	107	59.86	12.96	1.14	
SEFS	Yes	77	4.04	0.58	0.06	-3.48***
	No	226	3.77	0.57	0.04	
NASES	Yes	77	7.88	1.79	0.20	-0.63
	No	226	7.73	1.78	0.12	
TV-S	Yes	77	5.97	0.92	0.10	-2.28*
	No	226	5.65	1.09	0.07	
SELAP-S	Yes	77	5.08	1.04	0.12	-4.06***
	No	226	4.04	1.32	0.09	
MCSR-S	Yes	77	4.63	1.01	0.11	-0.83
	No	226	4.52	1.03	0.07	
CT-S	Yes	77	4.22	1.19	0.14	-1.77
	No	226	3.92	1.35	0.09	

Note: Yes*= has studied HSC Biology. No*=has not studied HSC Biology.
Yes**= has studied HSC Chemistry &/or Physics. No** = has not studied HSC Chemistry &/or Physics.
*p=0.02. **p=0.004. ***p=0.000.

6.6.5 Students' Views About TER Scores and Nursing

In accordance with Julie's impressions about students' TER score and their expectations of nursing, some students had the impression that because of the low TER required to get into nursing that it must be an easy program. The following students' comments indicate they had this impression of nursing:

> I heard that it [nursing program] was easy, but it isn't. I thought that because the TER for nursing was low. I got the impression that it was easy but it is average. (*261 12/6/98*)
>
> Everyone thought because nursing has a low TER, they expected it wouldn't be too hard. But it is more difficult than I thought. (*175 5/6/98*)
>
> I expected a bludge course. (*222 5/6/98*)

We can understand why, as Julie found, that students with this impression might complain about the depth of the program and how it might influence their academic success in their nursing program.

Table 6.8

Students' ethnicity and association between country of birth and language spoken at home and parents' birthplace

	Students' Birthplace	
	Aust/NZ/UK	Other
Semester One	70% n=211	30% n=90
Semester Two[1]	69% n=139	31% n=62
	Language Spoken at Home	
	English	Language Other Than English
	71% n=215	29% n=88
	Association between Country of Birth and Language spoken at Home[2]	
	DF	χ^2
	1	121.81***
	Parents' Birthplace	
	Aust/NZ/UK	Other
Mother	56% n=159	44% n=134
Father	53% n=155	47% n=137
	Association between Students' Mothers' and Fathers' Birthplace[2]	
	DF	χ^2
	1	207.20***

Note: 1 Includes Ireland and USA. 2 for semester one.
***p=0.000.

Table 6.9

Birthplace of semester two students

Category	%
Asia	29.5
Central Europe	20
Pacific[1]	18
Middle East	10
Central America	10
Africa	4
South America	4
Other	2.5
Balkans	2
Total	100

Note: Categories include the following countries:
Asia: China, Hong Kong, India, Indonesia, Korea and Vietnam
Central Europe: Bosnia, Germany, Hungary, Netherlands, Slovakia, Poland, Yugoslavia
Pacific: Fiji, Philippines, Tonga. 1Excluding New Zealand which is included in Other (ESB countries)
Middle East: Egypt and Lebanon
Central America: El Salvador/Uruguay, Mexico
South America: Chile
Other: England, Ireland, New Zealand United States of America
Balkans: Malta

6.7 Ethnicity

6.7.1 Introduction

Students' ethnicity—birthplace, language—was explored in this study to understand and determine if this variable was related to students' self-regulated learning and academic performance for their first year Science and Nursing Practice courses. The results for semester one are given in 6.7.2, including the questionnaire and interview results, and the results for semester two are given in 6.7.3. Most academics made comments about students' ethnicity and the themes identified from their comments are presented in 6.7.4.

6.7.2 Semester One

Questionnaire Results

In semester one, 70% of the questionnaire sample of students were born in Australia/New Zealand/United Kingdom (Aust/NZ/UK) and 30% were born elsewhere (Table 6.8). It was anticipated that the Aust/NZ/UK category would identify students from an English speaking background (ESB) whilst the "Other" category would identify students from a Non-English speaking background (NESB). This assumption appears to be supported as the percentages for students' responses to birthplace and their language spoken at home are very similar and, indeed, a Chi-square analysis confirmed this association $\chi^2(1, n=303) = 121.81$, $p=0.000$ (Table 6.8). English was the main language spoken by 71% of the students in their home, but 29% of students speak a language other than English in their home.

The birthplace of students' parents in Table 6.8 shows that the association between students' mothers' and fathers' birthplace is statistically significant $\chi^2(1, n=292)$

=207.20, p=0.000, which means that students are likely to have both parents from either an ESB or a NESB. Furthermore, the results indicate that whilst 30% of students are immigrants to Australia, a further 14% of students are first generation Australians, that is, both their parents are from the "Other" category although the students themselves were born in Australia.

In Table 6.10 it can be seen that the academic performance of students from NESB was statistically significantly below that for ESB students, in Sc1 (t=3.73, p=0.000) and NP1 (t=3.15, p=0.002). Table 6.11 reinforces these results by showing that NESB students were statistically significantly more likely to be in the Low Achiever group than ESB students for Sc1, $\chi^2(1, n=143) = 6.91$, p=0.000, and NP1, $\chi^2(1, n=143) = 8.20$, p=0.004.

NESB students also had lower self-efficacy for science, nursing academic and nursing clinical tasks as their scores for the SEFS (t=4.85, p=0.000), NASES (t=3.09, p=0.001) and the NCSES (t=3.20, p=0.01) were statistically significantly below those for ESB students (Table 6.10). Whilst not statistically significant, NESB students had higher mean scores for MCSR-N, MCSR-S, CT-N and CT-S although the difference for CT-S was very close to statistical significance (t=-0.86, p=0.06).

Telephone Interview Results

The percentage of the students interviewed who were born in countries other than Aust/NZ/UK was 30% (n=12) which was identical to the percentage for the semester one questionnaire sample. Like the questionnaire sample—although the percentages are higher for the telephone interview—the telephone interview sample of students were predominantly Low Achievers in their Sc1 (88%) and NP1 (82%) courses. Whilst not specifically questioned about their ethnicity, half of the telephone interview sample of students from a NESB made comment(s) referring to their ethnicity. Although NESB students (see Table 6.10 and 6.11) were equally likely to have difficulties with their semester one Nursing Practice courses, most made comments pertaining to their difficulties with their first semester Science courses.

Students' comments centred on their language skills and how it causes them difficulties with their Science courses:

> At first I expected to do well [in science course] but I'm finding the language a barrier, particularly medical knowledge. Reading is difficult. I have Asian background. I need to look up the medical terms to understand but there is no medical dictionary in my language. (*4 20/5/98*)

> There are more terms that are hard to understand [in science]. My background is [Asian]. (*114 31/5/98*)

One student indicated that a certain degree of competence in English language verbal skills is necessary to understand science because there was "more talking and less writing on the board" (*68 24/5/98*) than in the students' birthplace.

Table 6.10

Semester one: summary statistics and t-test results for ethnicity

Variable	Ethnicity	n	M	SD	SE	t
Sc1	ESB	100	64.05	12.07	1.11	3.73***
	NESB	43	55.83	13.89	1.91	
NP1	ESB	96	74.29	11.52	1.12	3.15**
	NESB	40	68.15	11.78	1.67	
SEFS	ESB	211	3.93	0.54	0.04	4.85***
	NESB	90	3.63	0.62	0.06	
NASES	ESB	211	8.00	1.58	0.11	3.09**
	NESB	90	7.28	2.09	0.22	
NCSES	ESB	211	7.92	2.07	0.14	3.20*
	NESB	90	7.25	2.27	0.24	
TV-N	ESB	192	6.09	0.99	0.07	0.25
	NESB	77	6.08	0.85	0.09	
TV-S	ESB	210	5.78	1.00	0.07	0.07
	NESB	90	5.68	1.16	0.12	
SELAP-N	ESB	192	5.34	1.03	0.07	-0.22
	NESB	77	5.23	1.14	0.13	
SELAP-S	ESB	210	4.59	1.22	0.08	-0.92
	NESB	90	4.61	1.38	0.14	
MCSR-N	ESB	189	4.55	0.98	0.07	-0.19
	NESB	76	4.71	1.01	0.11	
MCSR-S	ESB	210	4.52	0.99	0.07	-0.17
	NESB	90	4.67	1.04	0.11	
CT-N	ESB	189	4.10	1.23	0.09	-0.29
	NESB	75	4.23	1.27	0.15	
CT-S	ESB	210	3.92	1.27	0.09	-0.86
	NESB	90	4.23	1.37	0.14	

*p=0.01. **p<0.003. ***p=0.000.

Table 6.11

Students' ethnicity and academic achievement group for semester one and two

		Low %	High %	DF	χ^2
Sc1	ESB	56	44		
	NESB	77	23	1	6.96**
NP1	ESB	51	48		
	NESB	76	24	1	8.20***
Sc2	ESB	58	42		
	NESB	67	33	1	1.08
NP2	ESB	49	51		
	NESB	52	48	1	0.14

**p=0.004. ***p=0.000.

6.7.3 Semester Two

As students' birthplace and language spoken at home were strongly associated (Table 6.8), it was decided to use only one of these variables—students' birthplace (ESB/NESB)—to examine the relationship between ethnicity, self-regulated learning and academic performance in semester two.

To ascertain the countries that the students came from, and to confirm that the category Aust/NZ/UK was satisfactory to identify students from an ESB, students not born in Australia were asked to give their place of birth. Students who were not born in Australia came from diverse backgrounds with twenty four countries identified as students' birthplaces. These countries were grouped into categories according to their location (HarperCollins, 1995), and the percentages of students in these categories is given in Table 6.9. Students were most likely to come from Asia (China, Hong Kong, India, Indonesia, Korea, and Vietnam) followed by Central Europe (Bosnia, Germany, Hungary, Netherlands, Slovakia, Yugoslavia).

The expectation that NZ and the UK would be the major ESB countries from which nursing students would be drawn was supported by students' responses in this semester, as of the 2.5% of students who came from English speaking countries (other than Australia), 0.5% of students came from the United States of America and 2% came from NZ/UK (Table 6.9). These results, in conjunction with those for semester one where students' birthplace and language spoken at home were found to be strongly statistically associated (Table 6.8), provide support for the use of the term ESB for those students born in Aust/NZ/UK and NESB for those students born in countries other than Aust/NZ/UK. Thus students' birthplace was the variable used in statistical analysis of students' ethnicity and its relationship to self-efficacy, self-regulated learning and academic performance in this semester.

In Table 6.8 it can be seen that the proportion of ESB students and NESB students in semester two was almost identical to that for semester one with 69% of students born in Aust/NZ/UK and 31% born in "Other" countries.

Whilst NESB students had lower Sc2 academic scores than ESB students, the difference was not statistically significant. Table 6.12 shows that, just as they did in semester one, NESB students also had statistically significant lower mean scores than ESB students for the SEFS (t=2.47, p=0.01), NASES (t=2.92, p=0.004) and the NCSES (t=3.24, p=0.000) in semester two. There were no statistically significant differences between ESB and NESB students for any of the other research instruments.

Table 6.12

Semester two: summary statistics and t-test results for ethnicity

Variable	Ethnicity	n	M	SD	SE	t
Sc2	ESB	88	60.56	14.21	1.47	0.82
	NESB	40	58.49	13.96	2.04	
NP2	ESB	85	79.48	10.51	1.15	-0.11
	NESB	39	77.10	10.25	1.55	
SEFS	ESB	139	4.19	0.55	0.05	2.47*
	NESB	62	3.98	0.58	0.07	
NASES	ESB	139	7.86	1.53	0.13	2.92**
	NESB	62	7.16	1.58	0.20	
NCSES	ESB	139	7.81	1.70	0.14	3.24***
	NESB	62	6.90	1.98	0.25	
TV-N	ESB	131	5.90	1.14	0.10	0.24
	NESB	62	5.86	1.04	0.13	
TV-S	ESB	136	5.72	1.08	0.09	1.34
	NESB	51	5.84	1.21	0.17	
SELAP-N	ESB	131	5.41	1.07	0.09	-0.51
	NESB	62	5.19	1.09	0.14	
SELAP-S	ESB	136	4.70	1.09	0.09	-0.85
	NESB	51	4.80	1.35	0.19	
MCSR-N	ESB	131	4.47	0.99	0.09	0.14
	NESB	62	4.60	0.98	0.12	
MCSR-S	ESB	135	4.59	0.97	0.08	-0.05
	NESB	51	4.57	0.97	0.13	
CT-N	ESB	131	4.39	1.35	0.12	0.96
	NESB	62	4.40	1.10	0.14	
CT-S	ESB	135	4.22	1.31	0.11	-0.07
	NESB	50	4.23	1.03	0.14	

*p=0.01. **p=0.004. ***p=0.000.

Telephone Interview Sample

Whilst some of the telephone interview sample of students who were from a NESB moved from Low to High Achiever group, most were consistently Low Achievers in their first year Science and Nursing Practice courses. Of the students who failed their semester one Science course, 50% also failed their semester two Science course. The telephone interview sample of students did not make any comments about their ethnicity in their second interview.

6.7.4 Academics' Views of NESB Students

In accordance with the questionnaire and telephone interview results, academics from both the Nursing Practice and Science courses, overwhelmingly perceive NESB students as Low Achievers:

> They're the ones [NESB] that often get, you know, like two out of a hundred for the assessment. You know, very very bad fails, because they find it so hard. Or they scrape through. (*Heather 2/10/98*)

> In every group that I have I reckon I've had one or two people who have an English problem and they're failing. (*Jack 16/11/98*)

Academics discussed NESB students and the factors that they feel may influence these students' academic performance in first year Science and Nursing Practice courses. Three themes—language skills, help-seeking and cultural specific approach to study—that emerged from academics' comments are briefly discussed in relation to academic performance.

Language Skills

NESB students, by virtue of their background, may have difficulties with the English language and these difficulties may be with either verbal or written language skills—or both—in English. Academics feel that these language difficulties may be a factor in NESB students' modest academic performance in their first year Science and Nursing Practice courses. Jack, for example, when asked to elaborate on the characteristics that "stand out" in a core group of students who consistently failed the course in which he teaches, said:

> ...the first thing I would be looking at would be the name. And I would be looking for a foreign name. And that I would be making all sorts of prejudicial judgements about language. (*Jack 16/11/98*)

The judgements that Jack made, were about students' verbal skills in English, which he called "broken English."

Academics from both the course areas expressed similar concerns about some NESB students' English language verbal skills. There were differences between the Science and Nursing Practice courses in the nature of those concerns. Jack was concerned because "science specific" language skills are introduced in his Science course and this meant that NESB students had two languages to master to be successful in this course area:

> ...I know I've got one or two people [in the classes] who have no English at all. I don't know what they're doing here. Because they're sitting there and they can't possibly work out what I'm talking about. Then when you throw in the language of science on top of that. Throw in the science language into the English language they don't understand anyway. (*Jack 16/11/98*)

In the Nursing Practice courses, academics were concerned with NESB students' verbal skills in relation to success in the clinical component of the course and students' mastery of clinical skills. Julie explained why she felt that a certain degree of competence in verbal skills in English is necessary in nursing:

> You know in other Faculties if they get work and went out with an Arts degree, and couldn't speak really good English it wouldn't matter that much. But if they go to deal in a nursing situation making judgements, critically evaluating where their patient's at, communicating with a patient as well as their family, as well as other members of staff [they need to be able to speak English]. (*Julie 13/7/98*)

Heather expands on the type of difficulties some NESB students may have with their Nursing Practice courses:

> The ones [students] from a non-English speaking background found it really hard. And I worry about those ones because they tend to fail, because they can't write and they can't understand the text. And so, yeah they often don't do too well on clinical either, because people don't see them as interacting well with patients, and their [clinical] skills are often, you know, poorer than other students. (*Heather 2/10/98*)

Several academics expressed concern that because NESB students tend to congregate in groups with similar backgrounds they are presented with less opportunities to practise their verbal skills in English:

> Another problem is that they [students] work in groups.... and you tend to find that the poor English speaking students will stay together. Again they're not challenged by others saying "Don't understand what you're talking about. Can you tell me about that?" *Julie 13/7/98*

Another area of English language skills that NESB students may have difficulties with in the first year of their nursing program is with their writing skills in English. Academics varied in their opinions about NESB students' written skills. Heather's comments given earlier indicate that she feels that some NESB students' written English skills are limited. Ray, on the other hand, felt all students including "Anglo-Saxons" have problems with:

> Writing the assignments and some expression, clarity and understanding. That is a major problem. At least in the classes that I have. (*Ray 2/11/98*)

Students' written skills were certainly mentioned as an area of concern in relation to students irrespective of their age or background, but it may be that for some NESB students these difficulties are compounded if their English language skills are limited. Brian identified a means of assisting some NESB students in his course:

> Yeah we've got a large percentage of those [NESB students] and I think a lot of what I say in lectures probably goes straight over their heads and I certainly notice it in the labs. Very often they don't have a clue of what they're meant to be doing. Most of them can read English quite well, which means they tend to benefit from having handouts of lecture notes. (*Brian 16/11/98*)

In summary, academics feel that NESB students' English language skills may be a factor influencing students' academic performance in their first year Science and Nursing Practice courses.

Help-seeking

We have seen in the preceding theme—language skills—that academics are able to identify clearly some NESB students who require help with their spoken or written English skills to assist them to be successful or improve their academic performance in their first year courses. Academics commented that NESB students are often reluctant to seek help whether it is for help with their language skills or course specific skills, particularly from the academics involved in the courses in which they are enrolled. This is a source of frustration for some academics.

Julie and Mary advanced their reasons for why some NESB students are reluctant to seek help from academics:

> And over the years they [NESB students] have been the hardest to deal with, because they don't come and ask for help often. Again it's a very strong cultural difference. They don't want to lose face, they will sit and nod and smile and you think "Is this message getting through?" and eventually find out "No it hasn't." But they will seldom come and ask for help. And it's the learning centre they will go to. And that's I guess because the other people in the Faculty don't know about it. Again it's about saving face. (*Julie 13/7/98*)

> Yeah some do [seek help]. They do tend though to be fairly reticent and that may come through because of their ethnic background where they don't like to approach anybody either that they perceive to be in authority you know unless they've got a really really good reason and then they're very apologetic. (*Mary 23/10/98*)

As Julie's comments indicate, some students seek help for aspects of the course from a Learning Assistance Department, and some academics mentioned that they would refer students to this department if they did seek help from them for their language skills. Whilst academics might refer them to the Learning Assistance Department, Heather (1/10/98) found that "Some do and some don't go."

There are some NESB students who do seek help from academics. Susan was the only academic who commented that many NESB students approach her for help:

> They [NESB students] tend to, a lot of them tend to seek you out as well for assistance. And they are more so on wanting to know if they're doing it right, more than any other group. (*Susan 11/6/98*)

This may be partly explained by the fact that a number of Susan's NESB students were mature age entry students who we have seen are more likely than high school leavers to seek help when they have difficulties with a course. Other explanations may be the rapport between Susan and her students, or the possibility that Susan's students had a certain level of competence in the English language or cultural experiences and were therefore in a better position to seek help.

Several academics—including those who had indicated that NESB students generally did not seek help—had stories about NESB students who had sought help from the academic and then went on to be academically very successful in their nursing program and maybe to win prize/s for academic achievement. The common threads to these stories included students seeking help with English language and study strategies and taking an active role in their learning. But these students were the exceptions and academics felt that this did not happen often.

Cultural specific approach to study

A few academics talked about NESB students' approaches to study, indicating that they considered them specific to NESB students' cultural background and hence the label of this theme. Brian, for example, said:

> They [NESB students] tend to learn by rote. They're not good at applying knowledge, synthesising knowledge and applying it.... (*Brian 16/11/98*)

Brian's comments indicate that he sees "rote learning" as specific to NESB students and feels that this method of study may not lead to academic success in his course.

6.8 Summary and Discussion

This chapter was concerned with students' entry characteristics and their relationship to students' self-regulated learning, and academic performance. The entry characteristics examined in semester one included: nursing as a first choice, students' prior nursing experience, age/mode of entry into university, academic entry characteristics including TER Score, HSC Biology and HSC Chemistry and/or Physics, and ethnicity. Summary statistics for students' gender and their mode of study were computed but were not analysed in relation to self-regulated learning and academic performance. In semester two, the only entry characteristics examined were students' age and ethnicity. Where possible, the results from the academics' interviews, student telephone interviews and results from the questionnaire were triangulated giving credibility to all results and increasing our understanding of how some entry characteristics influence students' self beliefs, methods of studying and impact on their academic performance.

For 68% of the semester one questionnaire sample of students, nursing was their first career choice, and it appears that contact with nursing—either through family or friends or personal experiences—has influenced these students to choose to do their nursing program. In accordance with previous research (Andrew, 1995; Bishop, 1990), students for whom a nursing program was their first choice, performed better in their first semester Science course than those students for whom a nursing program was not their first choice. In addition to difficulties academically with their courses, academics found that students for whom nursing was not a first choice were more challenging to teach, as they were likely to question the relevance of their courses to nursing and find the courses uninteresting. These findings triangulate with the quantitative results, where students for whom nursing was not a first choice had statistically significantly lower mean scores for TV-N (see Table 6.1).

The results in Table 6.1 also show that students for whom nursing was not a first choice have higher SEFS and SELAP-S, than students for whom nursing is a first choice. The profile of students in Table 6.3 may help to explain these results, as students for whom nursing is not a first choice, are more likely to be in the 17-19 age group, and to have studied HSC Science and have more recent learning experiences, than students for whom nursing is a first choice, who were more likely to be in the 20+ age group, and to have a limited science background.

Students entering a nursing program may already have some experience in nursing or a nursing-related capacity with 37% of the questionnaire sample of students having this experience. In accordance with social cognitive theory, where students' personal experiences are a valuable source of efficacy information (Bandura, 1986), students with nursing experience had higher self-efficacy for clinical nursing (NCSES) than students without any nursing experience (see Table 6.2).

Whilst students with nursing experience had higher self-efficacy for clinical nursing, they did not perform better academically in their semester one Nursing Practice course than those without any nursing experience. This may be partly explained by academics' comments about ENs, one group of students with nursing experience, who they felt that whilst they had practical clinical experience it did not necessarily give them an advantage academically. The corollary to this, is the fact that the assessments for NP1 were theoretical, and practical clinical skills were not formally assessed in this semester.

The mean age of the questionnaire sample of students in semester one was 22.2 years with 56% aged 17-19 years and 44% aged 20+ years. A statistical association was found (Table 6.3) between these age groups and the following students' entry characteristics: Mode of Entry into university; ethnicity; nursing as a first choice; nursing experience and academic characteristics (HSC Chemistry/Physics; HSC Biology). A profile of the semester one questionnaire sample, by age groups, is given in Table 6.3.

Students in the 17-19 year age group were found to have statistically significantly higher SEFS, and SELAP-S and lower NCSES than students in the 20+ age group (Table 6.4). The same reasons, already discussed for nursing as a first choice, by age group, can be applied to these results. That is, students in the 17-19 year age group are more likely to have studied some HSC science and have more recent study experiences, than students from the 20+ age group, but have less nursing experience than this group and these variables may have influenced their SEFS, SELAP-S and NCSES.

Academics are aware that students' age and mode of entry are related, as corroborated by the quantitative results, and they use the term mature age to describe older students and "high school leavers" or "school leavers" for younger students. Whilst they describe mature age students as having the characteristics of High Achievers, in semester one, there was no statistical difference, in academic performance, between the two age groups—17-19 and 20+ years. However, once mature age students have "survived" (George 2/4/98) semester one including their exams, there is a positive change in students' academic self beliefs and academic achievements. Successful completion of their first semester at university, gives the mature age students feedback about the effectiveness of their study methods and raises their self-efficacy expectations for success in the next semester. By semester two the mature age students (20+) are significantly out-performing the younger students academically in their Science and Nursing Practice courses. Whilst they now have higher self-efficacy expectations than the 17-19 group for the SEFS, NASES, NCSES, SELAP-N and SELAP-S (Table 6.5) the difference between the groups was only significant for the SELAP-S. The 20+ group also have significantly higher TV-S than the 17-19 age group of students.

Furthermore, academics describe mature age students as having more self-regulated learning skills and strategies than High School Leavers and by semester two the quantitative data support their comments, with students in the 20+ group having significantly higher mean scores, than the 17-19 year old students, for MCSR-N, MCSR-S, CT-N, CT-S (Table 6.5). It is not surprising, therefore, that with higher self-efficacy and self-regulated learning strategies in semester two, compared to the 17-19 year old students, students in the 20+ age group had statistically significant higher mean academic scores in Sc2 and NP2.

For those students who were admitted on the basis of their TER score, which we know from Table 6.3 to be students primarily in the 17-19 age group, 31% were in the low (0-45), 31% in the high (56-100) range and 37% were in the medium TER range (46-55). There was an association between these TER groups and students' academic achievement in Sc1, with for example, students with a low TER more likely to be a Low Achiever than a High Achiever in Sc1 (Table 6.6). Students' TER scores were not associated with these achievement groups in NP1. Academics appear to be aware that students' TER scores are more relevant to the Science courses, particularly in relation to academic performance, as more academics from this area made comments about students' TER characteristics than those involved in the Nursing Practice courses.

Some students reported that they expected nursing to be a relatively easy program because of its entry TER requirement, and like students, for whom nursing is not a first choice, the academics report finding these students challenging to teach.

The variable of academic entry characteristics, in addition to students' TER score, also included the HSC science background of students. Table 6.3 shows that very few students in the 20+ age group have studied HSC Chemistry/Physics or Biology. For the 17-19 year age group, three quarters of the students have studied HSC Science, but only just over a half have studied HSC Biology and even less have studied HSC Chemistry/Physics. Students who enter nursing having studied Biology and Chemistry/Physics at HSC level have higher self-efficacy for science and learning and performance in science and value science more (Table 6.7) than students who do not have these entry characteristics. Only HSC Chemistry/Physics was related to academic performance in Sc1. Academics made comments that indicate some students who have studied HSC Science subjects mistakenly make judgements that Sc1 is similar to these subjects and start skipping lectures. Whilst Sc1 may initially appear to be covering familiar ground, in fact it varies significantly from these subjects as the semester progresses and these students may find that they have missed important connections between these science principles and nursing.

More than a quarter of the questionnaire sample of students in semester one and two were from a NESB. Furthermore, 44% of both students' parents in semester one come from a NESB, indicating that about 14% of students may be first generation Australians. Students were most likely to come from Asian (29.5%) or Central European (20%) countries and least likely to come from the Balkans (2%). For this study, statistical analysis supported the use of the two categories "Aust/NZ/UK" and "Other" to indicate whether a nursing student was respectively from an ESB, or

NESB. NESB students were almost twice as likely to be in the 20+ age group than the 17-19 group.

In semester one, students from a NESB performed significantly academically below ESB students in Sc1, and NP1 (Table 6.10). There was no significant difference between these students' academic performance for Sc2 and NP2. NESB students were more likely than ESB students to be academically Low Achievers, with this difference statistically significant for Sc1 and NP1 (Table 6.11).

NESB students had statistically significantly lower SEFS, NASES and NCSES scores than ESB students for semester one and two (Table 6.10 and 6.12 respectively). There was no other difference between students from a NESB/ESB for any of the other research instruments in semester one and two although the difference was close to significance for semester one CT-S (Table 6.10).

Many of the telephone interview students from a NESB were concerned about their language skills and the difficulties it presents them with in their first semester Science courses. These difficulties had some credence as half of these students failed their first semester Science course and many also failed their second semester Science course. In accordance with the questionnaire results, telephone interview students were consistently Low Achievers in their first and second semester Science and Nursing Practice courses.

Also in accordance with the questionnaire results and students' expressed concerns, academics were aware that NESB students are likely to be Low Achievers in their Science and Nursing Practice courses and three themes—language skills, help-seeking and cultural specific approach to study—emerged from their comments. The theme of language skills, as indicated by the name, referred to the difficulties with verbal or written language skills in English that NESB students experienced in their Science and Nursing Practice courses. Whilst there were some similarities in academics' concerns from both these areas, those involved with the science area talked about the fact that NESB students have to cope with two languages—science specific and English—in their area whereas academics from the Nursing Practice area were concerned with NESB students' difficulties related to clinical practice. The theme, help-seeking, related to academics' comments about NESB students' reluctance to seek help to improve their success in their nursing courses. The last theme related to NESB students' culturally specific approaches to study which academics felt influenced NESB students' academic success in nursing.

In the next chapter (7) the results pertaining to students' motivation are presented.

Chapter 7

RESULTS 2

Motivation

7.1 Introduction

Chapter 7 is the second results chapter for the thesis. The focus, in this chapter, is the results for students' motivation—self-efficacy and task value/relevance—and its relationship to students' academic performance in their first year Science and Nursing Practice courses. The chapter is divided into two parts with the first part dealing with self-efficacy (7.3-7.4) and the second part with task value/relevance (7.5-7.6). The chapter begins by reviewing the research questions relevant to this chapter and presenting the expectations with regard to the qualitative research (7.2) and finishes the chapter with a summary and discussion of the results (7.7).

The interview results in this chapter are primarily those from the student telephone interviews, although there are results from the academic interviews. The interview results are presented in conjunction with those for the questionnaires to give a comprehensive view of students' self-efficacy and task value/relevance for their first year Science and Nursing Practice courses.

7.2 Research Questions and Expectations

There was one research question (see 1.5 question 4) that was specific to this chapter with the results to this question found in this chapter. Based on the literature some of the qualitative results to this question can be anticipated and these research expectations are listed following the research question.

Research Question

4) What are and what can we understand about students' motivation (self-efficacy/self-beliefs/expectations and value/relevance perceptions) for their Science and Nursing Practice courses?

Research Expectations

Self-Efficacy

- It would be expected that the strength of a student's SEFS and SELAP-S scores for semester one would be related to a student's academic performance in Sc1, and their NCSES and SELAP-N scores would be related to their academic performance in NP1.
- It would be expected that the strength of a student's SEFS and SELAP-S scores for semester two would be related to a student's academic performance in Sc2, and that their NCSES and SELAP-N scores would be related to their academic performance in NP2.

Task Value

- It would be expected that a student's semester one TV-S score would be related to a student's academic performance in Sc1, and their TV-N would be related to their academic performance in NP1.
- It would be expected that a student's semester two TV-S score would be related to a student's academic performance in Sc2, and their TV-N score would be related to their academic performance in NP2.

Part One: Self-Efficacy

7.3 Semester One

7.3.1 Introduction

The questionnaire and telephone items were designed to examine students' self-efficacy for their science and Nursing Practice courses. In the telephone interviews students talked about their perceptions of their Bachelor of Nursing program and the Science and Nursing Practice courses in that program. Academics discussed students' perceptions of these courses and these results are given in this section. The students' and academics' comments may increase our understanding of some of the factors that influence students' motivation for their Science and Nursing Practice courses. Students also talked about their past experiences with science and these results may help increase our understanding of students' self-efficacy for science and the results may complement the quantitative results. Finally, students talked about their academic performance expectations for their Science and Nursing Practice courses and in addition to increasing our understanding of students' expectations for learning and academic success in these courses it was anticipated that the results might triangulate with those for the appropriate SELAP (N or S) research instrument. The results from the student interviews are also discussed in relation to students' achievement group for their Science and Nursing Practice courses.

In the questionnaire specific (SEFS, NASES & NCSES) and general (SELAP) measures of self-efficacy were to measure students' self-efficacy for their first year Science and Nursing Practice courses of their Bachelor of Nursing program.

The section begins by reviewing the student entry characteristics from Chapter 6 that pertain to self-efficacy and then the interview and questionnaire results relevant to this section are presented.

Students' Entry Characteristics

In semester one, the results for the questionnaire indicated that students had statistically significantly higher mean SEFS and SELAP-S scores if they were aged 17-19 years, nursing was not their first choice, they had studied HSC Biology, and Chemistry/Physics. Students from an ESB had statistically significantly higher mean SEFS scores than students from NESB. Students aged 17- 19 years and those with an ESB had statistically significant mean NASES scores. Students who had nursing experience, who were aged 20+ and came from an ESB tended to have statistically significant higher mean NCSES scores than those without these entry characteristics.

Like the quantitative results, the qualitative results indicate that students for whom nursing was not a first choice, students' age, students' science background, TER score and ethnicity were all factors that may influence students' beliefs about their capabilities for their Science and Nursing Practice courses.

7.3.2 Students' Perceptions of their Bachelor of Nursing Program

In chapter 6 we saw that the TER score required for admission to Bachelor of Nursing programs leads students to conclude that nursing must be an "easy option" compared to other university programs. Students are surprised, therefore, to find that the program is harder than they expected:

> Nursing is harder than I expected. I thought it would be easier. (*171 5/5/98*)

Some thought it was hard because they had stereotyped views of nursing as being mainly "practical" or "basic" and therefore having limited theory:

> The nursing program is harder than I thought [it would be]. I thought nursing was basic. (*4 20/5/98*)

> Nursing is harder [than I thought] because I didn't expect the amount of theory in it. There is a lot of work and study in it [the program]. It's not easy. (*6 25/5/98*)

Even the few students who found the program easier than they expected mentioned the workloads:

> I found the course easier than I expected, but it has a heavy workload. (*266 12/6/98*)

High and Low Achievers

Low Achievers were twice as likely, as High Achievers, to mention that they found the course harder than they expected.

7.3.3 Students' Perceptions Regarding Science in the First Year of a Nursing Program

More than half of the students interviewed (59%) expected to study science in the first year of their program. About one quarter (26%), however, did not expect to study science with some (9%) stating that they didn't know what to expect. A few students (6%) mentioned subject areas that they didn't expect to study within their first semester Science course namely physics and chemistry. Some students had reflected on their initial expectations and realised that they should have expected science to be an integral part of nursing:

> I didn't expect to have science in the course. Thinking realistically, I should have expected it, as science is in nursing, but, practically I didn't. (*146 17/5/98*)

Many students who expected to study science in the first year found the science harder than they expected particularly the detail and depth of the science component of the program:

> I didn't expect the science to be that intense, and certainly not a major part of nursing. (*171 5/6/98*)

> I think science is interesting but there's too much depth. It's like you're doing a doctor's course. (*165 19/5/98*)

> There's more detail in science [than I expected]. I didn't expect so much detail [in the science course]. (*221 5/6/98*)

For others the pace of the science was faster than expected:

> Science is the hardest course. It is full-on. There is a lot to do and we race through it. (*108 19/5/98*)
>
> I knew science was in the first year but I thought we would progress through it much more slowly. But in fact we do one chapter in one week. It's very hard to take the information in. (*172 29/5/98*)

A few students commented on the physics and chemistry component of the science course:

> The chemistry and physics are harder than I expected. (*123 31/5/98*)

High and Low Achievers

It appears that Low Achiever students are less informed about their first year nursing program than High Achiever students, as when students' comments were examined in relation to their achiever group, only these students stated that they were not aware that they would be expected to study science in their first year program.

7.3.4 Students' Past Experiences with Science

Just less than half the students interviewed had studied some science at HSC level. Many of the students, who had not studied any science at the HSC level, mentioned "dropping" subjects, particularly, chemistry and/or physics after year 10 at high school. This coincides with the stage, at high school, when students are give greater freedom to choose (and narrow) the subjects they will study for the HSC. Students tended to "drop" chemistry and/or physics as they disliked these subjects:

> I did biology to year 11. It was interesting. I did chemistry and physics in year 10. I didn't like them. They were a lot of work. (*98 5/6/98*)

or because they found them “difficult” or “hard”:

> I found chemistry and physics too hard [at high school] and avoided them. (*124 18/5/98*)

> I did physics until year 11 and then dropped it [physics] as I found it too difficult. (*171 5/6/98*)

For some, chemistry and physics evoked very negative responses:

> I didn’t do chemistry or physics after year 10. I didn’t choose them for the HSC because I hated them. (*261 12/6/98*)

The majority of students who did biology at high school, on the other hand, described liking this subject at school:

> Yes, I did biology until year 11. I did like it [biology]. (*138 20/5/98*)

> I did Biology for the HSC. I did chemistry and physics in years 7-10. I loved biology. I found chemistry difficult and physics was beyond me. That’s why I didn’t choose them for the HSC. (*251 12/6/98*)

A few students who did biology, chemistry or physics for the HSC, described their academic performance in science as being modest:

> I did biology and chemistry for the HSC. I enjoyed both but I was not good at either. (*123 31/5/98*)

Others reported that their HSC subjects had not given them the advantage in their Science course that they expected:

> I did biology and general science to HSC level. I did it to get higher marks for the HSC. It has only helped a very little bit. I did chemistry in year 10 but the depth is more at uni. The depth goes from basic to a higher level fast. (*172 29/5/98*)

High and Low Achievers

Whilst science subjects, particularly physics and chemistry, were considered to be difficult, or hard, or disliked by many students, Low Achievers were three times more likely than High Achievers to express a strong dislike or express a very negative opinion of chemistry or physics. These results triangulate and help with our understanding of those for SEFS (Table 7.2) where there is a significant difference between the achiever groups.

7.3.5 Academics' Comments about Students' Perceptions of their Science and Nursing Practice Courses

Science courses

Academics involved in teaching the Science courses are aware that students may be very "anxious", "terrified", or "worried" about these courses. This includes:

> Some of the HSC kids who didn't take science for the HSC have very colourful memories of how they couldn't cope with science. ...some will say that I don't like chemistry or physics or whatever. (*George 2/4/98*)

and mature age students:

> I spend so much time in the first few weeks providing a shoulder to cry on because they [mature age students] are so worried, so inhibited by the science. (*George 2/4/98*)

Academics are aware that students:

> ...find the science content harder than other courses. (*David 15/10/98*)

Academics may try to increase students' beliefs about their capabilities to do science:

> Sometimes they come to see me. Sometimes I just talk to them in class. But I keep on trying to give them positive reinforcement: "You can do it." In fact with [one student] I made her put—"I can do it"—up where she has books. And she did. And she told me she kept on looking at it—"I can do it." (*George 2/4/98*)

Academics are therefore aware of the students' self-beliefs about science and try to increase students' self-efficacy beliefs through positive verbal reinforcement as discussed by George.

Nursing Practice Courses

Academics are also aware that some students have the perception that their Nursing courses are going to be easy and have the expectation that they will get high grades without much effort:

> And I think that they [students] have a false impression that nursing, especially the nursing subjects [ie Nursing Practice courses] are going to be a breeze and it's an easy stepping stone and they'll get a credit average at least and be able to step ahead. Those type of mentality people tend to fail. (*Susan 11/6/98*)

The academics' perceptions triangulate with those for some of the Low Achievers who have higher expectations for their Nursing Practice courses than warranted by their performance.

7.3.6 Questionnaire Results

All the self-efficacy research instruments as shown in Table 7.1 were statistically significantly related to students' academic performance in their first semester Science course including those instruments more specifically expected to measure students' self-efficacy for Nursing Practice courses. The SEFS was the strongest predictor of academic performance ($r=0.35$, $p=0.000$) in Sc1 followed by the SELAP-S ($r=0.32$, $p=0.000$). When the differences between the high and low achievement groups were examined, as shown in Table 7.2, there were statistically significant differences between these Sc1 groups for the SEFS ($t=-3.04$, $p=0.003$) and SELAP-S ($t=-2.82$, $p=0.004$) but not the NASES, although it was close to statistical significance ($t=-3.07$, $p=0.07$).

As expected, students' scores for the NCSES ($r=0.23$, $p=0.004$) and SELAP-N ($r=0.25$, $p=0.003$) were statistically significantly related to their academic performance in their NP1 course. Also as expected, the science related research measures, the SEFS and SELAP-S, were not related to academic performance in NP1. The NASES was also related ($r=0.23$, $p=0.003$) to students' NP1 academic performance. When the difference between the achievement groups for NP1 were examined, High Achievers had higher mean scores for the NASES, NCSES and SELAP-N but the difference was only statistically significant for the NASES ($t=-2.53$, $p=0.01$).

Table 7.1

Relationship between self-efficacy measures and task value with academic performance

	Sc1 n=143	NP1 n=136
NASES	0.26***	0.23**
SEFS	0.35**	0.15
NCSES	0.18**	0.24**
MSLQ		
SELAP-S	0.32***	-0.05
SELAP-N	0.24**	0.25**
TV-S	0.38***	0.17*
TV-N	0.04	0.33***
	Sc2 n=128	NP2 n=124
NASES	0.27**	0.19*
SEFS	0.27**	0.19*
NCSES	0.02	0.11
MSLQ		
SELAP-S	0.34***	0.12
SELAP-N	0.26**	0.27**
TV-S	0.40***	0.32***
TV-N	0.25**	0.31***

***p=0.03. **p<0.005. *p=0.000.

7.3.7 Students' Academic Performance Expectations

Science

When questioned about their anticipated academic grades for their Science course, very few of the students interviewed openly stated that they expected to get a Credit grade or better or that they expected to fail. Both of these groups of students were accurate in their assessment. Most students, however, talked generally—rather than in terms of grades—about how they felt they were doing in science, with many using feedback from assignments or weekly exams to gauge their progress in science:

> I'm doing average in the science. I passed the [science] assignment. (awarded Pass grade) (*125 12/5/98*)

> In the weekly tests I have been getting [full marks]. I think I could do well. (awarded Distinction grade) (*220 12/6/98*)

> I thought I would do well, but I didn't go well in the assignment. I expect I will get a Pass [grade] no higher. (awarded Pass grade) (*162 17/5/98*)

> I thought I was doing badly, but I did well in the assignment. I'm not certain about the exam though. I don't expect to do well. (awarded Pass grade) (*138 20/5/98*)

The end of semester science exam was also a concern for several students:

> I passed the first assignment but I'm worried about the exam. I don't have good study techniques. (awarded Fail grade) (*140 17/5/98*)

> I did well in the assignment but I am very uncertain [of my final grade]. I am aiming for a pass [grade]. I prefer assignments to exams. I fall apart in exams. (awarded Pass grade) (*146 17/5/98*)

High and Low Achievers

Just as there was a significant difference between the achiever groups for the SELAP-S so was there between the achiever groups for the telephone interviews. High Achiever students tended to use terms like "doing/did well", "all right", "ok", or "good" or other terms indicating some confidence in their academic performance in science:

> I'm doing well [in science]. I expect to get a credit. (awarded Credit grade) (*221 5/6/98*)

> I hope for a pass. For the first assessment I got x. I am happy, confident. (awarded Credit grade) (*172 29/5/98*)

Low Achievers, on the other hand, use terminology indicating less confidence in their academic performance and made attributional references about their academic behaviour:

> I need to concentrate more. No I don't expect to get a credit. Maybe a pass. (awarded Fail grade) (*98 5/6/98*)

> I am still behind [in science]. I don't expect to pass. I need to try harder. I'm worried about the exam. (awarded Fail grade) (*101 24/5/98*)

Nursing Practice

Overall, students were confident in passing their Nursing Practice course with only one student—who was awarded a P grade—expressing a fear of failing the course. Whilst some students openly expressed confidence in their academic performance:

> I expect to get a credit or better [for Nursing Practice course]. (awarded Credit grade) (*175 5/6/98*)

others used terms such as "doing well" to indicate that they expected to do more than pass the course. Some students however were more guarded in their response and talked of doing "ok" or "all right." As with the science course, many students used feedback from assignments, or workbooks to determine how they were performing academically in their nursing course:

> I expect to do well [in Nursing Practice course]. I did well in my assignment. (awarded Pass grade) (*101 24/5/98*)

> I expect to do pretty good [in Nursing Practice course], based on my past assignment. (awarded Credit grade) (*108 19/5/98*)

High and Low Achievers

Half of the High Achievers expected to get a Credit grade or better in their Nursing Practice course. High Achievers used language that indicated they were confident of their course performance with many talking of "doing well" "pretty good" or "really well." High Achievers made comments indicating a strong like/enjoyment of their Nursing Practice course:

> I'm going pretty good. I enjoy [Nursing Practice course]. I expect a credit [or better]. You usually do well in things you enjoy don't you? (awarded Distinction grade) (*221 5/6/98*)

Unlike the High Achiever students, no Low Achievers openly stated that they expected to get a credit or better for their Nursing Practice course. Some Low Achievers, however, made comments that could be interpreted as indicating higher expectations for their course grade than they were eventually awarded:

> I think I will pass with flying colours. I scored high in the assessment [for Nursing Practice]. (awarded Pass grade) (*5 24/5/98*)

> I am doing well. I got x [full-marks] for my assignment. (awarded Pass grade) (*138 20/5/98*)

Other Low Achievers used more general terms such as "ok", "all right" or "fine" indicating perhaps that they expected to pass, but did not have higher expectations. Low Achievers also made more critical comments about the assessment procedures for the course:

> I don't understand why if you are doing well in clinical you should fail because you haven't completed your workbook. I don't have time with work and children. (awarded Pass grade) (*140 17/5/98*)

> One assignment I passed by one mark. The workbook/assignment are perception-based [ie Lecturers' perceptions}. (awarded Pass grade) *(162 17/5/98)*

> [There was] all confusion with the assignment. I didn't understand the second part. I realised my mistake when I went to hand it in. (awarded Pass grade) (*68 24/5/98*)

The results indicate that there is variation within the Low Achiever group, with some students having high expectations for success that are not achieved. This great variation within the achiever groups, particularly the Low Achiever group, triangulates with the results for the SELAP-N (Table 7.2) and helps with our understanding of why there was not a significant difference between the achiever groups.

7.4 Self-Efficacy Semester Two

7.4.1 Introduction

The only interview results presented in this section are those pertaining to students' comments about their second semester Science and Nursing Practice courses (7.4.2). These results may assist us to understand if any changes have occurred in students' self-beliefs for these courses. As for the first semester results, students' comments have been examined in relation to their achiever group. The questionnaire results for the relationship between the self-efficacy measures and academic performance are given in this section (7.4.3). As for section 7.3, this section begins by reviewing the student entry characteristics from Chapter 6 that pertain to self-efficacy and semester two.

Students' Entry Characteristics

In semester two, students who were aged 20+ and those who had an ESB had statistically significantly higher SEFS and NASES scores than students who did not have these entry characteristics. Students who were aged 20+ also had statistically significantly higher SELAP-S scores than students who were 17-19 years. Academics involved in the Science courses are aware that mature age students' confidence in their learning and performance for science is higher in the second semester particularly as it is likely to have been boosted by their first semester success in their Science course. Students who came from an ESB had higher NCSES scores than students from an NESB.

7.4.2 Students' Views about their Semester Two Science and Nursing Practice Courses

Science

Generally students found their second semester Science course harder than the first semester course because it was seen as "more complicated" or more "complex." One student said:

> It's [Science course] hard, but science is always hard. (*57 6/11/98*)

Some students who had studied HSC science felt that the semester two Science course was harder because:

> Last semester was a repeat of the HSC, but this semester the material is new so it's a bit harder. There's more study to do. (*162 6/11/98*)

This may partly explain why students aged 20+ perform academically better than students in the 17-19 age group although they are less likely to have studied any HSC science.

Some students mentioned that their feelings about science had changed:

> I dropped out of science in year 10. Never did homework, studied for tests etc. But now I'm doing well at uni. I found it [Science course] easier this semester especially as I now have the basics in chemistry and also because it is more applied. It's easier to read the textbooks. It's still hard though. (*225 6/11/98*)

This comment indicates an increase in the students' self-beliefs for science based on the students' first semester performance and triangulates with academics' comments about the influence of first semester success in science on students' self-beliefs.

High and Low Achievers

Low Achievers were more likely, than High Achievers, to say that semester two was easier than semester one.

Nursing Course

Students generally considered their second semester Nursing Practice course to be "harder", "more applied" but more "interesting" than their first semester Nursing Practice course. Some students discussed the influence of the experience they have gained from their first semester Nursing Practice course on their second semester course:

> Some things are easier because I know more now even though there is more detail. I know more terminology now like parts of the body. (*225 16/11/98*)

High and Low Achievers

High Achievers were more likely than Low Achievers to mention the impact of their first semester Nursing Practice course on their experience or knowledge for their second semester Nursing Practice course.

7.4.3 Questionnaire Results

In semester two, as shown in Table 7.1, the SELAP-S was the strongest self-efficacy predictor of students' academic performance in Sc2 ($r=0.34$, $p=0.000$) with the correlation slightly higher than that for the first semester. The results for the NASES ($r=0.27$, $p=0.003$) was very similar to those for the first semester ($r=0.0.26$, $p=0.000$), however the relationship between the SEFS and students' academic performance in Sc2 was weaker ($r=0.27$, $p=0.001$) than that for the first semester ($r=0.35$, $p=0.000$).

Like the first semester, the SELAP-N ($r=0.27$, $p=0.001$) and NASES ($r=0.19$, $p=0.03$) were also related to students' academic performance in their Science course, but unlike semester one, the NCSES was not. In semester two, the students in the High Achiever group for Sc2 had statistically significant higher mean scores, than the Low Achievers, for the SEFS ($t=-2.68$, $p=0.01$), NASES ($t=-2.57$, $p=0.01$), and SELAP-S ($t=-3.40$, $p=0.01$).

Whilst students' mean SELAP-N ($r=0.27$, $p=0.003$) scores were statistically significantly related to students' academic performance in NP2, as they were in semester one ($r=0.24$, $p=0.003$), the NCSES was not related to students' academic performance for NP2. The SEFS, which was not related to students' academic performance in NP1, nor was it expected to be, was related to students' academic performance in NP2, albeit the correlation was weak ($r=0.19$, $p=0.03$). No other research instruments were related to students' academic performance in NP2. For the achiever groups as shown in Table 7.2, High Achievers for NP2 had statistically significantly higher mean scores, than the Low Achiever group, for the NASES ($t=-2.20$, $p=0.03$) and SELAP-N ($t=-2.43$, $p=0.02$), but not for the NCSES ($t=-1.02$, $p=0.55$).

Table 7.2

Differences between between semester one and two Science and Nursing Practice high and low achiever groups and students' self-efficacy and task value

Variable	Achiever Group	n	M	SD	SE	t
				Sc1		
SEFS	Low	108	3.74	0.60	0.06	-3.04**
	High	64	4.01	0.51	0.06	
NASES	Low	108	7.42	1.87	0.18	-1.83
	High	64	7.94	1.63	0.20	
SELAP-S	Low	108	4.35	1.18	0.11	-2.82**
	High	64	4.88	1.21	0.15	
TV-S	Low	108	5.55	1.09	0.10	-3.07**
	High	64	6.04	0.86	0.11	
				NP1		
NASES	Low	94	7.31	1.86	0.19	-2.53*
	High	63	8.04	1.62	0.21	
NCSES	Low	94	7.37	2.20	0.23	-1.71
	High	63	7.99	2.19	0.27	
SELAP-N	Low	94	5.25	1.00	0.11	-1.56
	High	63	5.51	0.91	0.12	
TV-N	Low	94	6.08	0.85	0.09	-1.80
	High	63	6.34	0.79	0.11	
Variable	Achiever Group	n	M	SD	SE	t
				Sc 2		
SEFS	Low	85	4.05	0.55	0.07	-2.68*
	High	53	4.30	0.53	0.07	
NASES	Low	85	7.34	1.73	0.19	-2.57*
	High	53	8.05	1.34	0.18	
SELAP-S	Low	75	4.57	1.15	0.13	-2.63*
	High	53	5.10	1.06	0.15	
TV-S	Low	75	5.61	1.09	0.13	-3.40***
	High	53	6.21	0.77	0.11	
				NP2		
NASES	Low	65	7.31	1.75	0.22	-2.20*
	High	64	7.93	1.43	0.18	
NCSES	Low	65	7.49	1.79	0.22	-1.02
	High	64	7.69	1.95	0.24	
SELAP-N	Low	63	5.23	1.13	0.14	-2.43*
	High	64	5.65	0.83	0.10	
TV-N	Low	63	5.80	1.13	0.14	-2.21*
	High	64	6.19	0.83	0.10	

*p<0.04. **p<0.05. ***p=0.000.

Part Two: Task Value

7.5 Semester One

7.5.1 Introduction

Task value has been defined in this study as students' interest, importance and perceptions of the relevance of their Science and Nursing Practice courses to clinical nursing. Students and academics who were interviewed commented about the issue of the relevance of the Science and Nursing Practice courses to nursing and these results are presented in 7.5.2 and 7.5.3 respectively. Students' results are examined in relation to their academic achievement group. The quantitative results for the relationship between students' first semester TV (N & S) scores and their academic performance in their relevant Science and Nursing Practice courses are given in 7.5.4. The section begins by reviewing the student entry characteristics from Chapter 6 that pertain to value/relevance.

Students' Entry Characteristics

The results from Chapter 6 indicated that students who had studied HSC Biology or Chemistry/Physics were more likely to have statistically significant higher TV-S scores for Sc1 than students who had not studied these subjects for their HSC. NP1 students for whom nursing was a first choice were likely to have significantly higher mean TV-N scores than students for whom nursing was not a first choice. Academics felt that students for whom nursing was not a first choice were more likely to make comments about the relevance of science to nursing and although students for whom nursing was a first choice had higher mean TV-S scores than students for whom nursing was not a first choice, the difference was not statistically significant.

7.5.2 Relevance of Science Courses to Nursing

Students' Views

Students were more likely to consider their science courses as relevant (60%) to nursing than not relevant (22%), whilst 10% of students were undecided and 8% made general comments about relevance.

Students who could see the relevance of science to nursing could offer explanations of why they felt it was relevant:

> Yes science is relevant because of some of the topics. If you don't study science you don't know what is going on inside the body. You need to be able to treat the patient and need to know what is essential like body buffers and homeostasis. (*171 5/6/98*)

It appears that students' clinical experience during the first semester may help students to see first-hand the relevance of science to nursing practice as many students commented on the influence of clinical practice:

> Yes [the science is relevant to nursing], I'm so glad I'm learning science although it is hard, but you need to know why you're doing things. We did pressure in science before we went on clinical. When I took a patient's BP [Blood Pressure] the family of the patient asked what BP is and I could explain it to the family. (*172 29/5/98*)

> I see the relevance [of science to nursing] a little bit. I nursed a patient with a gall-bladder condition and I was able to explain the function of the gall-bladder to the patient as I had done it recently in science. (*94 24/5/98*)

Others mentioned their lecturer or tutors' influence:

> Yes the science is relevant. Clinical helps you to put it in perspective. When we talk in tuts (tutorials) we refer to clinical practice. (*196 29/5/98*)

Some students who considered that science was not relevant to nursing felt that with time they would come to see the relevance of science to nursing:

> I don't think science is relevant at the moment. I guess as I go on I will see the relevance of science [to nursing]. (*12 24/5/98*)

Some students who considered that science was not relevant to nursing questioned why they were doing science:

> No [the science is not relevant to nursing]. I asked the Lecturer "Why are we doing science?" [The Lecturer] says we need to know [science] to understand what we are doing on clinical. I don't think it's relevant. I don't see the relevance of why we are doing science. (*5 24/5/98*)

or the depth or detail of their science course:

> Sometimes I think the depth [of the science course] is more like that to become a doctor. (*216 20/5/98*)

> Some aspects [of the science] are relevant like blood, tissues, muscles, bone. Yes. Others like chemistry, atoms don't seem necessary. I don't see why you need to know it in detail like organic and inorganic molecules and atoms. (*221 5/6/98*)

High and Low Achievers

An examination of those students in the "no" or "undecided" category, regarding the relevance of science to nursing, revealed that approximately three quarters were Low Achievers. Some of these students questioned why they were doing science (see the comment above). The High Achiever students who considered that science was not relevant to nursing (none were in undecided category) did not question the presence of science but rather felt that with time they would come to see the relevance of science to nursing. The difference between the achiever groups triangulate with those for the TV-S research instrument where Low Achievers have significantly lower TV-S scores than High Achiever students (Table 7.2).

Academics' Views

Academics were aware that students questioned the relevance of their Science courses to nursing. George found that students would ask:

> Do we have to do all this stuff? (*George 2/4/98*)

Some academics mentioned certain sub-groups who question the relevance of science to nursing. Ray found this with respect to ENs:

> Especially [those who say things about relevance] students who have done the Enrolled Nurses program. They will say "This sort of crap you go on with er you don't use that." I constantly have to remind them what they're learning is not for today, it's for like ten or fifteen years time. I'm not teaching them for the sake of the knowledge. What will happen in say ten or fifteen years. They will be left unskilled. And the intention is to build up their confidence. It's a major hassle I have. (*Ray 2/11/98*)

Some academics try to show students that science is relevant to everyday life:

> Science is easy to learn if you're shown the relevance of what you're doing. And we use science in our lives all the time. We're using it without realising it. And all I'm really just giving them is the correct name for everything. (*Brian 16/11/98*)

and its relevance to nursing:

> When students say "Why do we have to do this?" I immediately go to the nursing situation.... If you put the whole problem in the nursing context—now we need to know understand this...we need to know what's going on. (*George 2/4/98*)

Academics triangulate with students' comments about the relevance of science to nursing and those for the TV-S scale.

7.5.3 Relevance of Nursing Practice Courses to Nursing

Students' Views

It would appear that Nursing Practice is highly valued by students as they overwhelmingly found it "interesting", "enjoyable", "fun", and "relevant to nursing" and tended to make comparisons of this course with the Science:

> Nursing Practice is more interesting, and more relevant [to nursing] than science (*12 24/5/98*)

> Nursing Practice is much easier than science, so applied, and commonsense. I am very interested in it. (*225 12/6/98*)

> It's more common knowledge. It's self-explanatory and a lot easier than science. (*196 29/5/98*)

High and Low Achievers

High and Low Achieving students were equally likely to consider their Nursing Practice courses as relevant to nursing which are in keeping with the results for the TV-N scale where there was no significant difference between the achievement groups, although the mean scores for the High Achiever students was higher than that for Low Achievers (Table 7.2).

Academics' Views

Academics who are involved in the Nursing Practice courses are aware that students highly value their Nursing Practice courses and consider it relevant to nursing:

> Nursing Practice is perceived [by students] as "real nursing", "more true of nursing." (*Susan 11/6/98*)

> They [students] love [Nursing Practice]. They are quite open in saying that that's the course that they enjoy most on campus. (*Mary 23/10/98*)

> ...so science is not seen as "real nursing" whereas the [clinical] labs are seen as "real nursing" and that's where they really want to be. And they always say things like "We want more of this [clinical practice] and less of that, you know, the science stuff." And I keep telling them that one day they'll realise that all of it is very important. But they don't believe you. Do they? (*Heather 2/10/98*)

7.5.4 Questionnaire Results

In semester one, as expected, students' TV-S scores were statistically significantly related to students' academic performance in Sc1 ($r=0.38$, $p=0.000$) but not for NP1 as shown in Table 7.1. Students in the High Achiever group for were statistically significantly more likely to have higher TV-S scores ($t=-3.07$, $p=0.002$) than Low Achievers (see Table 7.2).

The results for TV-N were also in keeping with expectations, with students' scores for this measure statistically significantly related to students' academic performance in NP1 ($r=0.33$, $p=0.000$) but not to their scores for Sc1. Whilst students in the High Achiever group for NP1 had higher mean TV-N scores, than those in the Low Achiever group, this difference, although close, was not statistically significant ($t=-1.80$, $p=0.07$).

7.6 Semester Two

7.6.1 Introduction

Students' views of the relevance of their second semester Science (7.6.2) and Nursing Practice (7.6.3) courses are presented in this section and like those for semester one these results are examined in relation to students' academic achievement group. The questionnaire results for the relationship between students' second semester TV (N & S) scores and their academic performance in their relevant Science and Nursing Practice courses are given (7.6.4). The section begins by reviewing the students' entry characteristics, from Chapter 6, that pertain to value/relevance.

Students' Entry Characteristics

In semester two, only students' age was related to students' TV-S scores for Sc2, with students aged 20+ having significantly higher scores than students aged 17-19 years. No entry characteristics were statistically significantly related to students' TV-N scores for NP2.

7.6.2 Students' Views About the Relevance of Science Courses to Nursing

It seems that by the second semester, students are starting to see their Science courses as more relevant to nursing. This increase may be partly attributed to the fact that students who in semester one felt they might see the relevance of science to nursing, with time, had indeed changed their attitude about its relevance by the end of semester two. For example, in semester two this student said:

> Yes [science is relevant]. More so this semester. You see the problems in nursing, and see the relevance. (*138 6/11/98*)

This indicates a shift in this student's beliefs as in semester one the student said that science was:

> Not [relevant] at the moment. I guess as I go on I will see the relevance [of science to nursing]. (*138 20/5/98*)

A change in students' beliefs about the relevance of science was evident among other students as, unlike their responses for semester one, no students said that they did not find the science relevant. Some students however said "I think so" implicitly indicating that they were still not fully convinced of the relevance of science to nursing practice, and a few were undecided:

> Yes, I guess so [Science relevant to nursing]. I don't know. Fluid and electrolytes I'll say. (*162 6/11/98*)

High and Low Achievers

Once again, like semester one, High Achievers were more convinced of the relevance of science to nursing than Low Achievers who were still not completely convinced of its relevance. It should be noted, however, that there had been softening of Low Achiever students' responses, in that students did not openly state that they did not find their science relevant to nursing. There was still a significant difference like semester one, between the High and Low Achieving students (Table 7.2).

7.6.3 Students' Views About the Relevance of Nursing Practice Courses to Nursing

Just as they did in semester one, students in semester two reported highly valuing their second semester Nursing Practice course and considered it relevant to nursing:

> The skills that they teach you are very useful. You can do them on [clinical] placement. (*261 6/11/98*)

High and Low Achievers

Both High and Low Achiever students valued their Nursing Practice course and considered it to be relevant to nursing which is in keeping with the TV-N scores for second semester (Table 7.2) where the numbers in the High and Low Achievement groups were also almost equally divided between these groups.

7.6.4 Questionnaire Results

The correlation, shown in Table 7.1, between students' mean scores for TV-S and their academic performance for Sc2 was slightly stronger in this semester ($r=0.40$, $p=0.000$). Students' TV-S scores were also statistically significantly related to students' academic performance in NP2 ($r=0.32$, $p=0.000$). Students in the High Achiever group, as shown in Table 7.2, had statistically significantly higher TV-S scores, than those in the Low Achiever group, for Sc2 ($t=-3.40$, $p=0.000$).

Like S1 students' TV-N scores were related to students' academic performance in NP2 ($r=0.31$, $p=0.000$), and to Sc2 this semester ($r=0.25$, $p=0.003$). Unlike S1, the difference between the NP2 achiever groups and students' TV-N was statistically significant for this semester ($t=-2.21$, $p=0.03$).

7.7 Summary and Discussion

In this chapter the results for students' motivation—self-efficacy and value/relevance—were presented. The results have been derived from the student telephone interviews, academic interviews and questionnaires with the results triangulated where possible.

In 1989, Higgins (p. 118) suggested that pre-registration nursing programs were "more comprehensive and demanding" than students expect. It would appear that for certain groups of students that is still the situation today, as students entering the nursing programs in this study were surprised to find that it is harder than they thought it would be, particularly Low Achievers, who were also likely to be less informed about the presence of science in a first year Bachelor of Nursing program. This may be because the program was not their first choice, and therefore these students had not obtained sufficient information about their nursing program before commencing it.

In keeping with the literature (Akinsanya & Hayward, 1980; Chapple, 1993) students from both achievement groups in this study, found their Science courses harder than they expected. Just less than half of the students interviewed had studied HSC science (Biology, Chemistry or Physics) and they tended to describe their HSC performance in these subjects as being very modest which is in accordance with the literature (Bishop, 1990). Some students avoided studying Chemistry and Physics at high school and most students, irrespective of whether they had studied them or avoided them at high school, had very negative feelings about Chemistry and Physics. Low Achievers were three times more likely, than High Achievers, to express a strong dislike or negative opinion of Chemistry or Physics. The fact that just half the students had not studied science at HSC level and those who had studied it were more likely to have studied Biology or have a modest performance in Chemistry and Physics may help to explain why students were not confident in predicting their academic grade for their first semester Science course.

These results correspond with those for the SEFS and SELAP-S where, as expected, students' first and second semester scores for the SEFS and SELAP-S were related to their appropriate Science courses, and the difference between the academic performance of the High and Low Achiever groups for these courses was statistically significant for the SEFS and the SELAP-S. In Table 4.2 the mean scores for the SEFS were shown to be significantly higher in semester two and these results triangulate with those for academics (6.5.2) where they comment that once these students have passed their semester one Science course they are "empowered" and their attitude and approach to science changes (Jack, 16/11/98).

Students entering nursing courses may have the impression that their Nursing Practice courses are going to be academically easy and so are the clinical skills associated with nursing and this may indicate why the results for the NCSES and SELAP-N (first semester) were not in keeping with expectations. The NCSES was not related in either semester to students' academic performance in their Nursing Practice courses and there was no significant difference between High and Low Achievers. These results may be partly explained by the fact that Low Achievers may have unrealistic expectations about clinical skills and some of these students may have higher expectations for academic success than was realised. This may also indicate why in the second semester the SELAP-N was statistically related to students' academic performance in NP2 whereas in semester one it was not statistically related to NP1.

The NASES was significantly related to students' academic performance in their first and second semester Science and first semester Nursing Practice courses. It was also significantly correlated to students' overall academic performance in semester one (although the correlation was weak) and semester two.

High Achievers in both semesters are more likely, than Low Achievers, to view their Science courses as relevant to nursing and to be able to give reasons for their viewpoint. These results are confirmed by the questionnaire results where students' first and second semester TV-S and TV-N scores were significantly related to students' academic performance in their appropriate courses and there were significant differences between High and Low Achievers in these courses.

In the next chapter the results for students' learning strategies are presented.

Chapter 8

RESULTS 3

Cognition

8.1 Introduction

Chapter 8 is the third results chapter for the thesis. In this chapter the results pertaining to students' cognition (learning strategies and critical thinking) for their first year Science and Nursing Practice courses are reported. These results include the strategies that students report using when studying for their Science and Nursing Practice courses and those for the relationship between students' strategy use and academic performance. The chapter contains results from the questionnaires, and the student telephone interviews.

The chapter begins by reviewing the research questions relevant to this chapter and presenting the research expectations for the qualitative data (8.2). The chapter is then divided into those results related to semester one (8.3) and those for semester 2 (8.4). A summary and discussion of the results is given in 8.5.

8.2 Research Question and Expectations

There were three research questions (see 1.5 questions 5, 6 and 7) that were specific to this chapter with the results to this question found in this chapter. Based on the literature some of the qualitative results to this question can be anticipated and these research expectations are listed following each research question. As 6 and 7 were qualitative questions there are no research expectations listed for this question.

Research Questions

5) What is the relationship between students' cognition (MCSR and CT) and their academic performance for their first year Science and Nursing Practice courses?

Research Expectations

- It would be expected that students' first semester MSCR-S and CT-S scores would be related to their academic performance in Sc1 and that students' second semester MSCR-S and CT-S scores would be related to their academic performance in Sc2.

- It would be expected that students' MCSR-N and CT-N scores would be related to their academic performance in NP1 and that students' second semester MCSR-N and CT-N scores would be related to their academic performance in NP2.

Research Questions

6) What are the learning strategies students report using for their Science and Nursing Practice courses?

7) What changes, if any, do students report making in the second semester when studying for their Science and Nursing Practice courses?

8.3 Semester One

8.3.1 Introduction

The cognition students use for their Science and Nursing Practice courses was determined quantitatively by the use of the research scales MCSR (Metacognitive Self-Regulation) and CT (Critical Thinking) found in the first semester questionnaire and qualitatively by examining the strategies students reported using—during the telephone interviews—when studying for these courses. It was anticipated that the qualitative results would expand on those regarding students' learning strategy use and that aspects of these results would triangulate with the quantitative results. The qualitative results were also examined in relation to students' achievement groups. The qualitative and quantitative results gave a comprehensive view of the learning strategies used by students for their Science and Nursing Practice courses and their relationship to academic performance.

The section begins by reviewing the student entry characteristics from Chapter 6 that pertain to students' learning strategies, and then the questionnaire and interview results relevant to this section are presented.

Students' Entry Characteristics

In the first semester, students who were aged 20+ had significantly higher mean scores for the MCSR-N than students aged 17-19. This corresponds with the academics' views of mature age students who they described as using more self-regulatory strategies. The MCSR-S, CT-N and CT-S were not related to any other student entry characteristics

8.3.2 Questionnaire Results

As anticipated, students' MCSR-S scores were statistically significantly related to students' academic performance in Sc1 (r=0.24, p=0.002) and their MCSR-N scores were related to students' academic performance for NP1 (r=0.14, p=0.004), as shown in Table 8.1. Also as anticipated students' CT-S scores were statistically significantly related to students' academic performance for Sc1 (r=0.17, p=0.03), however their CT-N scores were not related to students' academic performance for NP1 (r=0.05, p=0.67).

Table 8.1

Relationship between MCSR and CT with semester one academic performance

	Sc1 n=143	NP1 n=136
MCSR-S	0.24**	0.15
MCSR-N	0.14	0.24**
CT-S	0.17*	-0.02
CT-N	0.03	0.05

*p=0.03. *p<0.005.

When students were divided into the High and Low Achiever groups, the difference between these groups, as shown in Table 8.2 was statistically significantly different (MCSR-S: t=-2.69, p=0.008; CT-S: t=-2.88, p=0.004), with High Achievers having higher scores than Low Achievers for Sc1. The difference between High and Low Achiever groups for NP2 was statistically significant for the MCSR-N (t=-2.85, p=0.005), but there was no difference between the achiever groups for the CT-N.

Table 8.2

Differences between semester one Science and Nursing Practice high and low achievement groups and students' MCSR and CT

Variable	Achiever Group	n	M	SD	SE	t
				Sc1		
MCSR-S	Low	87	4.36	1.01	0.10	-2.69**
	High	56	4.78	0.93	0.12	
CT-S	Low	87	3.79	1.15	0.11	-2.88**
	High	56	4.34	1.28	0.16	
				NP1		
MCSR-N	Low	87	4.40	1.03	0.11	-2.85**
	High	56	4.88	0.90	0.12	
CT-N	Low	87	4.13	1.23	0.13	-0.39
	High	56	4.21	1.20	0.16	

**p<0.009

8.3.3 Students' Reported Learning Strategy Use for their Science Course

The learning strategies students described using were first analysed using the steps outlined in 5.2.7. Then the contents of the themes/categories were examined and where the categories matched, or were very similar to those for the general social cognitive model of learning strategies as shown in Table 2.1, they were named accordingly. There were eight categories of learning strategies identified from the student interviews and these were: organisation, reading, elaboration, rehearsal, metacognitive self-regulation, study environment, help-seeking and peer learning. These categories are summarised in Table 8.3 which shows the strategies contained with the categories and gives an explanation of the category and examples of the strategies. In addition to these learning strategies, there were three categories of "non-learning strategies" and these are shown in Table 8.4.

Organisation

Organisation strategies reportedly used by students were in keeping with those identified in the literature (Pintrich, 1988; Pintrich & Schrauben, 1992; Weinstein & Mayer, 1986) and were characterised by students' descriptions indicating that they identified or were using appropriate course material when studying for their Science course. In this category, six types of strategies were identified: 1a) highlight/underline, 1b) identifying key words, 1c) re-write/type lecture notes, 1d) make diagrams/pictures, 1e) listen to lecture tapes and 1f) use the library. In Table 2.1 highlighting/underlining and re-writing notes were considered to be rehearsal strategies where there was no reflection on the material being highlighted/underlined or re-written. Students' comments in this study, however, indicated that reflection did take place when they used these straetgies and hence their inclusion in this category. The strategy 1f) relates to the selection of relevant science course material and was therefore categorised as an organisation strategy (cf seeking information on SRLIS, Zimmerman & Martinez-Pons, 1986). Organisation strategies were the second most frequently used group of strategies by the students interviewed.

Reading

Reading strategies included comments by students that indicated efforts to read information relevant to the course. Whilst reading could be viewed as a form of organisation strategy according to the MSLQ, it was decided for this study—given the high number of students who mentioned it—to view it as a separate category (cf reviewing records, SRLS, Zimmerman & Martinez-Pons, 1986). Students described reading a variety of materials including notes 2a) textbooks 2b), diagrams 2c), and other materials 2d) (study guides, dictionary, lab reports, objectives) with textbooks and notes being the most frequently cited materials read.

Elaboration

Elaboration strategies in this study included descriptions by students indicating that they formed their own notes from existing materials which is in keeping with the definition in 2.1 where elaboration strategies were shown to involve the incorporation of new material with prior knowledge (Pintrich, 1988; Pintrich & Schrauben, 1992; Weinstein & Mayer, 1986). The strategies described by students in this category were: summarising, making notes and paraphrasing. Elaboration strategies were the third most common strategies reported to be used by the students interviewed.

Rehearsal

The rehearsal category included recitation, memorisation or repetition strategies (cf MSLQ, Pintrich et al., 1991) used by students indicating that they tried to memorise or rehearse the Science course material either verbally or by writing. These were the fifth group of strategies reportedly used by the students interviewed.

Metacognitive and Self-Regulation (MCSR)

In the literature (see Table 2.1) there are three categories of MCSR strategies—planning, monitoring and regulating. In this study, students only reported strategies that were relevant to the latter two categories. In this study MCSR included descriptions by students that indicated that they were aware of their study strategies and/or tested, and/or adjusted them if necessary. The monitoring type strategies included students' comments that indicated that they monitored their study and or (self-)tested their science knowledge. Regulating strategies included those referring to changes or adjustment of strategies, and understanding (an awareness of cognition). MCSR strategies were the fourth most common category of strategies reportedly used by the students interviewed.

Study Environment

Like the literature (see Table 2.1) this category involved descriptions by students of strategies indicating that they organised their study environment. Only a few students mentioned their study environment in relation to studying for their science course.

Help-Seeking

Help-seeking (cf support from others, Table 2.1) included descriptions by students indicating that they sought help with aspects of the Science course from lecturers/tutors of the course, the Learning Assistance Departments or hospital personnel.

Table 8.3

Explanations and examples of students' learning strategies for their first semester Science course

Strategies for Studying Science	Explanations and Examples
Organisation	Descriptions by students indicating the identification and use of appropriate course information in their study.
1a) highlight/underline	eg: "I highlight [relevant part of my text-book]."
1b) key words	eg: "I find key words in my notes."
1c) re-write/type lecture notes	eg: "I re-write the lectures."
1d) make diagrams/pictures	eg: "I make diagrams with arrows and this visual effect helps."
1e) listen to lecture tapes	eg: "I tape lectures and play them while I am studying."
1f) use library	eg: "I use the library to get an easier textbook."
Reading	Descriptions by students indicating efforts to read information relevant to the course.
2a) read notes	eg: "I tend to read lecture notes."
2b) read textbook	eg: "I read textbooks."
2c) read diagrams	eg: "I look at diagrams."
2d) read other	eg: "I read the questions on the study guide."
3 Elaboration	Descriptions by students of indicating that they formed their own notes from existing materials (lecture notes, textbooks)
3a) summarising	eg "I write a summary of my [Lecture] notes."
3b) make notes	eg "I write notes from my textbook."
3c) paraphrasing	eg "I re-do [my notes] in my own words."
4 Rehearsal	Descriptions by students indicating that they either try to memorise or rehearse course material either verbally or by writing in an effort to learn.
4a) repetition	eg: "I write notes over and over."
4b) memorisation	eg: "I memorise items."
4c) reciting	eg: "I learn parrot-phase."
5 Metacognitive and self-regulation	Descriptions by students indicating that they were aware of their study strategies, and/or tested, and/or adjusted them if necessary.
5a) monitoring study	eg: "I go through my lecture notes and read and then I find the relevant part in my text-book...."
5b) self-testing	eg: "I practice exams."
5c) understanding	eg: "I need to understand something before I learn it."
5d) changing/adjusting strategies	eg: "I've tried taping key points but I found that it was not all that successful. Now I take notes."
6 Study environment	Descriptions by students of strategies indicating organisation of their study environment to assist with their study. eg: "On the wall of my bedroom I put the points of what I've learnt and draw names and places so I can look at them."
7 Help-seeking	Descriptions by students of strategies indicating that they sought help for aspects of the course from persons.
7a) lecturers/tutors	eg: "I just see the lecturer if I have any problems."
7b) Learning Assistance Dept.	eg: "I attended a lunch-time course run by student services on note-taking."
7c) hospital personnel	eg: "I get information from work colleagues."
8 Peer Learning	Descriptions by students of strategies indicating collaboration with student peers. eg: "I use group studying [with peers] as others have expertise to share."

Table 8.4

Explanations and examples of students' "non-learning strategies" for their first semester Science course

9 Intention to study	Descriptions by students of indicating that they intended ("probably", or "try to") to study in the future. eg: "I will probably just read notes (to study for science)...."
10 Lack of strategy awareness	Descriptions by students of indicating that they were unaware of how to study or were having difficulties with the study of their Science course. eg: "I am uncertain of how to study."
11 Other	Descriptions by students of comments that could not be classified. eg: "When we have tests the words can be ambiguous."

Peer Learning

Peer learning included descriptions by indicating that they collaborated with their student peers (cf support from others, Table 2.1). Very few students mentioned peer learning.

Non-learning Strategies

In Table 8.4 the categories identified from students' interviews, which were not actual learning strategies, are shown. These categories included: intention to study, lack of strategy awareness and other (miscellaneous).

Table 8.5

Strategies used by high and low achievers for their first semester Science course

	Strategies %			
	1-2	3-4	5-7	Total
LA	64	27	9	100
HA	24	41	35	100

8.3.4 Academic Achiever Group and Strategy Use for Science

Table 8.5 shows that High and Low Achieving students reported using from 1-7 strategies when studying for their first semester Science course. However, 76% of High Achievers reported using 3 or more strategies whilst only 36% of Low Achievers reported using 3 or more strategies when studying for their Science course. Low Achievers were most likely to report using only 1-2 strategies when studying for their Science course.

In Table 8.6 the strategy means for the Science course are given according to students' achievement group. High Achievers had statistically significantly higher means for organisation, elaboration, rehearsal, metacognitive and self-regulation, help-seeking and the total number of strategies used, than Low Achievers. The means for reading and the other (non-learning strategies) category of strategies were statistically significantly higher for Low Achievers, than for High Achievers. The three main categories of strategies for Low Achievers were reading, followed by organisation and then elaboration whereas for High Achievers it was organisation, with metacognitive and self-regulatory strategies and reading equal second, and then elaboration.

Organisation strategies were the main strategies used by High Achievers, and the second most used strategies by Low Achievers. Both achiever groups were similar in the use of most organisation strategies except for key words with High Achievers more than two and a half times more likely, than Low Achievers, to report identifying key words in their relevant science material.

Reading strategies were the most common strategies used by Low Achievers with students reporting that they read mainly text-books and notes. Reading strategies were the second most often used strategies by High Achievers with the mean of these strategies equal to that for the MCSR strategies.

Elaboration strategies were also the third most reported strategies used by Low Achievers although they ranked fourth for High Achievers. High Achievers were slightly more likely than Low Achievers to make notes while they were reading and to summarise what they have been reading and were approximately two and a half times more likely than Low Achievers to use rehearsal strategies.

High Achievers were almost eight times more likely than Low Achievers to use MCSR strategies. This triangulates with the quantitative results where there was also a significant difference between High and Low Achievers for the MCSR-S. The only MCSR strategy reportedly used by Low Achievers was the monitoring reading strategy, although High Achievers were three times more likely than Low Achievers to use this strategy. Only High Achievers report testing their knowledge and regulating their study behaviour. High Achievers have an awareness of their cognition and talk about the need to understand a topic before they can learn it. In the example in Table 8.4 this student goes on to say:

> I need to understand something before I learn it. I can't just memorise something if I don't understand it. (266 12/6/98)

High Achievers were slightly more likely than Low Achievers to mention their study environment, almost five times more likely than Low Achievers to seek help with their Science course, and more likely than Low Achievers to mention studying with their student peers. Low Achievers were four times more likely, than High Achievers, to make comments relating to an intention to study therefore indicating that they had not yet studied for their Science course, and to indicate that they had a lack of strategy awareness.

Table 8.6

Srategy means, by achiever groups, for first semester Science course

Strategies	LA n=21	HA n=17	Total n= 38
Organisation	0.64	0.94	0.26
Reading	1.05	0.71	0.31
Elaboration	0.41	0.53	0.16
Rehearsal	0.09	0.24	0.05
Metacognitive and Self-regulation	0.09	0.71	0.12
Study environment	0.09	0.12	0.04
Help-seeking	0.05	0.24	0.04
Peer learning	0.05	0.12	0.02
Total	2.47	3.61	1.00
Other[1]	0.55	0.29	

Note: 1 Includes strategies 9, 10 & 11 (see Table 8.5)

8.3.5 Students' Reported Learning Strategy Use for their Nursing Practice Course

As mentioned in Chapter 1 and 4, the first semester Nursing Practice course had theoretical and practical components, with the latter component emphasised by students as indicated by their descriptions of Nursing Practice as "practical", "hands-on" and "common-sense." Many students made comparisons between their Science and Nursing Practice courses which was to be expected given that they were asked similar questions, by the interviewer, about these courses. Science was seen as "knowledge-based", whereas Nursing Practice was seen as "experience-based" and students made comparisons about the difficulty level, and time and effort, and different approaches to studying these courses and these comparisons are discussed in Chapter 10.

As shown in Table 8.7, there were 6 categories of strategies that students described using to study for their Nursing Practice course: workbook, reading, elaboration, clinical skills, metacognitive and self-regulation and help-seeking. Whilst four of the categories—reading, elaboration, metacognitive and self-regulation and help-seeking—have the same label as those for the Science course, the actual strategies within some of these categories are very different to those used for the Science course. Two of the categories—Workbook and Clinical Skills Practice—were specific to the Nursing Practice course.

Workbook

Students report using the workbook as a method of studying (also part of the evaluation procedure for the course) for their Nursing Practice course. To complete the workbook students need to use organisation and elaboration strategies, that is, they need to: select appropriate information (organisation) and to integrate new information with prior knowledge (elaboration).

Reading

Just as they did for their Science course students reported reading notes and textbooks for their Nursing Practice course.

Elaboration

When studying for their Nursing Practice course students may "make notes", an elaboration strategy that was also used by students when studying for their Science course. They do not report, however, using summarising or paraphrasing strategies. Students described using two very specific elaboration strategies when studying for their Nursing Practice course. Some students made comments about their clinical experience or their science that could be interpretated as making connections between them and what they were doing in their Nursing Practice course and it was therefore decided to categorise these as elaboration strategies.

Table 8.7

Explanations and examples of students' learning strategies for their first semester Nursing Practice course

Strategies for Studying Science	Explanations and Examples
1 Workbook	Descriptions by students indicating that they complete the course workbook. eg: "I do the workbook."
2 Reading	Descriptions by students indicating efforts to read information relevant to the course. This included descriptions of reading notes, or textbooks. eg: "I read notes and textbooks."
3 Elaboration	Descriptions by students indicating they making connections between clinical, science or theoretical knowledge to the Nursing Practice course material.
3a) make notes	eg: "I read the text-book and make notes."
3b) links between Nursing Practice and clinical	eg: "Clinical experience reinforces what happens in [Nursing Practice] class."
3c) links between science and nursing	eg: "Science backs up nursing theory."
4 Clinical skills practice	Descriptions by students indicating that they do extra clinical skills practise to study for the Nursing Practice course. eg: "I practice it [clinical skills] at home or in the labs."
5 Metacognitive Self-Regulation	Descriptions by students of strategies indicating an awareness and/or adjustment of their study practices, or use self-testing.
5a) self-testing	eg: "Preparation for mini-quizzes helps with my study."
5b) awareness of study practices	eg: "I study Nursing Practice the same as science if it applies."
6 Help-Seeking	Descriptions by students of strategies indicating they sought help for aspects of the course from people (not peers).
6a) lectures/tutors	eg: "I ask the Lecturer for help."
6b) hospital personnel	eg: "I speak to a nurse to get help."

Table 8.8

Explanations and examples of students' "non-learning strategies" for their first semester Nursing Practice course

7 Intention to study	Descriptions by students of indicating that they intended to study in the future. eg: "I don't know the format [I will use for studying] yet."
8 Lack of strategy awareness	Descriptions by students indicating they were unaware of how to study or were having difficulties with the study of their Nursing Practice course. eg: "I am uncertain [how to study]."
9 Other	Descriptions by students of comments that could not be classified. eg: "It's [Nursing Practice] self-explanatory."

Clinical Skills Practice

Students report practising the clinical skills they have been taught in their Nursing Practice course. This practice may require repeated practice of the skill in a student's free-time and involve some appropriate structuring of the environment to allow practice of the clinical skill. Thus clinical skills practice incorporates rehearsal, time management and study environment strategies (see Table 2.1). This category, which was specific to the Nursing Practice course, also incorporated peer learning at times as several students reported practising their clinical skills with friends (peers).

Metacognitive and Self-Regulation

Just as they did when studying for their Science course, some students may test their knowledge in relation to their Nursing Practice course. Some students indicated that they have an awareness of their study practices and indicate making decisions or adjustments to their study practices based on this awareness.

Help-Seeking

Just as they did for their Science course, students seek help with their Nursing Practice course from lecturers/tutors or hospital personnel.

Non-learning Strategies

Like the Science course, some of the students' comments have been categorised as "non-learning strategies" as shown in Table 8.8.

Table 8.9

Strategies used by high and low achievers for their first semester Nursing Practice course

	Strategies %			
	1	2	3-4	Total
LA	72	18	10	100
HA	46	36	18	100

8.3.6 Academic Achiever Group and Strategy Use for Nursing Practice

Both Low Achievers and High Achievers describe using less strategies when studying for the Nursing Practice course (Table 8.9). This may be partly explained by the fact that Low Achievers find their Nursing Practice course less difficult and put less time and effort into studying for it than their Science course and whilst this does apply to a certain extent to High Achievers, they are more likely, however, than Low Achievers, to see the need for some study in their Nursing Practice course. 54% of High Achievers described using 2-4 strategies when studying for their Nursing Practice course whereas 28% of Low Achievers used 2-4 strategies.

Except for help-seeking, High Achievers were more likely, than Low Achievers, to describe using strategies from all of the other categories (Table 8.10). Low Achievers were most likely to use elaboration strategies and least likely to describe using help-seeking strategies. Low Achievers were more likely, than High Achievers, to use "non-learning strategies". High Achievers were equally likely to use elaboration and metacognitive and self-regulation strategies followed by reading. Like Low Achievers, High Achievers were least likely to describe using help-seeking strategies.

Table 8.10

Strategy means, by achiever groups, for first semester Nursing Practice courses

Strategies	LA n=19	HA n=17	Total n=36
Workbook	0.10	0.19	0.14
Reading	0.10	0.25	0.17
Elaboration	0.25	0.38	0.33
Clinical skills practice	0.10	0.19	0.14
Metacognitive self-regulation	0.10	0.38	0.22
Help-seeking	0.05	0.06	0.05
Total	0.90	1.95	1.38
Other[1]	0.55	0.29	

Note: 1 Includes strategies 7, 8 & 9 (see Table 8.9)

8.4 Semester Two

Due to the smaller number of students interviewed in the second semester, students' approaches to study are discussed according to their achievement group.

8.4.1 Introduction

Students' use of metacognitive and self-regulation and critical thinking strategies were determined quantitatively by the use of the MCSR and CT scales which were included in the second semester questionnaire. In semester one, the learning strategies that students use to study for their Science and Nursing Practice courses were identified, so in semester two the focus was on determining if and what changes students reported making in their learning strategies for these courses. Like semester one, the quantitative and qualitative results were examined in relation to students' academic achievement groups.

This section begins by reviewing the student entry characteristics from Chapter 6 that pertain to students' learning strategies and the questionnaire (8.4.2) and interview results (8.4.3) relevant to this section are presented.

Students' Entry Characteristics

In semester two students who were aged 20+ had statistically significantly higher mean scores for the MCSR-S and CT-S in their Science course and MCSR-N and CT-N scores for their Nursing Practice course, than students aged 17-19 years (Table 6.5). As already discussed (8.3), these results triangulate with academics' views who describe mature age students as using more self-regulatory learning strategies.

Table 8.11

Relationship between MCSR and CT with semester two academic performance

	Sc2 n=128	NP2 n=124
MCSR-S	0.16*	0.11
MCSR-N	0.02	0.11
CT-S	0.17*	0.11
CT-N	0.07	0.14

*p=0.05

8.4.2 Questionnaire Results

As anticipated, students' MCSR-S (r=0.16, p=0.05) and CT-S (r=0.17, p=0.05) scores were statistically significantly related to their academic performance in Sc2. However students' MCSR-N and CT-N scores were not related to their academic performance for their NP2 courses as shown in Table 8.11.

Although the High Achiever group had higher mean scores for the MCSR-S and CT-S, the difference between the High and Low Achiever groups was only statistically significant for the MCSR-S (t=-1.81, p=0.05) as shown in Table 8.12.

The mean MCSR-N and CT-N scores for the NP2 High Achiever groups were higher than the mean scores for the Low Achiever groups but the differences were not statistically significant as shown in Table 8.12.

Table 8.12

Differences between semester two Science and Nursing Practice high and low achiever groups and students' MCSR and CT scores

Variable	Achiever Group	n	Mean	SD	SE	t
				Sc2		
MCSR-S	Low	75	4.45	1.00	0.11	-1.81*
	High	53	4.78	1.02	0.14	
CT-S	Low	75	4.12	1.04	0.12	-0.88
	High	53	4.30	1.30	0.18	
				NP2		
MCSR-N	Low	61	4.58	1.03	0.13	-1.14
	High	63	4.79	1.03	0.13	
CT-N	Low	61	4.30	1.12	0.14	-1.04
	High	64	4.51	1.23	0.15	

*p=0.05

8.4.3 Learning Strategies for Science

Students' approaches to studying for their Science courses were examined according to their achievement group, to determine the changes if any, that may have occurred in students' strategy use over the year. Whilst most students remained in the same achievement group in the second semester, there were some students who either changed their achievement group, or improved or decreased their performance within their group.

Low Achievers

Low Achiever students did not seem to make any significant change to the way they study for their Science courses in semester two. Some students commented that they were approaching their study of science differently in this semester, however, their descriptions of the study strategies they used did not appear to support their assertions. For example, one student who indicated that she was studying for the science differently in the second semester said:

> Yes [I have changed the way I study] a lot. I couldn't just study from a textbook. I like diagrams. I read the textbook but it doesn't make sense so I keep reading it and take points from the textbook. (*12 6/11/98*)

In the first semester this student had also mentioned using diagrams, reading the textbook and taking key words from her notes. In other words, the student was still basically using the same study strategies in the second semester as used in the first semester. Other Low Achiever students also continued to use similar strategies in semester two, with reading once again being the strategy most frequently being cited. They also describe using a limited repertoire of self-regulatory strategies and when questioned they admitted that they did not monitor their reading or test their knowledge.

In semester two, like semester one, Low Achiever students continue to leave their study preparation for the final examination until the last minute. When interviewed in the final weeks of the second semester, one student who had failed science in the first semester said:

> I am very prepared this semester. I have studied more this semester. I have been studying since last week. (*68 6/11/98*)

Apart from the fact that the student has left examination preparation until the last minute, this student's comments also indicate unrealistic perceptions of the preparedness for the final examination. This student also said:

> This semester was easier than last semester. (*68 6/11/98*)

This student was one of a sub-group of Low Achiever students who had very unrealistic perceptions about the course difficulty level, as, contrary to other Low Achiever and High Achiever students who considered semester two harder than semester one, these students talked about the Science course as being easier in semester two. The Science courses in semester two had more anatomy and physiology and therefore appeared to be more directly applicable to nursing, consequently leading one student to state that the Science course was:

> A lot easier [in semester two]. More to do with real nursing. (*138 6/11/98*)

In summary, Low Achiever students made few, if any, changes to their study strategies for semester two. Reading is the strategy they were most likely to use when studying for their Science courses, although, they are unlikely to monitor their reading. Low Achiever students leave their study until the last minute and some have very unrealistic perceptions about the Science courses and their preparedness for the end-of-semester science examination.

High Achievers

High Achievers could be divided into two groups. One group was comprised of students who were Low Achiever students in semester one but had improved their academic performance in Science in semester two and had moved into the High category. This group of students had made changes to the way they study science in semester two and this may be a contributory factor in their improved academic achievement. For example, in the first semester one student indicated she studied for science by reading the textbook and notes.

In second semester the student said:

> I have changed the way I study. Because this semester we were given objectives, and I used them to look up the textbook and make notes and answers. I will read notes and the textbook, lab and tuts [notes]. I will also use the CD [Compact Disc] that comes with the textbook and do the multiple choice questions they have. (*57 6/11/98*)

This student had made several changes to her study of science. She had increased the number of strategies used to study and included metacognitive self-regulatory strategies—namely self-testing—to assess her knowledge. Similar changes were evident among other students in this group.

The other group of High Achiever students were those who were consistent in their achievement group in that they were High Achievers in their Science courses in both of the semesters. Some students talked about making some adjustment to their study strategies:

> I think I have refined the way I study [in semester two]. Refining has helped my study. I make more pictures like cell etc., that have shapes and diagrams. I have a textbook. The lecture notes and lab books go together. I go through the objectives and then the information I need to do them. I go through the material to find the information. Also, I do the weekly test to keep them and redo them to see, if I can answer them. I fill in the gaps [in my knowledge/understanding] if I find any. I also make flashcards with things like definitions, laws etc. (*225 7/11/98*)

Overall, however, High Achiever students recognised the success of their study strategies and talked about studying for science "the same" in the second semester or not changing "the way I study." One student said:

> I haven't changed the way I study [in semester two] because that's how I teach myself. (*261 7/11/98*)
>
> I study [for Sc2] the same as last semester. (*221 7/11/98*)

These students were consistent in the descriptions of the study strategies they use. For example in the first semester one student said she studied for science in the following manner:

> I read the lectures and compare them to the textbook. I write out the lecture notes and try to get it into my head and read the textbook alongside to confirm. (*261 11/6/98*)

In the second semester this student said:

> I read lecture notes carefully. I write out the lecture notes. I check with the textbook if I don't understand the notes. I also check the lab book. *(261 7/11/98)*

High Achiever students were also consistent in the use of metacognitive and self-regulatory strategies, in particular monitoring and self-testing and the use of rehearsal strategies:

> I write terms over and over and practice spelling them. *(94 6/11/98)*

8.4.4 Learning Strategies for Nursing Practice

Although there was more movement within the achievement groups in the Nursing Practice courses, than for the Science courses, the majority of students remained in their respective academic achievement groups.

Low Achievers

The Low Achiever group in Nursing Practice consisted of two groups of students. The first group were students who were consistent Low Achievers, that is they were in this category for both semesters. Although semester two was considered "a "lot of work" and "not as easy as semester one", these Low Achievers were not likely to have changed their study strategies in the second semester. For example, one student who mentioned using reading as the main learning strategy in semester one said in semester two:

> I study [NP2] pretty much the same [as NP1]. I use the textbook. I don't study as much [in NP2] as for the Science [course] *(12 6/11/98)*

Most Low Achievers mentioned doing the workbook although they were confused about its role as a study strategy:

> I don't do any study because there aren't any exams. The workbook is how I study. I learn by doing the things in the workbook *(138 6/11/98)*

Low Achiever students made attributions about their progress and blamed lecturers for "lack of supervision" or "being bad at explaining things", "coping with young children" and having "three assignments in one day."

The other group of Low Achievers were students who were awarded significantly different grades for their second semester Nursing Practice courses compared to their grades in semester one and as a consequence of their altered grades also changed academic achievement groups. Characteristically, these students were High School Leavers who were from an ESB and had no previous nursing experience.

These students described studying for their Nursing Practice course "pretty much the same" in the second semester, although, it could be argued that there has obviously been some change to students' study strategies to account for their altered grades. The factors that have led to these students' changed academic status were unclear and it may be that time-management or non-academic factors have been influential in these students' academic performance.

High Achievers

Like the Science courses, there were two groups of High Achiever students. One group tended to describe increasing the number of learning strategies that they used in semester two when studying for their Nursing Practice courses and hence became High Achievers in the second semester. For example, one student who obtained a Pass grade in semester one said:

> I tend to read the lecture notes and what I don't understand I re-read. *(162 12/6/98)*

In the second semester, this student described using more strategies including the workbook and was subsequently awarded a Distinction grade.

The other and main group of High Achievers reported that overall they had not changed significantly the way they study and that they found Nursing Practice harder in semester two:

> It was harder and there was more to absorb this semester. *(57 6/11/98)*

Whilst High Achiever students did not significantly change the way they studied in the second semester they did make some changes because they recognised the fact that the clinical component is assessed in this semester:

> Yes [I have changed way of studying in S2], because in this semester you have clinical skills exam. So we have to know how and why you're doing the skill. (*221 7/11/98*)

and made adjustments to their study:

> I go into the [clinical] lab every chance I have to practise especially wound field management. (*94 6/11/98*)

In addition to extra clinical skills practice, these students describe using a variety of learning strategies including metacognitive and self-regulatory strategies.

8.5 Summary and Discussion

As expected, for both semesters students' MCSR-S and CT-S scores were statistically significantly related to their academic performance for their appropriate Science courses. This was not the case for the Nursing Practice courses, as only students' first semester MCSR-N scores were related to their academic performance for their Nursing Practice courses.

Students reported using a variety of strategies when studying for their first semester Science and Nursing Practice courses. Whilst there was some commonality in the strategies students employed to study these courses, there were also strategies that were course-specific. The study strategies used by students when studying for their Science and Nursing Practice courses are shown in Table 8.3 and 8.7 respectively.

For the Science course, eight categories of self-regulatory strategies were identified: organisation, reading, elaboration, rehearsal, metacognitive self-regulation, study environment and help-seeking. These strategies are comparable to those found on other self-regulatory measures, for example the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich et al., 1991) and the Self-Regulated Learning Interview Schedule (SRLIS) (Zimmerman & Pons, 1986). Categories termed "intention to study", "lack or strategy awareness" and "other" were termed non-learning strategies. High Achievers were most likely to use organisation strategies and significantly more likely to describe using organisation, elaboration, rehearsal, metacognitive and self-regulation and help-seeking strategies than Low Achievers.

The reading of a variety of course or course-related materials was the strategy most often described as being used by students when studying for their Science course, whilst help-seeking was the least reported strategy. Whilst students also report reading for their Nursing Practice course, the variety of materials they read was less than for the Science course. As for the Science course, help-seeking was also the least used strategy for the Nursing Practice course.

Elaboration was the strategy students were most likely to report using when studying for their Nursing Practice course. Whilst students "make notes", an elaboration strategy also used in the study of science, they do not discuss summarising or paraphrasing study course materials for the Nursing Practice. This may be because students see Nursing Practice as practical and not theoretical and therefore do not employ their full range of strategies when studying for this course. Students made comments indicating that they make links between their Nursing Practice course and the Science course material or their clinical (hospital) experiences and these were included in this category.

Two course-specific categories of strategies—workbook and clinical skills practice—were identified for their Nursing Practice course. It may be that the workbook and clinical skills practice incorporated other strategies. For example, to do extra clinical skills practice, students needed to organise a place to practise (at home or university clinical skills laboratory and maybe with friends—peer learning) which therefore also incorporated time management strategies, and possibly perform the skill more than once during the practice (rehearsal).

Therefore, organisation, rehearsal, peer learning or study environment strategies are more course-specific to science with reading—of textbooks and notes—and elaboration and help-seeking more generic strategies.

Overall, students are consistent during the year in their use of study strategies for their Science and Nursing Practice courses. Low Achievers generally had not changed the way they studied for their courses and tended to leave their study "to the last minute." Some students who were Low Achievers in semester one, however, did report making changes to the way they studied and were subsequently awarded higher grades and became High Achievers for their second semester courses. High Achievers were consistent in the use of metacognitive and self-regulatory strategies and also described adapting them as necessary. For example, High Achievers tended to make adjustments to their study for the Nursing Practice course in the second semester particularly in response to the clinical skills examination.

The models of students' self-regulated learning are presented in the next chapter.

Chapter 9

TOWARDS MODELS OF STUDENTS' ENTRY CHARACTERISTICS, SELF-REGULATED LEARNING AND ACADEMIC PERFORMANCE FOR FIRST YEAR SCIENCE AND NURSING PRACTICE COURSES

9.1 Introduction

In the previous three chapters, the results for students' entry characteristics, cognition and motivation were examined separately. This chapter attempts to integrate these results into the adapted hypothesised conceptual model proposed by Pintrich and Schrauben (1992) and discussed in Chapter 2, and to develop models that explain the inter-relationships among students' entry characteristics, self-regulated learning and academic performance for their Science and Nursing Practice courses. This is in accordance with the overall aim of the thesis as was stated in 1.4.

To assist in the testing of the hypothesised conceptual models, for each of the first and second semester Science and Nursing Practice courses, structural equation modeling (SEM) was undertaken using the computer software package AMOS.

Before conducting SEM, the preliminary steps recommended by Hair (1995) and Norris (2001b) were undertaken, such as calculating the summary statistics for the research instrument including their internal consistency and computing a correlation matrix of all variables for the thesis (9.2). These statistics are given in section 9.2. Aspects of SEM are discussed in section 9.3. The hypothesised and the final (trimmed) models, including their parameter estimates and goodness-of-fit indices, are discussed separately, for each of the first semester Science (9.4) and Nursing Practice (9.5) and second semester Science (9.6) and Nursing Practice (9.7) courses.

9.2 Research Instruments

9.2.1 Introduction

In this section, various statistics pertaining to the research instruments are presented including: the summary statistics (mean, SD); Cronbach alphas (a measure of the internal reliability of the instruments); and t-test results which were computed to determine if there were any differences between the first semester and second semester scores for the research instruments (Table 9.1).

9.2.2 Self-Efficacy for Science

The SEFS was one of the few research instruments where the mean was statistically significantly higher in the second semester than in the first, as shown in Table 9.1. The standard deviations for both the semesters were very similar. The reliability of the SEFS has been reported as 0.90 (Andrew, 1998). For this thesis, the alpha was found to be slightly lower for semester one (α=0.84) but the same (α=0.90) for semester two as that reported for the instrument.

9.2.3 Nursing Clinical Self-Efficacy Scale

Although not statistically significant, the mean and SD for the NCSES was lower in the second semester than for the first semester.

The internal reliability of the NCSES was reported as 0.96 in the literature (Harvey & McMurray, 1994) and was the same for semester two (α=0.96) and marginally higher (α=0.97) in semester one for this thesis (Table 9.1).

Table 9.1

Summary statistics, Cronbach alphas and t-test results for the research instruments

		Semester One			Semester Two		
	M 1	SD 1	Alpha 1	M 2	Alpha 2	SD 2	t
SEFS	3.84	0.58	0.84	4.11	0.90	0.57	-4.59***
NASES	7.77	1.78	0.97	7.63	0.96	1.57	0.39
NCSES	7.72	2.15	0.97	7.55	0.96	1.82	0.26
TV-N	6.09	0.95	0.86	5.87	0.90	1.12	3.10**
TV-S	5.73	1.06	0.85	5.74	0.91	1.14	0.89
SELAP-N	5.73	1.06	0.91	5.32	0.93	1.09	-1.12
SELAP-S	4.58	1.29	0.94	4.71	0.93	1.18	-1.31
MCSR-N	4.59	0.99	0.78	4.68	0.82	1.01	2.26
MCSR-S	4.55	1.02	0.79	4.61	0.81	1.01	0.39
CT-N	4.14	1.25	0.75	4.40	0.82	1.28	-2.00*
CT-S	4.00	1.31	0.79	4.24	0.79	1.25	-1.15

*p=0.05. **p=0.002. ***p=0.000.

9.2.4 Nursing Academic Self-Efficacy Scale

Although not statistically significant, the mean and SD for the NASES was lower in the second semester than the first semester. The reliability of the NASES was reported as 0.94 in the literature (Harvey & McMurray, 1994) and was found to be higher in this thesis for semester one (α=0.97) and two (α=0.96).

9.2.5 Task Value

The mean for the TV-N was higher than the mean for the TV-S for both semesters. The mean for the TV-N was statistically significantly lower in the second semester, and the SD slightly higher, than for the first semester. The mean TV-S scores were very similar for both semesters, although the SD was slightly higher in the second semester than the first semester. The reliability of the TV scale has been reported as 0.90 in the literature (Pintrich et al., 1993). For this thesis, the alphas for the TV-N (α=0.86) and TV-S (α=0.85) were slightly lower in the first semester than those reported for the TV scale, but they were the same or marginally higher (TV-N α=0.90; TV-S α=0.91) in the second semester than those reported in the literature (Pintrich et al., 1993).

9.2.6 Self-Efficacy for Learning and Performance

The mean was higher for the SELAP-N than for the SELAP-S for both semesters. The second semester mean for the SELAP-N was lower, but the SD the same as for the first semester, whilst the mean for the SELAP-S was higher in the second semester and the SD lower than the first semester. The difference in the means was not statistically significant for either instrument. The reliability of the SELAP has been reported as 0.93 (Pintrich et al., 1993), and the reliability for this study was very comparable with the α=0.91 and α=0.93 respectively for the first and second semester SELAP-N scales, and α=0.94 and α=0.93 respectively for the first and second semester SELAP-S.

9.2.7 Critical Thinking

The mean for the CT-N was higher than the CT-S for both semesters and the means for both were higher in the second semester, but this difference was only statistically significant for the CT-N. The reliability for the CT scale has been reported as 0.80 (Pintrich et al., 1993), and for this study the Cronbach alphas were α=0.75 and α=0.82 respectively, for the first and second semester CT-N scale and α=0.79, in both semesters for the CT-S scales (Table 9.1).

9.2.8 Metacognitive Self-Regulation

Like the TV and SELAP, the means for the MCSR-N were marginally higher than the MCSR-S for both semesters. For both the MCSR-N and MCSR-S, the means were higher in the second semester, although the differences were not statistically significant, and the SDs were basically the same for each semester.

The reported reliability of the α=0.78 and α=0.82 respectively, in this thesis, for the first and second semester MCSR-N scales, and α=0.79 and α=0.81, respectively, for the first and second semester MCSR-S scales (Table 9.1).

9.3 Aspects of Structural Equation Modeling

9.3.1 Introduction

When conducting SEM the variables used therein should be clearly defined and a correlation matrix of the data computed to examine the data for possible collinearity. These issues are addressed in 9.3.2 and 9.3.3 respectively. In 9.3.4 the steps taken in the SEM analysis of the data are discussed.

9.3.2 Variables

In chapter 4 the terms endogenous, exogenous, latent and manifest variables were introduced. The latent variables for this thesis were cognition and motivation and the research instruments used to test these components of self-regulated learning were the manifest variables. For example, the CT and MCSR scales of the MSLQ were manifest variables used to measure cognition (latent variable). Students' entry characteristics and academic performance were manifest variables. Students' academic performance was an endogenous variable in this thesis but students' entry characteristics were exogenous variables. It was anticipated that cognition and motivation would be both endogenous and exogenous variables. For example, it was anticipated that students' entry characteristics would influence cognition and motivation (exogenous path) and that they in turn would influence academic performance (endogenous path) with all these paths being direct (see Figure 2.2).

9.3.3 Correlations and Collinearity

In section 4.7.4 the fact that data used in SEM should be examined for multicollinearity was discussed (Hair et al., 1995; Tabachnick & Fidell, 1996).

Collinearity and multicollinearity refers to the "association measured as the correlation between two [or more] independent variables" (Hair et al., 1995, p. 93) which may have "devastating effects on regression statistics" (Pedhazur, 1997, p. 294). One way of assessing for collinearity is by computing a correlation matrix of all the variables. This was performed by using Pearson Product Correlation, and the resulting correlation matrixes for semester one and semester two are given in Tables 9.2 and 9.3 respectively.

Table 9.2

Correlations for students' entry characteristics, motivation, cognition and academic performance for semester one Science (n=143) *and Nursing Practice* (n=136) *courses*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1 Age	1.00																			
2 Ethnicity	0.14	1.00																		
3 Nursing first choice	0.33***	0.06	1.00																	
4 Nursing Experience	0.21*	0.11	0.18*	1.00																
5 TER	-0.02	-0.07	0.26*	0.16	1.00															
6 HSC Biology	-0.41***	0.09	0.02	-0.13	-0.22*	1.00														
7 HSC Chem/ Physics	-0.29***	0.01	0.03	0.04	0.11	-0.14	1.00													
8 NASES	-0.15	-0.18	-0.07	0.04	0.12	-0.14	-0.00	1.00												
9 NCSES	0.20*	-0.17	0.14	0.22	0.12	0.12	-0.15	0.78***	1.00											
10 SEFS	-0.21*	-0.19*	-0.17*	0.00	0.09	0.19*	0.20*0	0.48***	0.33***	1.00										
11 TV-S	0.02	-0.07	-0.04	-0.05	0.09	0.18*	0.18*	0.54***	0.38***	0.34***	1.00									
12 TV-N	0.05	0.12	0.20*	-0.04	0.07	-0.09	-0.06	0.34***	0.35***	0.19*	0.43***	1.00								
13 SELAP-S	-0.17*	-0.03	-0.19*	-0.07	0.10	0.22*	0.22**	0.40***	0.23**	0.34***	0.65***	0.20*	1.00							
14 SELAP-N	0.05	-0.14	0.07	-0.07	0.15	-0.08	-0.12	0.42***	0.29***	0.29***	0.32***	0.64***	0.45***	1.00						
15 MCSR-S	0.02	0.01	0.15	0.10	0.04	0.08	-0.05	0.45***	0.38***	0.29***	0.49***	0.29***	0.51***	0.36***	1.00					
16 MCSR-N	0.17*	0.13	0.13	0.09	0.04	0.07	-0.12	0.42***	0.39***	0.28***	0.32***	0.43***	0.33***	0.49***	0.86***	1.00				
17 CT-S	0.02	0.14	0.12	0.04	0.10	0.16	0.04	0.41***	0.29***	0.31***	0.49***	0.16*	0.55***	0.23**	0.67***	0.49***	1.00			
18 CT-N	0.11	0.08	0.10	0.02	0.08	0.15-	-0.05	0.38***	0.29***	0.28***	0.29***	0.28***	0.34***	0.36***	0.57***	0.58***	0.82***	1.00		
19 Sc1	0.10	-0.19*	0.31***	0.12	0.22***	0.08	0.22**	0.26**	0.18*	0.35***	0.38***	0.04	0.32***	0.24**	0.24**	0.14	0.17*	0.03	1.00	
20 NP1	0.15	-0.20*	0.15	0.15	0.14	-0.12	-0.08	0.23**	0.24**	0.15	0.17*	0.33***	-0.05	0.25**	0.15	0.24***	0.02	0.05	0.43***	1.00

Note: Chem=Chemistry
* <0.05. ** p=0.00. *** p=0.000.

Table 9.3

Correlations for students' entry characteristics, motivation, cognition and academic performance for semester two Science (n=128) *and Nursing Practice* (n=124) *courses*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Age	1.00														
2 Ethnicity	0.22**	1.00													
3 NASES	0.00	-0.18*	1.00												
4 NCSES	0.04	0.18*	0.77***	1.00											
5 SEFS	0.07	-0.18*	0.49***	0.32***	1.00										
6 TV-S	0.29**	0.16	0.33***	0.13	0.31***	1.00									
7 TV-N	0.15	0.03	0.26**	0.11	0.32***	0.47***	1.00								
8 SELAP-S	0.17*	-0.06	0.41***	0.16*	0.36***	0.66***	0.70***	1.00							
9 SELAP-N	0.15	-0.11	0.45***	0.27**	0.44***	0.71***	0.67***	0.53***	1.00						
10 MCSR-S	0.27**	0.08	0.23**	0.11	0.23**	0.46***	0.35***	0.46***	0.41***	1.00					
11 MCSR-N	0.36***	0.15	0.18*	0.18*	0.21**	0.35***	0.51***	0.35***	0.44***	0.88***	1.00				
12CT-S	0.24**	0.02	0.21*	0.00	0.27**	0.38***	0.19*	0.38***	0.45***	0.57***	0.52***	1.00			
13 CT-N	0.28**	0.03	0.26*	0.12	0.18*	0.30***	0.43***	0.30***	0.45***	0.52***	0.58***	0.83***	1.00		
14 Sc2AP	0.31***	-0.13	0.27**	0.02	0.27***	0.40***	0.25**	0.34***	0.27**	0.16*	0.02	0.17*	0.07	1.00	
15 NP2	0.24	-0.04	0.19*	0.11	0.19*	0.32***	0.31***	0.12	0.26**	0.11	0.11	0.11	0.14	0.48***	1.00

*p<0.05. **p=0.00. ***p=0.000.

These tables also include correlations of the variables with academic performance, a dependent and endogenous variable in this study.

There is variation, however, on what correlations may indicate collinearity with some authors considering a correlation of 0.70 as an indication of collinearity (Hair, 1995, p. 94), whilst others accept a much higher correlation of 0.85 (Norris, 2001a, p. 271).

If 0.85 is accepted as an indicator, then no variables that were measuring different constructs could be seen as having (multi)collinearity. It should be noted that some correlations were higher than 0.85, for example the correlation for MSCR-S and MCSR-N in semester one was 0.86, however collinearity was not an issue as these instruments are essentially the same measures which were used in relation to different courses.

When SEM was conducted it was evident that there was, in fact, collinearity between the NASES and NCSES and additional statistical measures—tolerance and variance inflation factor—were computed. For a discussion of these measures see, for example, Munro (2001) or Pedhazur (1997). The NASES and NCSES are both measures of self-efficacy, with the NASES measuring self-efficacy for nursing academic tasks and the NCSES measuring self-efficacy for nursing clinical tasks. Both research instruments were designed by the same author (Harvey, 1995) and were designed specifically to be used with nursing students. The NASES and NCSES both had high internal consistency (see 9.2.3 and 9.2.4) and the correlations between these instruments were $r=0.78$, $p=0.000$ and $r=0.77$, $p=0.000$ for first and second semester respectively. Collinearity was found to exist between the NASES and NCSES and therefore in the trimming of the hypothesised models only one of these instruments was retained.

9.3.4 SEM Analysis

The steps outlined by Norris (2001b) for SEM analysis, and specifically for AMOS (Bryne, 2001), were used in this thesis. After the data were examined and prepared, the four hypothesised models were specified based on the models presented in Chapter 2, the results from the previous results chapters, and the results for the correlation matrixes (Tables 9.2 and 9.3). Model estimation and testing using

AMOS were conducted, and squared multiple correlations, standardised path coefficients, standard errors, critical ratios and significance levels, and various fit indices were obtained (see 4.7.4 for discussion). The fit indices and their acceptable ranges in this thesis included: a non-significant χ^2, a normed χ^2 below 3.0, RMSEA in the range of 0.05-0.08, AGFI, CFI and TLI 0.90 or above.

The models were then revised (trimmed), and these respecified trimmed ad hoc models were tested using AMOS. The trimming process is discussed in the sections pertaining to the hypothesised models. The hypothesised and final trimmed models are discussed, by courses, in the following four sections of this chapter, which also includes the statistics for the hypothesised models and a diagrammatic representation of the trimmed models.

9.4 Semester One Science Courses

9.4.1 Introduction

The model for Sc1 was the first model to be tested, and therefore it became the pivotal one for decisions about specific points relating to SEM of the data.

One of those decisions was how to incorporate so many variables into the hypothesised model in first semester as, for example, there were seven student entry characteristics to be considered. This was in addition to the seven research instruments used in the thesis. Whilst the model presented in 2.1 conceptualised all the entry characteristics as having effects on cognition, motivation and students' academic performance, results from the previous chapters and the Pearson correlations in this chapter (9.2 and 9.3) indicated that this was not the case in this study. It was decided, therefore, to use the tables in 9.2 and 9.3 as a guide, with the statistically significant relationships, or those close to significance, to be included in the hypothesised models. The effect of nursing as a first choice, for example, on the SEFS was examined in the hypothesised model for Sc1. It was also decided that, in keeping with the model in 2.1, any entry characteristics included in a hypothesised model would also be retained to determine their effect on students' academic performance. To determine any difficulties and refine the SEM, preliminary computations of the models (results are not shown in this thesis) were obtained and studied.

Nursing experience was not correlated to any of the research instruments or academic performance in the first semester, and it was therefore not used in the hypothesised models for the Science and Nursing Practice courses for this semester.

On the basis of preliminary SEM a decision was made about the MCSR and CT scales which comprised the latent variable, cognition. For both semesters, the intercorrelations of these scales were strong and their correlations with the other research instruments were similar although the MCSR scales had stronger relationships to academic performance than the CT scales. It was decided that rather than examining the effect of these instruments separately in the hypothesised models, they would be examined together as cognition. This is similar to the action taken by Brackney and Karabenick (1995) when using the MSLQ and other research instruments to examine the interrelationships among motivation, learning strategies, psychopathology and academic performance where the MCSR and CT scales were combined with two other MSLQ scales to form a latent variable called "cognition-metacognition" (p. 7). To confirm the appropriateness of this decision, the hypothesised model for Sc1 was examined using MCSR-S and CT-S as manifest variables and this was repeated using them combined as the latent variable, cognition. The standardised coefficients for the MCSR and the CT were lower when they were used in the model in this way compared to when they were conceptualised together as cognition.

Another decision for the MCSR and CT was made. The paths between cognition and motivation were conceptualised by a double headed arrow (cognition <—> motivation) in the hypothesised model in 2.2, that is, motivation was seen as influencing cognition and vice versa. However for all of the models (hypothesised and trimmed), preliminary SEM results indicated larger standardised coefficients and better fit indices when the direction of the path was drawn conceptualising cognition as influencing motivation variables (self-efficacy and task value) and accordingly this pathway was used for all the models.

In the following sub-section the hypothesised model for Sc1 is discussed.

9.4.2 Hypothesised Sc1 Model

The hypothesised paths among students' entry characteristics, cognition, motivation and academic performance are discussed in this sub-section. The results of SEM for the hypothesised Sc1 model are also presented.

Entry Characteristics

Using the statistically significant correlations shown in Table 9.2 as a guide, the entry characteristic of age was hypothesised as having a direct effect on SEFS, NCSES, SELAP-S, cognition and academic performance for Sc1. Ethnicity was hypothesised as having an effect on SEFS, NASES, NCSES and students' academic performance for Sc1. The relationship between ethnicity and students' NASES and their NCSES was close to significance and hence their inclusion in the hypothesised model. Nursing as a first choice was hypothesised as having an effect on SEFS, NCSES, TV-S, cognition and students' academic performance for Sc1. TER was only hypothesised as having an effect on students' academic performance for Sc1. HSC Biology was hypothesised as having an effect on students' SEFS, NASES, TV-S, SELAP-S, cognition and students' academic performance for Sc1. HSC Chemistry and/or Physics was hypothesised as having an effect on SEFS, SELAP-S, cognition and students' academic performance for Sc1.

Cognition

The MCSR-S and CT-S were hypothesised as comprising cognition. Cognition was hypothesised as having an effect on the SEFS, NASES, NCSES, SELAP-S, TV-S and students' academic performance for Sc1.

Motivation

The SEFS, NCSES, NASES, SELAP-S and TV-S, all measures of motivation, were hypothesised as having an effect on students' academic performance for Sc1.

SEM Analyses

The paths for the hypothesised Sc1 model already discussed were examined, using SEM for the hypothesised model. Results for the goodness-of-fit indices, which are given in Table 9.6, were: $\chi^2(42, n=143) = 168.20$, $p=0.000$; AGFI=0.53; RMSEA=0.21; TLI=0.35; CFI=0.72; normed $\chi^2 = 4.00$. These indices indicate that the model was a poor fit for the data.

The standardised path coefficients (β), standard error, critical ratio and significance level for the Sc1 hypothesised model are given in Table 9.4. For students' entry characteristics ethnicity was the only student entry characteristic that had statistically significant (negative) standardised path coefficients with any of the research instruments. It had statistically significant path coefficients with the SEFS

(β=-0.20, p=0.007), NASES (β=-0.15, p=0.02) and NCSES (β=-0.09, p=0.03). Some paths were close to significance, such as nursing as a first choice with the SEFS (β=0.13, p=0.06) and HSC Biology with SELAP-S (β=0.12, p=0.08) and TV-S (β=0.13, p=0.08). Nursing as a first choice was the only entry characteristic, however, that had statistically significant effects on academic performance, although ethnicity (β=-0.17, p=0.06) and TER (β=0.11, p=0.09) were close to significance.

Cognition had statistically significant standardised path coefficients with all the measures of motivation. The path between cognition and academic performance was not significant. Two measures of motivation—SEFS (β=0.19, p=0.05) and TV-S (β=0.20, p=0.04)—had statistically significant standardised paths with academic performance for Sc1.

To develop a more parsimonious model, ad hoc trimming was performed. In the first trim the NCSES was removed from the model (see 9.3.3 for explanation). Apart from the entry characteristics, TER and ethnicity, which were retained because they were close to statistical significance, only significant standardised path coefficients were retained. The statistics for the goodness-of-fit indices for this trim 1 model were: χ^2(24, n=143) =64.17, p=0.28; AGFI=0.83; RMSEA=0.04; TLI=0.74; CFI=0.83 and normed χ^2 =3.4. Although this indicated an improvement from the hypothesised model further trimming was performed. Non significant paths/variables were trimmed and this included TER and academic performance, HSC Biology and TV, and the SELAP-S and NASES. SEM was conducted and the results for this trimmed 2 or final (trimmed) model are presented in the following sub-section.

Table 9.4

Standardised path coefficients for Science 1 hypothesised model (n=143)

Model Variable	β	SE	CR	p
SEFS, direct effects of:				
Age	-0.07	0.13	-0.90	0.36
Ethnicity	-0.20	2.03	-2.68	0.00
Nursing as first choice	0.14	2.00	1.85	0.06
HSC Chemistry/Physics	0.05	2.60	0.67	0.50
HSC Biology	0.09	1.94	0.20	0.23
Cognition	0.50	0.13	5.65	0.00
Cognition, direct effects of:				
MCSR-S	0.79	0.05	8.24	0.00
CT-S	0.77	0.06	8.28	0.00
Age	0.14	1.89	1.55	0.12
Ethnicity	0.02	0.99	1.40	0.17
NASES, direct effects of:				
Age	-0.01	0.39	-0.21	0.83
Ethnicity	-0.15	5.94	-2.28	0.02
Nursing as first choice	0.02	5.86	0.30	0.77
Cognition	0.73	0.44	7.87	0.00
NCSES, direct effects of:				
Age:	0.12	0.56	1.71	0.09
Ethnicity	-0.09	8.50	-2.17	0.03
Nursing as first choice	0.12	8.38	1.21	0.23
Cognition	0.59	0.57	6.51	0.00
SELAP-S, direct effects of:				
Age	-0.09	0.09	-0.14	0.16
Ethnicity	-0.03	0.98	-1.39	0.16
Nursing as first choice	0.07	1.46	0.98	0.33
HSC Biology	0.12	1.98	1.75	0.08
HSC Chemistry/Physics	0.14	2.10	1.85	0.06
Cognition	0.71	0.11	7.68	0.00
TV-S, direct effects of:				
Age	-0.09	0.06	-1.38	0.17
Ethnicity	-0.08	0.92	-1.16	0.24
Nursing as first choice	0.08	0.91	1.14	0.25
HSC Biology	0.13	0.99	1.76	0.08
Cognition	0.74	0.13	5.64	0.00

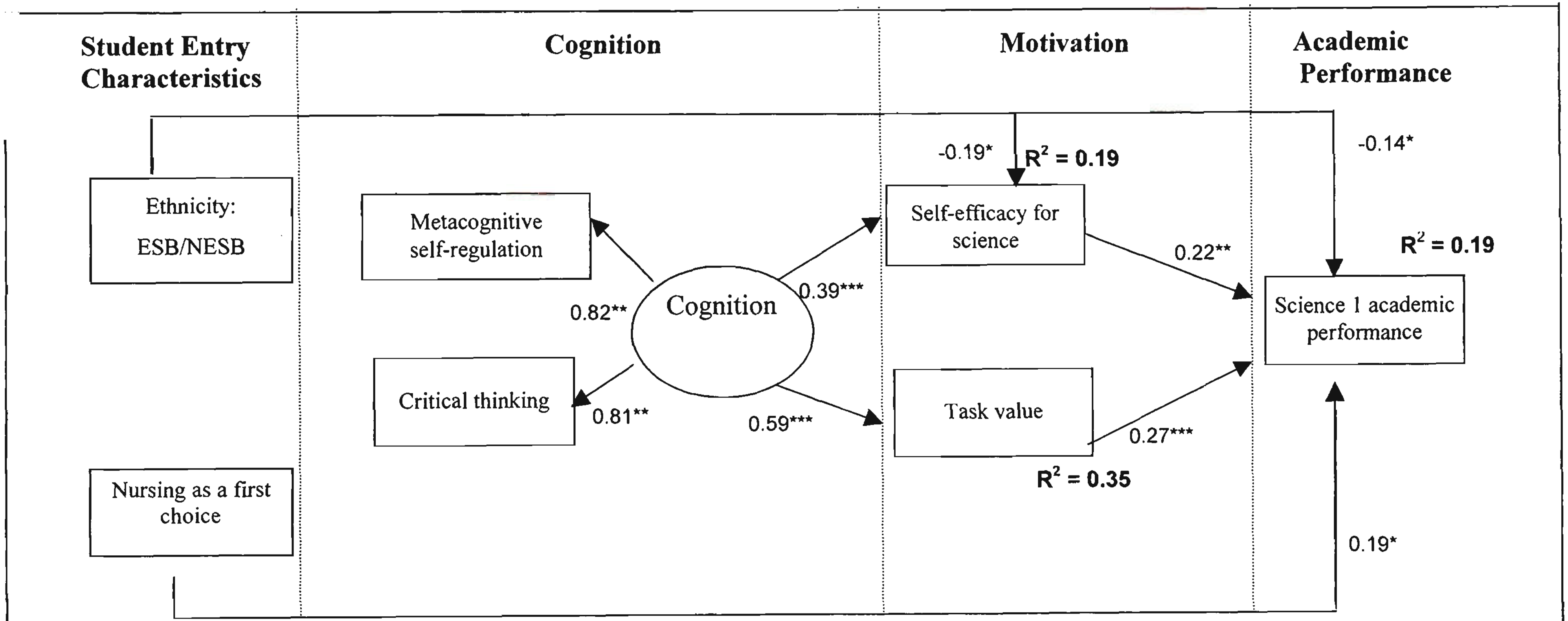
Table 9.4 cont

Model Variable	β	SE	CR	p
Science1 academic performance direct effects of:				
Age	0.09	0.14	1.12	0.26
Ethnicity	-0.17	2.41	-1.90	0.06
Nursing as first choice	0.19	2.10	1.97	0.05
HSC Biology	0.09	1.93	1.20	0.26
HSC Chemistry/Physics	0.08	1.54	1.18	0.27
TER	-0.11	2.19	-2.04	0.09
Cognition	0.06	0.49	0.47	0.68
SEFS	0.19	0.07	1.98	0.05
NASES	0.09	0.04	0.64	0.29
NCSES	0.04	0.02	0.33	0.74
SELAP-S	0.00	0.17	0.02	0.99
TV-S	0.20	0.29	2.20	0.04

Table 9.5

Standardised path coefficients Science 1 final (trimmed) model (n=143)

Model Variable	β	SE	CR	p
SEFS, direct effects of:				
Ethnicity	-0.19	2.11	-2.53	0.01
Cognition	0.59	0.11	4.30	0.00
TV-S, direct effects of:				
Cognition	0.35	0.01	6.50	0.00
Cognition, direct effects of:				
MCSR-S	0.82	0.07	7.70	0.00
CT-S	0.81	0.07	7.70	0.00
Science 1 academic performance direct effects of:				
Nursing as first choice	0.19	2.05	2.52	0.01
Ethnicity	-0.14	2.06	-1.98	0.05
SEFS	0.22	0.10	2.81	0.00
TV-S	0.27	0.91	3.50	0.00



Note: ESB=English Speaking Background; NESB=Non-English Speaking Background. *p=0.05. **p=0.005. ***p=0.000.

Figure 9.1 Final (trimmed) model of nursing students' entry characteristics and self-regulated learning for their first semester Science course

Table 9.6

Goodness-of-fit indices for the hypothesised and final (trimmed) model for Science1 (n=143)

Model	χ^2 (DF; p)	AGFI	RMSEA	TLI	CFI
Hypothesised model 1 for Science 1	168.20 (42, 0.00)	0.53	0.21	0.35	0.72
Final (trimmed) model for Science1	15.42 (13, 0.28)	0.94	0.04	0.98	0.99

9.4.3 Final (Trimmed) Sc1 Model

Results for the goodness-of-fit indices—χ^2(13, n=143) =15.42, p=0.28; AGFI=0.94; RMSEA=0.04; TLI=0.98; CFI=0.99 (Table 9.6) and normed χ^2=1.19—demonstrated an excellent fit of the final (trimmed) Sc1 model with the data.

The standardised path coefficients for the final (trimmed) Sc1 model indicated a significant improvement between the hypothesised model and the data with all the paths being statistically significant (Table 9.5). For the final (trimmed) Sc1 model ethnicity (β=-0.14, p=0.05) and nursing as a first choice (β=0.19, p=0.01) were found to have statistically significant direct effects on academic performance. Ethnicity also had a statistically significant direct (negative) effect on students' SEFS scores (β=-0.19, p=0.05).

As expected, the MCSR-S and CT-S were both statistically significant components of cognition. Cognition had an indirect effect on Sc1 academic performance through the SEFS and TV-S. The SEFS (β=0.22, p=0.005) and TV-S (β=0.27, p=0.000) were both directly related to Sc1 academic performance and were directly influenced by students' cognition. As already stated there was a direct path between ethnicity and the SEFS.

The final model for Sc1 explained 19% of students' academic performance for Sc1, 19% of their SEFS and 35% of their TV-S. A diagrammatic representation of the final (trimmed) model for Sc1 is given in Figure 9.1.

9.5 Semester One Nursing Practice Courses

9.5.1 Introduction

The same decisions made for Sc1 were implemented for NP1 (see 9.4.1). Like Sc1, the hypothesised NP1 model was tested (9.5.2) and then trimmed (9.5.3). The variables included in the hypothesised NP1 model (9.5.2) and the final (trimmed) NP1 model (9.5.3) and the SEM statistics for both models are included in this section.

9.5.2 Hypothesised NP1 Model

Students' Entry Characteristics

The entry characteristics, HSC Biology and HSC Chemistry/Physics, were excluded from the hypothesised model as neither variables were significantly related to any of the research instruments for NP1 or academic performance for NP1 (see Table 9.2). Age was included, and was hypothesised as having direct paths with the SEFS, NASES, NCSES, cognition and students' academic performance for NP1. In the hypothesised model, ethnicity was conceptualised as having direct paths with the SEFS, NASES and academic performance. The paths between nursing as a first choice and the SEFS, NCSES, SELAP-N, TV-N and students' academic performance for NP1 were examined.

Table 9.7

Standardised path coefficients for Nursing Practice1 hypothesised model (n=136)

Model Variable	β	SE	CR	p
SEFS, direct effects of:				
Age	-0.20	1.98	-2.52	0.01
Ethnicity	-0.15	2.18	-1.99	0.05
Nursing as first choice	0.08	2.07	1.05	0.29
Cognition	0.51	0.18	4.96	0.00
NASES, direct effects of:				
Age	-0.16	5.65	-2.36	0.02
Ethnicity	-0.08	6.21	-1.16	0.25
Cognition	0.87	0.75	6.76	0.00
NCSES, direct effects of:				
Age	0.00	0.08	0.03	0.97
Nursing as first choice	0.19	0.09	2.62	0.00
Cognition	-0.75	0.07	-6.38	0.00
SELAP-N, direct effects of:				
TER	0.11	0.15	1.45	0.16
Nursing as first choice	0.11	0.19	1.34	0.18
Cognition	-0.07	0.02	-4.71	0.00
TV-N, direct effects of:				
Nursing as first choice	0.11	0.18	1.40	0.16
Cognition	0.45	0.01	4.47	0.00
Cognition, direct effects of:				
MCSR-N	0.57	0.07	4.55	0.00
CT-N	0.49	0.09	4.73	0.00
Age	0.13	2.09	2.09	0.07
Nursing Practice1 direct effects of:				
Age	0.17	2.81	1.77	0.04
Ethnicity	-0.18	2.80	-1.98	0.05
Nursing as first choice	0.03	2.66	0.29	0.77
TER	0.14	2.77	1.67	0.10
Cognition	0.08	1.18	0.12	0.91
SEFS	0.03	0.12	0.26	0.79
NASES	0.11	0.13	0.27	0.78
NCSES	0.11	4.59	0.55	0.58
SELAP-N	-0.04	1.27	-0.35	0.73
TV-N	0.23	1.26	2.27	0.02

The only other entry characteristic included in the NP1 model was TER which was hypothesised as having direct paths with the SELAP-N and NP1 students' academic performance for NP1.

Cognition

For the hypothesised NP1 model, the MCSR-S and CT-S comprised the cognitive component of self-regulated learning. Cognition was considered to directly influence motivation (SEFS, NASES, NCSES, SELAP-N and TV-N) and academic performance.

Motivation

All the measures of motivation were considered to have direct effects on students' academic performance for NP1.

SEM Analysis

Like the hypothesised model for Sc1, the goodness-of-fit indices given in Table 9.9—$\chi^2(28,\ n=1136) = 154.19$; $p=0.000$; AGFI=0.54; RMSEA=0.20; TLI=0.25; CFI=0.67 indicated a poor fit of the NP1 hypothesised model for the data and consequently ad hoc trimming was performed.

The paths for the hypothesised NP1 model—the standardised path coefficients, standard errors, critical ratios and significance levels—are given in Table 9.7. For students' entry characteristics, age had statistically significant direct effects on the SEFS ($\beta=-0.20$; $p=0.01$) and NASES ($\beta=-0.16$, $p=0.02$) and academic performance ($\beta=0.17$, $p=0.04$). The standardised path for age with cognition ($\beta=0.13$, $p=0.07$) was close to significance and it was decided to retain this path in the trimmed model. Ethnicity had statistically significantly (negative) paths with SEFS ($\beta=-0.15$, p=0.05) and with NP1 academic performance (β=-0.18, p=0.05). The only statistically significant path for nursing as a first choice was with the NCSES (β=0.19, p=0.00). There were no significant paths for TER.

As expected the MCSR-N (β=0.57, p=0.000) and CT-N (β=0.49, p=0.000) had direct paths with cognition. Cognition had statistically significant direct effects on all the motivation instruments but did not have a significant effect on students' academic performance for NP1.

Only TV-N had a direct effect on academic performance (β=0.23, p=0.02). Apart from TV-N, none of the other motivation research instruments had statistically significant paths with students' academic performance for NP1.

For the ad hoc trimming process, the SELAP-N (only significant was with cognition) and all paths that were not statistically significant were trimmed from the hypothesised NP1 model. SEM was conducted on this trim 1 NP1 model but the goodness-of-fit indices did not improve significantly. The difficulty achieving a satisfactory fit was due partly to the fact that apart from TV-N none of the other self-efficacy research instruments were statistically related to academic performance. It seemed appropriate therefore to omit all self-efficacy instruments, but the fit indices indicated an overfit when only TV-N (and self-efficacy measures were omitted) was included in a trim 2 NP1 model. Thus in NP1 model trim 3 the NCSES was included in addition to TV-N as the NCSES had been chosen specifically to be used in relation to the Nursing Practice courses in this thesis. The goodness-of-fit indices for the NP1 model trim 3 were—$\chi^2(16, n=136)=50.72$; p=0.000; normed $\chi^2=3.17$; AGFI=0.82; RMSEA=0.13; TLI=0.64; CFI=0.80. This indicated an improvement in fit but the path between nursing as a first choice and NP1 academic performance were not statistically significant (β=0.00, p=0.96) and it was decided to trim this path. This model then became NP1 trim 4 or the final (trimmed) NP1 the SEM results for this model are reported in the following sub-section.

Table 9.8

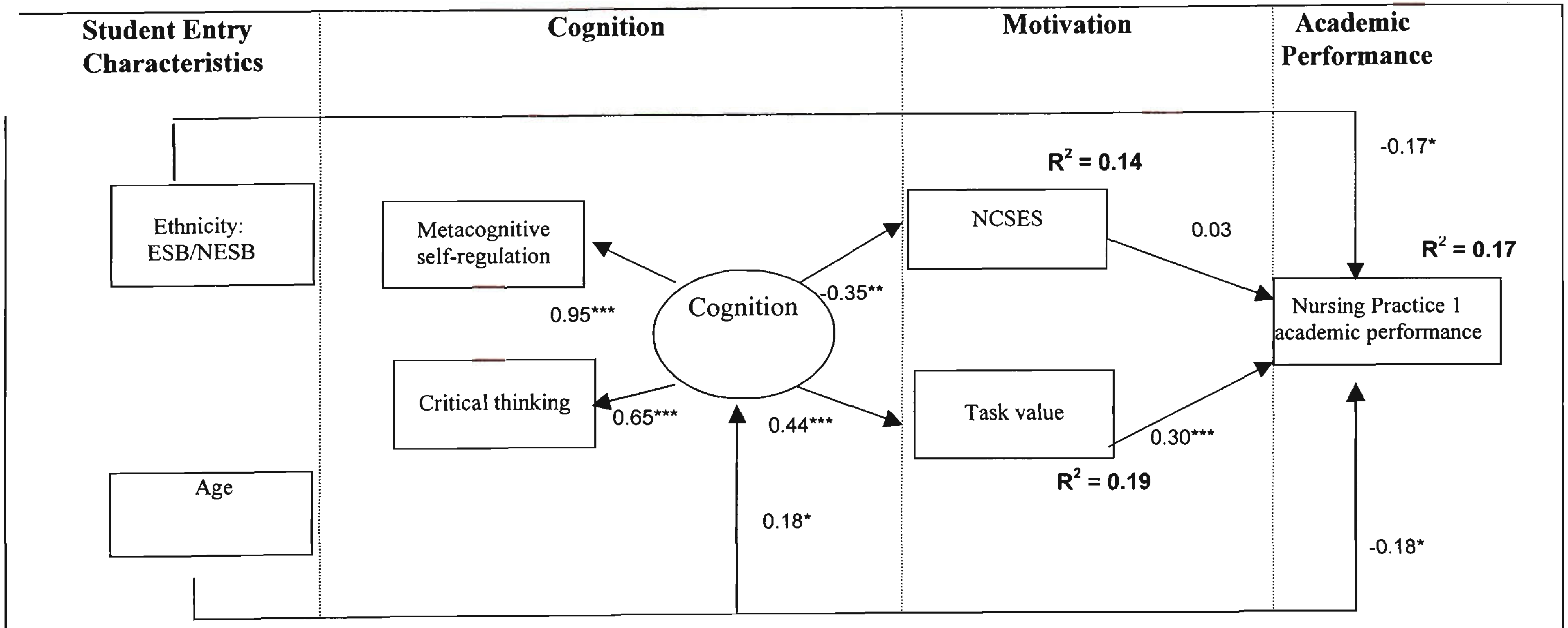
Standardised path coefficients for Nursing Practice 1 final (trimmed) model (n=136)

Model Variable	β	SE	CR	p
NCSES, direct effects of:				
Cognition	-0.35	0.00	-3.35	0.00
Cognition, direct effects of:				
Age	0.18	2.10	2.02	0.04
MCSR-N	0.95	0.03	9.00	0.00
CT-N	0.65	0.07	4.90	0.00
TV-N, direct effects of:				
Cognition	0.44	0.01	4.05	0.00
Nursing Practice 1 academic performance, direct effects of:				
Age	0.18	2.07	2.27	0.02
Ethnicity	-0.17	2.23	-2.18	0.03
NCSES	0.03	1.85	0.40	0.69
TV-N	0.30	0.98	3.72	0.00

Table 9.9

Goodness-of-fit indices for hypothesised and final (trimmed) model for Nursing Practice 1 (n=136)

Model	χ^2 (DF; p)	AGFI	RMSEA	TLI	CFI
Hypothesised model 1 for Nursing Practice 1	154.19 (28; 0.00)	0.54	0.20	0.25	0.67
Final (trimmed) model for Nursing Practice 1	18.18 (10; 0.08)	0.91	0.07	0.90	0.94



Note: ESB=English Speaking Background; NESB=Non-English Speaking Background. *p<0.05. **p=0.001. ***p=0.000.

Figure 9.2 Final (trimmed) model of nursing students' entry characteristics and self-regulated learning for their first semester Nursing Practice course

9.5.3 Final (Trimmed) NP1 Model

The standardised path coefficients for the final (trimmed) NP1 model are shown in Table 9.8, the goodness-of-fit indices are given in Table 9.9, and a diagrammatic representation of the final (trimmed) NP1 model is given in Figure 9.2. In the final (trimmed) NP1 model, age has a statistically significant direct influence on cognition (β=0.18, p=0.04) and students' academic performance for NP1 (β=0.18, p=0.02). Ethnicity has a direct (negative) influence on academic performance (β=-0.17, p=0.03) and so has TV-N (β=0.30, p=0.000). Both the NCSES (β=-0.35, p=0.001) and TV-N (β=-0.44, p=0.000) were directly influenced by cognition.

The goodness-of-fit indices for the NP1 final (trimmed) model (4) were—χ^2(10, n=136) =18.18; p=0.08; normed χ^2=1.8; AGFI=0.91; RMSEA=0.07; TLI=0.90; CFI=0.94. The final model explained 19% of students' TV, 14% NCSES and 17% of students' academic performance for NP1.

9.6 Semester Two Science Courses

9.6.1 Introduction

In the second semester, age and ethnicity were the only student entry characteristics collected in the questionnaire for this semester and it was decided to include these variables in all paths in relation to the research instruments and academic performance. Cognition was examined in a SEM in the same manner as for the first semester Science and Nursing Practice courses. The hypothesised model for Sc2, including the results of SEM is discussed in 9.6.2 and those for the final (trimmed) Sc2 model in 9.6.3.

9.6.2 Hypothesised Sc2 Model

Students' Entry Characterisitcs

In the hypothesised model for Sc2, as discussed in 9.6.1, age and ethnicity were hypothesised as directly influencing the SEFS, NASES, NCSES, SELAP-S, TV-S, cognition and students' academic performance for Sc2.

Cognition

The MCSR-S and CT-S were measures of cognition and were therefore hypothesised as having paths to this component of self-regulated learning. Cognition was hypothesised as having a direct influence on all the motivation variables and students' academic performance for Sc2.

Motivation

All the research instruments for the motivation component of self-regulated learning were hypothesised as directly influencing students' academic performance for Sc2.

SEM Analysis

The goodness-of-fit statistics for the hypothesised Sc2 model, as shown in Table 9.12 were: $\chi^2(23, n=128) = 116.36$, $p=0.000$; AGFI=0.60; RMSEA=0.19; TLI=0.39; CFI=0.73; and the normed $\chi^2=5.06$. All the goodness-of-fit indices indicate that the model was a poor fit for the data, and as for Sc1 and NP1, ad hoc trimming was performed. Unlike Sc1 and NP1, however, the Sc2 model was only trimmed once, with the final (trimmed) Sc2 model discussed in the next sub-section of the thesis (9.6.3).

The standardised path coefficients, standard errors, critical ratios and significance levels for the hypothesised Sc2 model are given in Table 9.10. Age had a statistically significant direct path with academic performance (β=0.33; p=0.000) and its path with cognition was close to significance (β=0.17, p=0.08). Both these paths were retained in the final (trimmed) Sc2 model. There were no statistically significant paths for ethnicity and this variable was omitted from the final (trimmed) model for Sc2.

Cognition had statistically significant paths with all the research instruments measuring motivation, and like Sc1 and NP1, it did not directly influence students' academic performance for Sc2.

For motivation, the NASES (β=0.23, p=0.02), NCSES (β=0.21, p=0.04) and TV-S (β=0.28, p=0.000) had statistically significant direct paths with academic performance. The NASES and TV-S were retained and the NCSES and SELAP-S were deleted from the final (trimmed) Sc2 model (see 9.3.3 for explanation pertaining to NCSES).

Table 9.10

Standardised path coefficients for Science 2 hypothesised model (n=128)

Model Variable	β	SE	CR	p
SEFS, direct effects of:				
Age	0.06	2.09	0.65	0.52
Ethnicity	-0.05	2.25	-0.64	0.52
Cognition	0.34	0.14	4.01	0.00
NASES, direct effects of:				
Age	0.04	5.37	-0.54	0.59
Ethnicity	-0.12	5.77	-1.53	0.13
Cognition	0.61	0.39	6.02	0.00
NCSES, direct effects of:				
Age	0.06	0.09	0.74	0.48
Ethnicity	0.14	0.09	1.63	0.10
Cognition	-0.42	0.01	-4.26	0.00
SELAP-S, direct effects of:				
Age	0.11	1.34	1.51	0.13
Ethnicity	0.03	1.44	0.38	0.73
Cognition	0.74	0.11	7.05	0.00
TV-S, direct effects of:				
Age	0.09	0.89	1.26	0.21
Ethnicity	-0.10	0.95	-2.26	0.12
Cognition	0.72	0.07	6.98	0.00
Cognition direct effects of:				
MCSR-S	0.70	0.04	6.22	0.00
CT-S	0.56	0.07	5.51	0.00
Age	0.17	2.20	1.75	0.08
Ethnicity	-0.08	1.32	-0.35	0.68
Science 2 academic performance, direct effects of:				
Age	0.33	2.22	4.25	0.00
Ethnicity	-0.08	2.36	-0.99	0.32
Cognition	0.04	0.49	0.13	0.90
SEFS	0.08	0.09	1.00	0.32
NASES	0.23	2.22	2.03	0.02
NCSES	0.21	2.36	2.39	0.04
SELAP-S	0.01	0.23	0.09	0.93
TV-S	0.28	0.34	1.87	0.00

9.6.3 Final (Trimmed) Sc2 Model

The goodness-of-fit indices given in Table 9.12—$\chi^2(7, n=128) =22.61$, $p=0.10$; AGFI=0.90; RMSEA=0.08; TLI=0.93; CFI=0.97—and normed $\chi^2=2.51$ indicate a satisfactory fit for the final (trimmed) Sc2 model with the data.

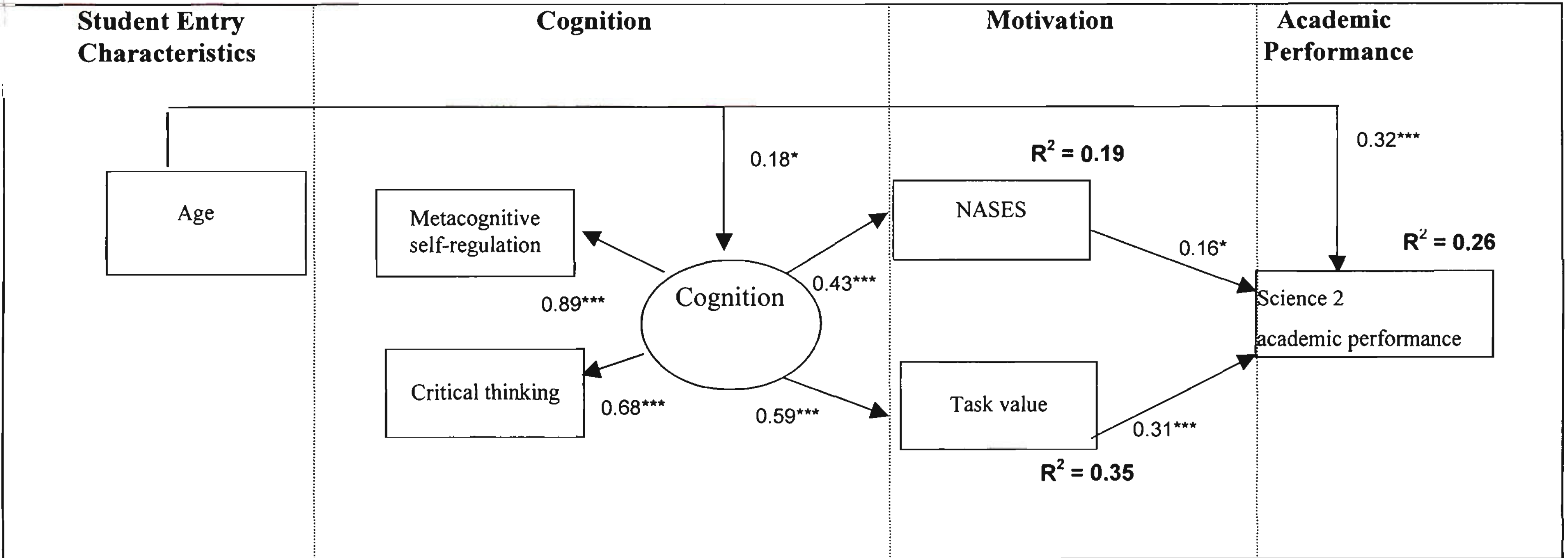
All of the paths for the Sc2 final model were statistically significant as shown in Table 9.11. Age directly influenced cognition ($\beta=0.18$; $p=0.05$) and academic performance ($\beta=0.32$, $p=0.000$). Cognition had a direct influence on motivation—the NASES ($\beta=0.43$, $p=0.000$) and TV-S ($\beta=0.59$, $p=0.000$)—and these instruments had direct effects on students' academic performance ($\beta=0.16$, $p=0.05$; $\beta=0.31$, $p=0.000$ respectively) for Sc2.

The final (trimmed) Sc2 model could explain 26% of students' academic performance, 19% of their NASES and 35% of their TV-S. A diagrammatic representation of the final (trimmed) Sc2 model is given in Figure 9.3.

Table 9.11

Standardised path coefficients for Science 2 final (trimmed) model (n=128)

Model Variable	β	SE	CR	p
NASES, direct effects of:				
Cognition	0.43	0.30	4.41	0.00
Cognition, direct effects of:				
Age:	0.18	2.20	2.00	0.05
MCSR-S	0.89	0.02	7.00	0.00
CT-S	0.68	0.06	6.50	0.00
TV-S, direct effects of:				
Cognition	0.59	0.01	5.86	0.00
Science academic performance, direct effects of:				
Age	0.32	2.15	4.12	0.00
NASES	0.16	0.03	1.98	0.05
TV-S	0.31	1.01	3.90	0.00



*p<0.05. ***p=0.000.

Figure 9.3 Final (trimmed) model of nursing students' entry characteristics and self-regulated learning for their second semester Science course

Table 9.12

Goodness-of-fit indices for hypothesised and final (trimmed) model for Science 2 (n=128)

Model	χ^2 (DF: p)	AGFI	RMSEA	TLI	CFI
Hypothesised model 1 for science 2	116.36 (23; 0.00)	0.60	0.19	0.39	0.73
Hypothesised trimmed model for Science 2	22.61 (7; 0.10)	0.90	0.08	0.93	0.97

9.7 Semester Two Nursing Practice Courses

9.7.1 Hypothesised NP2 Model

The SEM paths for the hypothesised NP2 model were the same as those for Sc2 (see 9.6.2).

SEM Analysis

The goodness-of-fit indices contained in Table 9.15—$\chi^2(28, n=124) = 116.78$, $p=0.000$; AGFI=0.47; RMSEA=0.24; TLI=0.10; CFI=0.60—and the normed χ=4.17 indicated that the hypothesised NP2 model was a poor fit for the data and therefore ad hoc trimming of the model was performed.

The standardised path coefficients, standard errors, critical ratios and significance levels for the hypothesised NP2 model are given in Table 9.13. For this model the only statistically significant path for age was cognition ($\beta=0.23$, $p=0.03$) although the path with academic performance was close to significance ($\beta=0.14$, $p=0.08$) and hence both these paths were retained in the final (trimmed) model. Ethnicity had a statistically significant (negative) path with the NASES ($\beta=-0.17$, $p=0.04$) and

NCSES (β=-0.28, p=0.005) and its path with academic performance (β=-0.14; p=0.08) was close to statistical significance.

Cognition had statistically significant paths with all the research instruments measuring aspects of motivation, but like Sc1, NP1 and Sc2, the path with academic performance was not statistically significant.

TV-N (β=0.34, p=0.005) was the only motivation research instrument that had a statistically significant path with academic performance, although the path for the NASES with academic performance was close to significance (β=0.14; p=0.08).

The SELAP-N and SEFS which were only influenced by cognition and had no other significant paths and were trimmed from the final (trimmed) NP2 model. Both the NASES and the NCSES were directly influenced by ethnicity and cognition but only the NASES had a statistically significant path coefficient with academic performance hence the NASES was retained and the NCSES was trimmed from the final (trimmed) NP2 model. This model was tested and the results are given in the next sub-section.

9.7.2 Final (Trimmed) NP2 Model

The fit indices for the final (trimmed) NP2 model are given in Table 9.16—χ^2(11, n=124) =15.46, p=0.16; AGFI=0.92; RMSEA=0.06; TLI=0.94; CFI=0.97—and indicate significant improvement from the hypothesised NP2 model and support the fit of the data for the revised model. The normed χ^2=1.41 also supported the fit of the NP2 model and the data.

The standardised path coefficients, standard errors, critical ratios and significance levels for the final (trimmed) NP2 model are shown in Table 9.14. Except for the NASES, all paths for the final (trimmed) NP2 model were statistically significant.

Table 9.13

Standardised path coefficients for Nursing Practice 2 hypothesised model 1 (n=124)

Model Variable	β	SE	CR	p
SEFS, direct effects of:				
Age	0.01	2.23	-0.17	0.87
Ethnicity	-0.16	2.32	-1.79	0.07
Cognition	0.37	0.18	3.48	0.00
NASES, direct effects of:				
Age	0.07	5.85	0.89	0.37
Ethnicity	-0.17.	6.09	-2.01	0.04
Cognition	0.51	0.53	4.52	0.00
NCSES, direct effects of:				
Age	0.02	7.63	0.19	0.85
Ethnicity	-0.28	7.94	-3.34	0.00
Cognition	0.27	0.59	2.77	0.00
SELAP-N direct effects of:				
Age	0.00	1.28	0.00	0.98
Ethnicity	-0.14	1.33	-1.89	0.06
Cognition	0.18	0.16	5.99	0.00
TV-N, direct effects of:				
Age	0.02	0.17	0.32	0.75
Ethnicity: ESB/NESB	-0.07	0.18	-0.88	0.38
Cognition	-.81	0.02	5.96	0.00
Cognition, direct effects of:				
MCSR-N	0.56	0.10	4.62	0.00
CT-N	0.54	0.09	4.67	0.00
Age	0.22	2.15	2.19	0.03
Ethnicity	-0.07	0.18	-0.78	0.40
Nursing Practice 2 academic performance, direct effects of:				
Age	0.14	1.95	1.96	0.08
Ethnicity	-0.14	1.88	-0.58	0.08
Cognition	-0.02	0.84	-0.04	0.97
SEFS	0.10	0.09	1.03	0.31
NASES	0.14	0.04	1.96	0.08
NCSES	0.05	0.03	0.48	0.64
SELAP-N	0.05	0.37	0.19	0.85
TV-N	0.34	2.54	2.00	0.00

Table 9.14

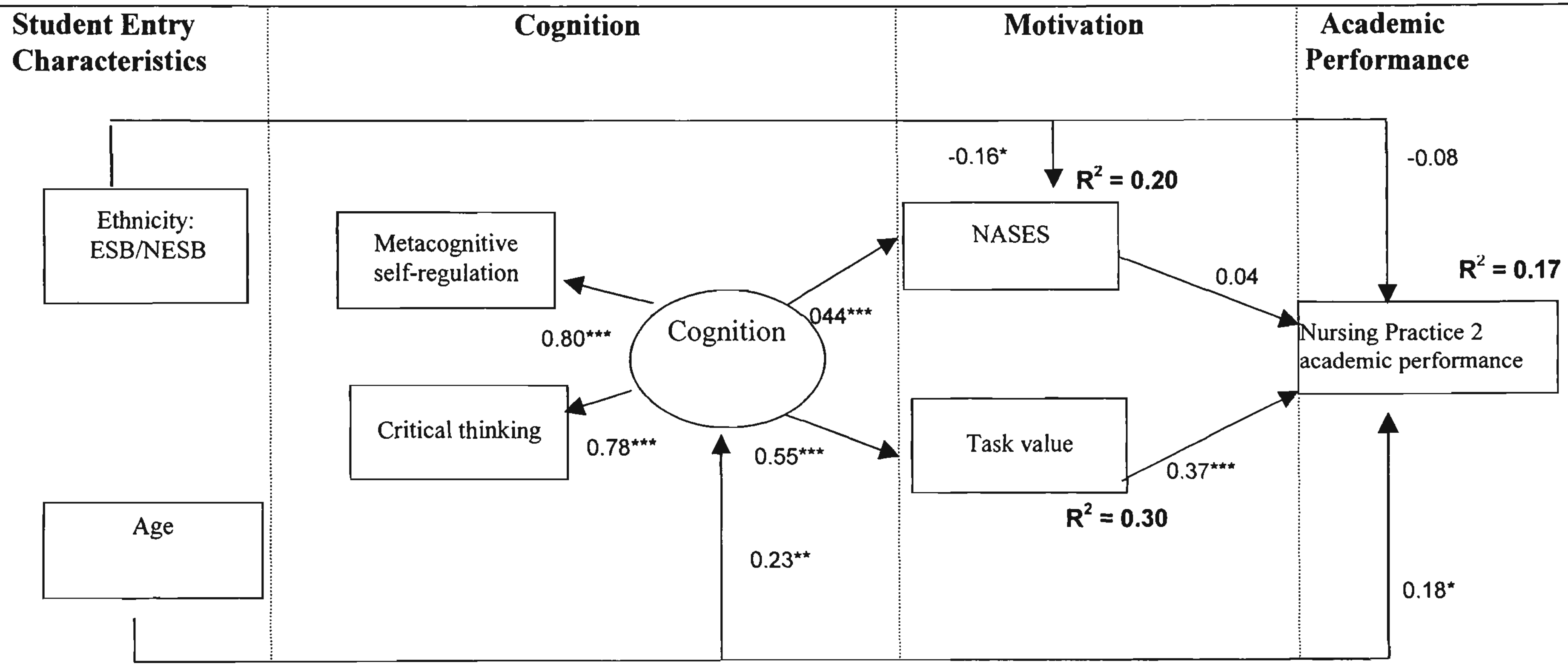
Standardised path coefficients for Nursing Practice 2 final (trimmed) model (n=128)

Model Variable	β	SE	CR	p
NASES, direct effects of:				
Ethnicity	-0.16	5.99	-2.00	0.05
Cognition	0.44	0.34	4.21	0.00
Cognition, direct effects of:				
MCSR-N	0.80	0.08	6.52	0.00
CT-N	0.78	0.07	6.55	0.00
Age	0.23	2.15	2.29	0.02
TV-N, direct effects of:				
Cognition	0.55	0.01	5.33	0.00
Nursing Practice 2 academic performance, direct effects of:				
NASES	0.04	0.03	0.48	0.63
Age	0.18	1.97	2.00	0.04
Ethnicity	-0.08	2.06	-0.94	0.35
TV-N	0.37	2.07	4.36	0.00

Table 9.15

Goodness-of-fit indices for hypothesised and final (trimmed) model for Nursing Practice 2 (n=124)

Model	χ^2 (DF, p)	AGFI	RMSEA	TLI	CFI
Hypothesised full model for Nursing Practice 2	116.78 (28; 0.00)	0.47	0.24	0.10	0.60
Hypothesised trimmed model for Nursing Practice 2	15.46 (11; 0.16)	0.92	0.06	0.94	0.97



Note: ESB=English Speaking Background; NESB=Non-English Speaking Background. *p< 0.05. **p=0.002. ***p=0.000.

Figure 9.4 Final (trimmed) model of nursing students' entry characteristics and self-regulated learning for their second semester Nursing Practice course

Ethnicity directly influenced the NASES (β=-0.16, p=0.05) and students' academic performance for NP2 (β=-0.08, p=0.35). Age had a direct effect on cognition (β=0.23, p=0.002) and academic performance (β=0.18, p=0.04). Cognition had direct influence on motivation (NASES β=0.44, p=0.000 and TV-N β=0.55, p=0.000) and indirect influence on academic performance through students' TV-N which was the variable that had the strongest effect on students' academic performance for NP2 (β=0.37, p=0.000).

The final (trimmed) NP2 model could explain 17% of students' academic performance for NP2, 30% of their TV-N and 20% of their NASES. A diagrammatic representation of the final (trimmed) NP2 model is shown in Figure 9.4.

9.8 Summary and Discussion

This chapter examined the interrelationships among students' entry characteristics, self-regulated learning (cognition and motivation) for their first year Science and Nursing Practice courses. An adapted version of Pintrich and Schrauben's (1992) conceptual model of motivation and cognition was used as the hypothesised model. The computer program AMOS was used to perform a SEM on the data. Four models were tested and respecified—one each for Sc1, NP1, Sc2 and NP2. All of the hypothesised models required trimming to improve the goodness-of-fit indices with the first semester models for Sc1 and NP1 requiring several trims whilst the second semester models for Sc2 and NP2 only required one trim.

For the final (trimmed) models for NP1, Sc2 and NP2, students' age had statistically significant direct influence on their academic performance and cognition. This result is in accordance with the qualitative findings for Chapter 6 where academics described mature-age students as having behaviours consistent with self-regulated learners, and to academically out-perform younger students. Academics also recognised mature-age students as having lower science self-efficacy in the first semester of their Bachelor of Nursing course, and this path was a significant one for Sc1 in the final (trimmed) model for this course. Academics also suggested that once mature-age students had successfully completed their first semester Science course that it empowered them so that by second semester they were out-performing younger students even though the younger students were more likely to have a science background. The final (trimmed) model for Sc2 confirmed academics' viewpoint, as age was a significant influence on academic performance for this second semester Science course.

Also in keeping with the qualitative and quantitative results for Chapter 6 was the fact that ethnicity (NESB) had significant direct negative influence on students' academic performance for Sc1 and NP1, but not for the second semester courses. Ethnicity (NESB) had a significant direct negative effect on students' self-efficacy—SEFS for Sc1 and NASES for NP2.

In Chapter 6 academics talked about the influence of students choosing "nursing as a first choice" and in keeping with their comments, this variable had a direct influence on students' academic performance for Sc1.

Students' science background and TER scores, which were only obtained in the first semester, were not retained in any of the first semester models as they did not have significant paths to academic performance, or improve the fit statistics for the final (trimmed) models. Nursing experience was excluded from all the models as it was not correlated to any other variable in the correlation matrix (Table 9.2).

For all of the courses, TV had the strongest influence on academic performance. This is in contrast to the self-regulation literature where TV has not been found to be predictive of students' academic performance (see for example Pintrich & De Groot, 1990; Wolters & Pintrich, 1998). On the other hand, relevance was discussed as an important issue in relation to Science courses in nursing (section 3.4.2-3.4.3) and the models for Sc1 and Sc2 support this discussion. Although relevance was seen as a major issue in relation to the Science courses in nursing programs, the models for NP1 and NP2 confirm that relevance is also a major factor in Nursing Practice courses.

In the first semester, the SEFS was the other motivation measure that had a direct influence on students' academic performance for Sc1. Although other motivation measures were retained in the final (trimmed) models for NP1, NP2 and Sc2 none of these constructs had significant influence on academic performance. Surprisingly, the SELAP did not statistically significantly influence academic performance in any of the first year models. This was unexpected as SELAP was strongly correlated to academic performance (see Table 9.2 and 9.3).

For all of the final (trimmed) models, cognition had an indirect path to academic performance and this was through the motivation variables. This was an unexpected finding as research including the type of cognitive strategies measured in this thesis have been reported as being predictive of academic performance (Pintrich & De Groot, 1990). On the other hand, studies comparing self-efficacy (a motivation variable in this thesis) and self-regulated learning (cf cognition in this thesis) have found self-efficacy more predictive of academic performance than self-regulation (Pajares & Graham, 1999).

All of the hypothesised models required ad hoc trimming, and all of the final (trimmed) models were parsimonious, with the goodness-of-fit indices indicating a good fit between the data and the respecified models. The final (trimmed) Sc1 model could explain 19% of students' academic performance, 19% of their SEFS and 35% of their TV. The final (trimmed) NP1 model could explain 17% of students' academic performance for NP1, 14% NCSES and 19% of TV. The final (trimmed) Sc2 model was the best of all the models for explaining academic performance. It could explain 26% of students' academic performance, 19% of their NASES and 35% of their TV for Sc2. The final (trimmed) model for NP2 could explain 17% of students' academic performance, 20% of their NASES and 30% of their TV.

More discussion is contained in Chapter 10, the final chapter for the thesis.

Chapter 10

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

10.1 Introduction

This thesis used a multi-method approach (quantitative questionnaires and qualitative interviews of students and academics) to examine nursing students' entry characteristics, self-regulated learning (motivation and cognition) for their Science and Nursing Practice courses of first year Bachelor of Nursing programs. The results for the study in this thesis were presented in the previous four chapters. In Chapter 6 the results for students' entry characteristics were presented. In Chapter 7 the results for motivation (self-efficacy and task value/relevance) were given and in Chapter 8 those for cognition (learning/thinking strategies) were presented. In the previous chapter models for the interrelationships among students' entry characteristics, motivation, cognition and academic performance for each of the first year Science and Nursing Practice courses were presented. At the end of each results chapter the results contained in that chapter were summarised and briefly discussed. In this final chapter for the thesis, these results are discussed in more depth. The aims of the thesis were introduced in 1.5 and these are used to facilitate the discussion in this chapter. These aims are not presented sequentially as the first and main aim of the thesis is addressed last. Inevitably, students make comparisons between their Science and Nursing Practice courses and these comparisons are discussed in this chapter. The conclusions, limitations, implications and recommendations arising from the study in the thesis are also contained in this chapter.

10.2 The first Year of a Bachelor of Nursing Program and Comparisons/Contrasts of the Science and Nursing Practice Courses

10.2.1 Bachelor of Nursing Programs: The First Year

Students enrolled in the first year Bachelor of Nursing programs examined in this thesis, were required, as expected, to study introductory Science and Nursing Practice courses in both semesters. In 1989, Higgins (p. 118) suggested that pre-registration nursing programs were "more comprehensive and demanding" than students expected and it would appear that for certain groups of students that is still the situation today as students entering the nursing programs in this study were surprised to find that it was harder than they thought it would be. This particularly applied to Low Achievers, who were also likely to be less informed about the presence of science in a first year Bachelor of Nursing program. This may be because the program was not their first choice, and therefore these students had not obtained sufficient information about their nursing program before commencing it. This finding is in accordance with research, where students who withdrew from a nursing course were found to have obtained less information about nursing prior to entry, than students who continued in their nursing program (Harvey & McMurray, 1997). Moreover, it was the science content which was different to students' expectations (Harvey & McMurray, 1997). Like the students in the study by Harvey and McMurray (1997), the students in this thesis also commented on the depth of science material in their courses which was much greater than many students expected.

Students enter a nursing program for a variety of reasons (see Table 5.2-5.4) with the most frequent reason being "previous experience with nursing." The themes for the reasons why students chose to do a nursing course also included the "characteristics of nursing", "nursing was not my first choice" and "change in direction." A discussion of these reasons is contained in 6.3.3.

10.2.2 Some Comparisons/Contrasts of the Science and Nursing Practice Courses

In 1.2 and 4.4.1 the first year Science courses were described as primarily covering theoretical scientific knowledge, whilst the Nursing Practice courses included both theoretical and practical aspects (nursing skills) of nursing. It was inevitable that students would compare/contrast these courses. Science was seen by students as "knowledge-based", whereas Nursing Practice was seen as "experience-based." Students' comments about their Science and Nursing Practice courses were analysed and put into categories (themes). There were four categories: difficulty; real nursing; time and effort; and, approaches to study. Table 10.1 contains these categories and has explanations and examples of these categories. As would be expected, Low Achievers were more likely, than High Achievers, to describe putting less time and effort into their Nursing Practice courses compared to their Science courses.

Table 10.1

Students' comparisons/contrasts of their Science and Nursing Practice courses: categories with explanations and examples

Category	Explanation and Example
1 Difficulty	Descriptions by students indicating that they found their Nursing Practice course easier than their Science course. eg: "There is not much to remember in Nursing Practice. It is more common knowledge. It's self-explanatory and a lot easier than science. There's not much to remember, just basic concepts."
2 Real Nursing	Descriptions by students indicating that the Nursing practice course was "more fun", "more enjoyable", "more interesting" and "more relevant" than their science course, that is, more like what they expect of "real nursing." eg: "I love, and fully understand [Nursing Practice] and can relate it to clinical. I can't relate science. It [the Nursing Practice course] helps you feel like you know something."
3 Time and Effort	Descriptions by students about the time and effort they expend studying for their Nursing Practice course.
3a) time	Descriptions by students indicating that they spend more time studying for their Science than their Nursing Practice courses. eg: "I don't spend much time studying [for Nursing Practice]. I spend more time on science."
3b) effort	Descriptions by students indicating that they put less study effort into Nursing Practice and more effort into the Science course. eg: "I don't study as hard [in Nursing Practice course]." eg: "I study harder in science because we have to learn all terms—science terminology."
4 Less Strategies	Descriptions by students indicating that they use less strategies to study Nursing Practice than for their Science course eg: "I study [nursing practice] differently to science. I get by without reading."

10.3 Students' Entry Characteristics and their Relationship to Students' Self-Regulated Learning and Academic Performance in their First Year Science and Nursing Practice Courses (Aim 2)

Student' entry characteristics examined in the first semester in this study were: nursing as a first career choice; nursing experience; academic background (TER score; HSC Biology; HSC Chemistry/Physics); age; and, ethnicity. As some variables were closely associated with each other—for example, students aged 17-19 years were most likely, as would be expected, to have been admitted to university on the basis of their HSC/TER background whereas students aged 20+ were more likely to be admitted via mature age entry/other entry—it was decided to reduce the number of variables surveyed in the second semester. In addition to the association between students' entry characteristics, it was anticipated that by the second semester some variables might not be relevant any more, for example students' science background. Accordingly, in the second semester age and ethnicity were the only entry characteristic data that were collected and examined.

For 32% of students enrolled in the Bachelor of Nursing programs examined in this study nursing was not their first career choice. Many of these students were high school leavers aged 17-19 years, who did not have the entry requirements to get into the program that was their first preference or their TER score was low, and a Bachelor of Nursing program may have been the only university program open to these students. Students for whom nursing is not a first choice soon come to the attention of academics teaching in a nursing program as they become bored easily and question the relevance of the courses that they are studying to nursing. These students may have had stereotypical views of nursing as "practical" and therefore were not prepared for the academic rigor of current Bachelor of Nursing programs.

Whilst only a few studies have examined nursing as a first choice and academic performance (Andrew, 1995; Bishop, 1990) academics are well aware of the significance of this variable in nursing programs. In this thesis, nursing as a first choice had a direct influence on students' academic performance in their first semester Science course but it did not have any significant paths to cognition or motivation and was not an influence on academic performance in the first semester Nursing Practice courses.

Thirty seven percent of students entering the Bachelor of Nursing programs in this thesis had some form of nursing experience. It had been expected that having nursing experience would give students an advantage in their first semester Nursing Practice course but whilst students with nursing experience had higher self-efficacy for clinical nursing they did not perform better academically than students who did not have any nursing experience. Explanations for this result may be that the type of nursing experience that students indicated that they had did not require formal educational training (for example Nursing Assistant, or work experience) or the training was not specific to nursing (for example Dental Nursing) and hence did not necessarily confer an academic advantage to these students. Another explanation may be that some Enrolled Nurses were exempt from the first semester Nursing Practice course and these students may be those who have a stronger academic background and hence this variable might have a stronger relationship to academic performance in the second semester. On the other hand, academics' comments triangulated with the quantitative results for this variable.

In keeping with previous research findings which found that 68.25% of nursing students applying to 1997 pre-registration nursing programs in NSW had TER scores less than 50, 68% of the students in this thesis had TER scores of 55 or less. This indicates that many of the students entering nursing programs have performed poorly in their HSC subjects. Students who entered nursing with TER scores of less than 55 were more likely to be Low Achievers than High Achievers in their first semester Science courses than students who had scores in the 55-100 range. These quantitative results triangulated with academics' views of students' TER background with respect to students' academic performance in the first semester Science courses.

The academics suggested that by accepting students with a low TER score implies that a nursing program is an easy university option and this view is supported by students' comments. When students found out that this is not the case, they tended to be "problematic in class" (Julie 13/7/98). Whilst not examined, it is most likely that the students identified by Julie are also those students for whom nursing was not their first choice particularly as they were also high school leavers.

As students who have a very high TER score are likely to be a small minority it was not surprising that academics can readily identify them in their classes. The fact that students are homogeneous (mainly low TER scores) with respect to their TER scores and the fact that so few have high scores, may help to explain why this variable has not been found by some researchers useful in predicting students' academic performance (Khytense & Beanland, 1994). When students' TER background was examined simultaneously with other student entry characteristics in this thesis it was found not to have a significant effect on academic performance.

In recent years some universities have been increasing their academic requirements for entry to Bachelor of Nursing programs. Given the fact that nursing has been consistently recruiting students from the lower high school performance groups any change in recruiting patterns must be examined in relation to its impact on nursing enrollment figures particularly in light of the current nursing shortages.

In 1990 Bishop found that 68% of students admitted to university on the basis of their HSC background had studied Biology. This figure appears to be static as 68% of students in this thesis also had studied HSC Biology. Compared to the study by Bishop (1990) there has been an increase in the number of students studying HSC Chemistry and Physics with 41% and 17.5% of students respectively studying these subjects in this thesis and 13% studying each of the subjects in Bishop's sample of students. Given that the numbers of students studying these courses in Bishop's (1990) study were below the state averages for females (Andrew, 1995) it can be assumed that the same applies to the sample of students in this thesis.

Just as Chang predicted in 1978 that students with physics and chemistry would be able to cope with the theoretical aspects or their nursing program, students in this thesis who had studied HSC Physics and/or Chemistry achieved higher marks in their first semester Science courses than students who had not studied these courses. HSC Chemistry and/or Physics did not have an effect on students' academic performance in the first semester Science course when other student entry variables were included.

Unlike students who had studied HSC Chemistry and/or Physics, students who had studied HSC Biology, whilst having slightly higher mean scores for their first semester Science courses, did not out-perform those who had not studied HSC Biology. Although not surveyed quantitatively, data gathered from students' interviews indicate that students are likely to have performed modestly in their high school Science courses which is in keeping with previous research (Bishop, 1990; Griffiths & O'Connor, 1995; Kershaw, 1990). HSC Biology was not a student background variable that was related to students' academic performance in their first semester Science course.

The quantitative and qualitative results triangulate with respect to students' science background and their self-efficacy beliefs for their Science courses. Students' actual experiences are a powerful source of efficacy information (Bandura, 1986; 1997) and therefore, as expected, students who had a science background had higher self-efficacy beliefs than those who had not studied science at HSC level (this also includes mature-aged entry students). For some students these self-efficacy expectations may be unrealistic as whilst the first semester Science course included physics and chemistry components and some biological concepts and may initially appear to be akin to the science students have studied at high school, the similarity is limited. The Science courses at university seek to link the science to nursing practice and hence vary from high school science. Some students may fail to recognise this fundamental difference as they have started to skip classes.

In this thesis, 44% of students were aged 20+ and 56% were aged 17-19 years and in keeping with findings by Lawler et al. (1997) these groups varied in their educational background. Mature age (older) students were more likely to be admitted under special entry requirements, namely mature-age entry, have overwhelmingly chosen nursing as their first career choice and have limited science background compared to high school students. Mature age students are also twice as likely to come from a NESB, and 60% more likely to have nursing experience than high school students. It may have been many years since mature age students had studied at school, and whilst these students have may low self-efficacy expectations for science, academic study and learning and performance they have a wealth of life-skills such as the ability to use time effectively. These students are keen to study, not afraid of admitting that they need help, and of seeking help with assignments or clarification of material that they do not understand. So although mature age students may not have studied recently, they have advanced self-regulatory skills. Once mature-age students have honed these skills with respect to academic studying, their self-efficacy beliefs are raised concomitantly, and they start to increasingly out-perform high school leavers even though they may have less academic entry qualifications. Whilst other Australian nursing studies have included age when examining students' academic performance in relation to first year Science courses (Bishop, 1990; Caon & Treagust, 1992; Khytense & Beanland, 1994), none have commented on the change that occurs as mature-age students progress through their first year of study. Academics, nevertheless, are well aware of the change that occurs over a year and talked about mature age students becoming "empowered" when they are academically successful in their first semester courses (Jack 16/11/98). This is the first Australian study to examine age in relation to Nursing Practice courses.

Whilst it has been suggested that studies examining mature age (nontraditional) students' self-regulation are limited, age (traditional vs nontraditional age students) has been found to be a factor in self-regulation, with mature age (nontraditional) students (>25 years) having stronger self-regulation than traditional (<23 years) age students (Spitzer, 2000).

In this study, academics' comments about the relationship of age to self-regulation and academic performance triangulated with the quantitative results, particularly for the second semester. Age was a significant influence on students' academic performance for their first and second semester Nursing Practice courses and second semester Science courses. Just as academics described, age had significant influence on cognition for these same three courses. Mature age students come to the attention of academics as they have the confidence to ask questions when they are unable to understand new material, even if it is in a lecture, and seek help with clarification of assignments. High school leaver students may need to be taught these strategies if they are to improve their academic performance in nursing programs.

Although mature age students had lower self-efficacy for science than high school students, it was not a significant influence when all the student entry characteristics were examined in the modeling process. Ethnicity was the student entry characteristic that had a significant direct effect on students' self-efficacy for science.

Just as the Australian nation is comprised of people from many different countries, so were the universities in this study, with twenty four different countries nominated among students' birthplaces. The two main groups of countries that students came from were Asia and Central Europe, which is in keeping with previous research (D'Cruz & Tham, 1993; Lawler et al., 1997), as was the Pacific, the third largest group (Lawler et al., 1997).

It had been planned to define the term "NESB" in this study as referring to students who were born in non-English speaking countries and who speak a language other than English at home. However, due to the close association between students' birthplace and language spoken at home, the term NESB was redefined to refer to students who were born in countries other than Australia/NZ/UK—the main ESB countries that students were drawn from in this study (see Table 6.11).

The percentage of NESB students in this study were remarkably consistent, with 30 and 31% of students, in the first and second semester respectively, having a NESB. These percentages lend support to the assertion made in chapter two that the percentage of NESB students entering nursing in NSW may indeed be increasing.

In this study, students from a NESB are at an academic disadvantage, compared to students from an ESB. This disadvantage is strongest in the first semester as students from a NESB had lower academic performance than students from an ESB for their Science and Nursing Practice courses. For both semesters, students from a NESB had lower self-efficacy for science, academic learning and clinical skills than students from an ESB.

Students and the academics teaching them are aware that having a NESB is an academic disadvantage in a Bachelor of Nursing program, and both feel that this disadvantage is directly related to English language skill proficiency. Academics were concerned about this proficiency in relation to both course areas—NESB students performed academically below ESB in both areas—but NESB students were particularly concerned about their first semester Science courses. NESB students and academics were aware that in the Science courses students have to learn the terms which are specific to science and this is like learning another language. This places NESB nursing students—who may be still developing proficiency in their English language skills—at a disadvantage in their Science courses. This situation is not specific to nursing students, as NESB school students have been found to have more difficulty with science subjects than ESB students, because they did not have the required science background or experience or vocabulary (Lee, Fradd & Sutman, 1995).

One way of assisting NESB students may be by making available medical dictionaries in a students' ethnic language as students in this study report wanting to be able to translate science terms that they don't understand into their ethnic language, but found that medical dictionaries are generally unavailable. Non-medical dictionaries may not suffice as medical terms may have meanings that are specific, and may vary from the generic use of a term (Lee, Fradd & Sutman, 1998).

Language is comprised of verbal, written and reading skills and it is possible that a NESB student's proficiency in these areas may vary, and therefore whilst a NESB student may have difficulty with his or her spoken English language skills this does not necessarily mean that the student's writing or reading skills are also limited (Atwater, 1994). This was recognised by some academics who tried to assist students by giving them handouts of lecture notes so they could read about the areas that they may have missed in lectures because of language difficulties.

NESB students tend to congregate in groups with similar cultural backgrounds. Academics suggest that this disadvantages NESB students because it reduces their exposure to students with an ESB whom they feel would encourage the development of NESB students' English verbal skills. Research, however, seems to indicate that when grouped together in one tutorial group NESB students were more likely to participate in that tutorial (Zollo, 1998).

Researchers (Purdie et al., 1996) have found that Australian high school students are also more likely to seek help than students from other cultural backgrounds and this appears to apply to nursing students with academics involved in the Science and Nursing Practice courses expressing frustration that NESB students do not seek help from them which they attribute to losing face or reticence to approach people in authority. These results, however, are in keeping with those for Low Achievers who may perceive help-seeking as a reflection of their (in)competence (Ryan & Pintrich, 1998).

Although academics consider that NESB students may have a culturally specific approach to study in their Science and Nursing Practice courses, this viewpoint was not supported by the quantitative results, as there were no statistically significant differences identified between ESB and NESB students' self-regulatory or critical thinking skills in this study.

Some academics in nursing have stereotypical views of NESB students as "rote learners" a strategy which they view as negatively related to academic performance. Some researchers have challenged this viewpoint (Biggs, 1990; Niles, 1996). Others (Purdie et al., 1996) have found that whilst, for example, an Asian cultural group may use "rote learning" techniques more than Australian students, it does not mean that these students do not use deep thinking or try to understand material being presented in an academic situation. In this study the strategy called "repetition" which can be seen as related to "rote learning" was more likely to be used by High Achievers in their Science courses. This finding is similar to that of Purdie and Hattie (1996) who found that "memorization", a rote learning strategy, was more likely to be used by high achieving Australian high school students than low achieving students.

By second semester the academic disadvantage that NESB students experience in the first semester appears to lessen, as, whilst their mean scores for their Science and Nursing Practice courses were lower than that for ESB students, the results were not statistically significant for this semester. One possible explanation for NESB students' improved academic performance in the second semester may relate to the fact that NESB students are twice as likely to be mature aged students (20+)

than high school leavers and mature age students seem to “get it all together” by the second semester of their Bachelor of Nursing program and start to out-perform the younger students. Another explanation may be that by the second semester of their Bachelor of Nursing program there has been some increase in NESB students' English language skills proficiency which has enabled them to improve their academic performance in their Science and Nursing Practice courses.

Additional support has been advocated for NESB students to assist them to be academically successful (Kanitsaki, 1988; Zollo, 1998). This support would need to include strategies to improve NESB students' self-efficacy as although there was a change in NESB students' academic performance in the second semester in this study, their self-efficacy beliefs for science, nursing academic and nursing clinical skills remained below that for ESB students.

10.4 Students' Motivation—Self-Efficacy and Value/Relevance—for their First and Second Semester Science and Nursing Practice Courses (Aim 3)

10.4.1 Self-Efficacy

Four self-efficacy research instruments were used in this thesis—SEFS, NASES, NCSES and SELAP (-N & -S). The first three instruments were designed by Australians to be used to measure self-efficacy expectations of nursing students. The SELAP was a scale taken from the MSLQ and was designed to be used by college students.

The SEFS was designed specifically for a first year Science course containing physics, chemistry and some biological aspects (Andrew, 1998), in other words, a course similar to that undertaken in the first semester of the Bachelor of Nursing programs examined in this study. As would be expected, this instrument was a better predictor of students' academic performance in the first semester Science course than the second semester, although the relationship was significant for both semesters.

Students have low self-efficacy expectations for science long before they enter nursing programs as students from both age groups described performing modestly in science subjects at school, having negative attitudes to science, and avoiding science where possible. It has been recommended that when teaching self-regulation, programs should include components for enhancing students' self-efficacy (Schunk & Ertmer, 2000)

Students' science background, age and ethnicity were found to have an influence on students' self-efficacy for science, but when all these factors were considered together ethnicity was the entry characteristic that had the strongest influence on students' self-efficacy for science.

Feedback is known to have an influence on students' self-efficacy (Schunk & Ertmer, 2000) and this appears to apply to students' self-efficacy for science. There was a significant increase noted both in the qualitative and quantitative findings with respect to students' self-efficacy for science in the second semester, and it may be partly attributed to the positive feedback students receive by being academically successful in their first semester Science course. Academics also reported using "persuasive information" (Schunk & Ertmer, 2000, p. 633) as a means of raising students' efficacy for their Science course.

Apart from Harvey's (1995) doctoral research which was more concerned with persistence in nursing than academic performance, this is the only other study identified from the literature where the NCSES and NASES have been used specifically to assess students' clinical and academic self-efficacy, and to examine them in relation to academic performance. Like Harvey's (1995) research, the NASES was found to have a stronger relationship with academic performance than the NCSES. The NCSES was included specifically in relation to students' first year Nursing Practice courses, and whilst its relationship was better with these courses than the Science courses, its performance was still only mediocre in predicting academic performance. As the Nursing Practice courses contain theoretical and practical aspects of nursing and the practical aspects are not included in the grade assessment, this study appears to concur with Harvey (1995) who suggested that the lack of a clinical skills performance measure may be a reason for the lack of academic predictability of the NCSES. Harvey (1995) found that nursing students had unrealistically (high) clinical self-efficacy expectations and this finding also applied to the students in this study. It has been suggested that over estimations of competence may be adaptive, in that it may help students to maintain effort (Garcia & Pintrich, 1996). Whilst there was no significant change in students' NCSES scores over a year, an examination of the individual items indicated that students adjusted their self-efficacy expectations for skills that they had been taught during the first semester, but still had unrealistically high expectations for skills that they had not been taught.

Whilst not related to academic performance, the NASES nevertheless was used in the structural equation models for both the second semester courses. For the second semester Nursing Practice course the NASES was directly influenced by ethnicity.

Some Low Achievers had unrealistic expectations for their academic grades for their Nursing Practice courses, and once again the likely explanation is that students expect their Nursing courses to be easy. Nursing students are not alone in having unrealistic expectations for academic performance, as a study of students enrolled in undergraduate programs in general found that one-third of students did not perform as well as they anticipated (McInnis, James & Harley, 2000).

Although the SELAP has been reported as the best of all the MSLQ scales at predicting academic performance (Pintrich et al., 1993), this was not the case in this study, as whilst it was related to academic performance, the TV scale was a better predictor, than the SELAP of academic performance.

10.4.2 Task Value/Relevance

In this study, task value/relevance was the most significant quantitative predictor of academic performance, and was clearly related to academic performance when examined qualitatively. Task value/relevance has not been found to be predictive of academic performance in the self-regulatory literature (Pintrich & DeGroot, 1990; Wolters & Pintrich, 1998), but it has been found in the literature to be related to academic performance in Science courses in nursing programs (Caon & Treagust, 1993; Jordan et al., 1999).

Science and Nursing Practice courses must have their academic material taught in an applied manner, that is, directly related to the clinical situation, as task value/relevance was found to have a significant direct influence on students' academic performance for all their first year Bachelor of Nursing Science courses and Nursing Practice courses in this study.

Low achievers particularly need to be persuaded to see the relevance of their Science courses to nursing as these students were consistently more likely than High Achievers, in both semesters, to question the relevance of science knowledge to nursing. Some Low Achievers may be starting to alter their opinion by the second semester, but the quantitative results indicate that this change may not be significant.

Students' clinical experience is important for reinforcing the relevance of science to nursing. This experience may need to be undertaken early in the first semester, as students need some clinical experience to reinforce the relevance of science to nursing. If academics are to teach science in an applied manner they may need nursing experience or have discussed the material with Registered Nurses, as students in this study who had academics who were able to use clinical examples were more likely to see science as relevant to nursing. This supports the findings of others (Graham et al., 1996; Trnobranski, 1993) who suggest that the teachers with a science and nursing qualification may be the teachers best able to connect scientific knowledge and nursing clinical practice.

10.5 The Learning Strategies Students Report Using for their Science and Nursing Practice Courses and Changes, if any, that Students Report Making to these Strategies (Aim 4)

This study found that students used general and course-specific strategies when studying for their Science and Nursing Practice courses. Eight categories of learning strategies—organisation, reading, elaboration, rehearsal, metacognitive self-regulation, study environment and help-seeking—were found to be used by students when studying for the Science course and these were comparable to categories found in other self-regulated learning instruments (Pintrich et al., 1991; Zimmerman & Martinez-Pons, 1986). Six categories of learning strategies were identified for the Nursing Practice courses—workbook, reading, elaboration, clinical skills practice, metacognitive self-regulation and help-seeking. Elaboration (making notes), reading textbooks and notes, metacognitive self-regulation (self-testing) and help-seeking were strategies common to both the Science and Nursing Practice courses. Strategies specific to Science included organisation, rehearsal, peer learning, the study environment and the reading of specific materials, for example diagrams. The use of these strategies may reflect the heavy theoretical nature of the Science courses. The course-specific learning strategies for Nursing Practice included participation in extra clinical practice, the completion of the course workbook and making links between science knowledge, clinical and the course (elaboration). It is possible that extra clinical skills practice and the workbook may require additional strategies from categories such as rehearsal.

Whilst students described doing extra clinical practice and completing the workbook as methods of studying for their Nursing Practice course, they had difficulty conceptualising them as study strategies. This may be because this is the first time they have had to study a course that had a theoretical and practical component. Radloff and de la Harper (1999) recommend that lecturers spend time finding out about students' conceptions of study, and it would appear that this would help students in Nursing Practice, particularly as those who failed to come to terms with the dual nature of this course tended to be less successful in the course.

In congruence with previous studies students who were High Achievers in this study described using a variety of learning strategies (Ablard & Lipschultz, 1998; Purdie & Hattie, 1996; Risemberg & Zimmerman, 1992; Zimmerman & Martinez-Pons, 1990). Low Achiever students therefore need to be taught a wider range of strategies if they are to improve academically. One strategy that these students particularly need to develop, is the monitoring of their reading and study generally, as it helps them to identify any faulty areas in their learning (Zimmerman & Paulsen, 1995).

In the second semester students who were Low Achievers in their Nursing Practice courses were not likely to report changing their study strategies, and were most likely to use the workbook to study for their Nursing Practice course. The students who were persistently High Achiever students in Nursing Practice course made adjustments to their study in the second semester particularly in response to the clinical skills examination in this semester. They recognised that the Nursing Practice course had practical and theoretical aspects and managed to address both in their study. As for the Science course, the High Achiever student used metacognitive self-regulatory strategies.

Just as they did in the first semester, Low Achiever students describe using less strategies when studying for their Science course. Reading the textbook was the strategy most frequently used by Low Achiever students who continued to use this strategy without monitoring their reading. Low Achiever students also continue to leave their study until the last minute. Some students reported making some changes to their strategies and this was reflected in their academic performance and hence change from the Low Achiever to the High Achiever category. They also reported increasing the number of strategies they employed and to have introduced, or increased, metacognitive self-regulatory strategies, particularly monitoring of their reading and self-testing into their study practices. Persistent High Achiever students were consistent in their study strategy usage, particularly metacognitive self-regulatory ones, and seem to recognise the success of their academic approach to studying science.

These results are in accordance with results from previous research where some students are able to adjust their strategies in response to course requirements but others continue with the same set of strategies (Cantwell & Moore, 1996) and this may be irrespective of students' limited academic performance (Hofer et al., 1998), and despite being introduced to a variety of alternative methods of study (Barnett, 1996; Lan, 1998).

To assist students to be academically successful in their Science and Nursing Practice courses they need to be taught to employ a wide range of general learning strategies, in particular self-monitoring and those specific to the course they are studying. Students may need to be convinced of the need to increase or change the strategies they use when studying for their Bachelor of Nursing courses (Hofer et al., 1998).

10.6 The Interrelationships Among Nursing Students' Entry Characteristics, Self-Regulated Learning (Motivation and Cognition) and Academic Performance in their Science and Nursing Practice Courses for their First Year Bachelor of Nursing Programs (Aim 1)

The interrelationships among nursing students' entry characteristics, self-regulated learning and academic performance in their Science and Nursing Practice courses for their first year Bachelor of Nursing programs was the first and main aim of this thesis. An adapted version of the Pintrich and Schrauben (1992) model was used to guide the examination. Structural equation modeling was used to assess and develop the models and these results were given in Chapter 9. In this section the significance of these results are discussed with reference to the literature.

Self-regulation may be context- (Hadwin, Winne, Stockley, Nesbit & Woszczyna, 2001) or discipline-specific (Donald, 1994) and whilst the interrelations among components of self-regulation may also vary (Bong, 2001) in different contexts or disciplines researchers have found that there may be more similarities than differences in these interrelations (Bong, 2001; Wolters & Pintrich, 1998). This was the situation for this study as whilst the self-efficacy measures varied between some of the models there was a great deal of similarity in the interrelations among students' entry characteristics, cognition, motivation and academic performance.

In all of the models, whilst the entry characteristics included in a model may have varied, they had direct influence on academic performance. In all of the models cognition had a direct influence on students' motivation and motivation then had direct links to academic performance. The indirect link between cognition and academic performance was not expected. Wolters and Pintrich (1998), for example, found that strategy use (cognition) predicted students' academic performance with self-efficacy (motivation) influencing strategy use and this pattern was consistent for three different high school subject areas. Zhang and RiCharde (1999) also found that self-efficacy was not directly influential on students' academic performance. Several studies, on the other hand, have reported finding self-efficacy influencing students' use of self-regulated learning strategies and of being predictive of students' academic performance (Chemers, Hu & Garcia, 2001; Tuckman & Dennis, 1998).

The qualitative results for this study with respect to the relationship between students' learning strategies and academic performance could be construed as not triangulating with the quantitative results. It should be noted that the MCSR and CT (components of cognition) were correlated with students' academic performance but when all the instruments were examined simultaneously in the SEM analyses, cognition had an indirect influence on academic performance and this was through motivation which was a mediator for cognition's influence on academic performance. The result may indicate that cognitive scales specific to nursing programs need to be developed and if they were available the results may vary from those for this study.

In all of the models in this study, task value had the strongest direct influence on students' academic performance. Previous research examining task value has varied, with some finding it not predictive (Wolters & Pintrich, 1998), whilst others have found it predictive of academic performance (Vanderstoep et al., 1996). Although self-efficacy was included in all the models, the instruments varied and only one—the SEFS—had a statistical significant path with academic performance. The models for the Science courses were better than those for the Nursing Practice courses in explaining students' academic performance with the first semester Science course explaining 19% and the second semester Science course explaining 26% of students' academic performance. Both the Nursing Practice models explained 17% of students' academic performance for these courses.

10.7 Conclusion

The adapted version of the Pintrich and Scrauben (1992) general social cognitive model of motivation and cognition used in this study provided a basis for examining the interrelations among first year Bachelor of Nursing students' entry characteristics, self-regulated learning (motivation and cognition) and academic performance for their Science and Nursing Practice courses. The inclusion of qualitative data provided a deeper understanding of these interrelationships than would have been obtained if only one means of data collection had been employed.

Students entering Bachelor of Nursing programs were found to have diverse entry characteristics that influence their motivation, cognition and academic performance in their Science and Nursing Programs. To develop self-regulated learners, educational programs need to develop strategies that account for student diversity and assist all students to reach their full academic potential. In this study, students from a NESB were at an academic disadvantage in the first year of their Bachelor of Nursing program and specific educational programs need to be developed to increase their self-efficacy for academic learning and assist these students to reach their full academic potential.

Although first year nursing students have limited clinical experience, they nevertheless make judgements about the relevance of the material they are learning to clinical nursing practice. In this study, task value/relevance had a major influence on students' academic performance not only in their Science courses, which was expected, but also in their Nursing Practice courses. Educational material taught in Bachelor of Nursing programs must be taught in an applied manner, that is, the material must clearly draw links between the material being taught and clinical nursing practice. This raises the issue of whether academics without nursing experience can teach material in Bachelor of Nursing programs in an applied manner and warrants further research.

The low self-efficacy science beliefs that students have with their Science courses have their antecedents in students' science school experiences. It may not be possible or feasible for Bachelor of Nursing programs to attract students with a strong academic background in science and positive high school science experiences. Science courses therefore need to develop specific educational strategies to change students' opinions and experiences about science and increase students' self-efficacy beliefs about science.

The first year of a Bachelor of Nursing program is the foundation year in which students are introduced to tertiary education and the requirements of their chosen career. As it may be difficult to change students' habits once they are established it is essential that students are introduced to self-regulatory learning behaviours early. Some students may already be self-regulated learners but others will need educational assistance to achieve this goal. This study found that there were general and course-specific strategies and it is imperative that educational programs designed to assist students to become self-regulated learners address both types of strategies if they are to be successful.

Technological and informational systems are evolving at truly amazing speeds, and having such a significant impact on nursing that the acquisition of lifelong learning skills is imperative if an individual is to deliver effective nursing care. Educational institutions need to play a part in this process, by preparing nurses who are capable of self-regulating their learning not only during their Bachelor of Nursing programs, but also during their nursing career.

10.8 Recommendations

1 Due to the diversity of students entering some academic disciplines, more studies examining students' entry characteristics and their relationship to self-regulated learning are required both in nursing and in educational psychology.

2 Educational strategies need to be developed to assist NESB students to reach their full academic potential in Bachelor of Nursing programs. Additional research is required to determine the specific needs of NESB students in Bachelor of Nursing programs.

3 More research is required to investigate and understand why NESB and younger students (17-19 years) are reluctant to seek help from academics for academic related difficulties.

4 Although this study used qualitative and quantitative methods more studies using triangulation are required to increase our understanding of the components of self-regulation.

5 Aspects of self-regulation were course-specific in this study and self-regulatory research must not assume that generalisations can be made from one course or discipline to another without the need for further research.

6 Material taught in Bachelor of Nursing programs must be taught in an applied manner so that students can clearly see the relevance of the material to nursing practice. First year students do not have sufficient clinical experience to make those links themselves. New or additional educational materials may need to be developed. Further research is required on the preparation and experiences academics need to teach in Bachelor of Nursing programs.

7 Students, particularly Low Achievers need to be taught a range of learning strategies that are specific to the courses that they are enrolled in and be encouraged to employ those strategies.

8 More longitudinal studies are required to determine the changes that occur in students' self-regulation as they progress through an educational program.

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APPENDIX 1

Consent:

Ethics

Research Instruments

Academic Interviews

University of Wollongong

Office of Research

University of Wollongong
NSW 2522 Australia

Tel (042) 21 3386
Fax (042) 21 4338
International +61+42

AMENDMENTS APPROVED
In reply please quote: SD:KM HE98/028
Further Information: Karen McRae (42214457)

26 March 1998

Ms Sharon Andrew
Graduate School of Education
University of Wollongong

Dear Ms Andrew,

I am pleased to advise that amendments to the following Human Research Ethics application have been approved. **Please provide copies of the universities approval to the Secretary of the Ethics Committee when they are received.**

Ethics Number:	HE98/028
Project Title:	First Year Students' Self-Efficacy, Self-Regulated Learning and Academic Performance in Science and Nursing
Name of Researchers:	Sharon Andrew
Approval Date:	26 March 1998
Duration of Clearance:	27 March 1999

This certificate relates to amendments to the research protocol submitted in your letter of 26 March 1998. It will be necessary to inform the Committee of any changes to the research protocol and seek clearance in such an event.

Please note that experiments of long duration must be reviewed annually by the Committee and it will be necessary for you to apply for renewal of this application if experimentation is to continue beyond one year.

Karen McRae
Secretary
Human Research Ethics Committee

cc: Dr Wilma Vialle, Supervisor

[redacted]

30 Oct. 1997

Dear Sharon,

I am very pleased to give you permission to use the self-efficacy measures in your research.

I wish you well in your project.

Yours sincerely

[redacted]

Dr Paul R. Pintrich
Associate Professor
School of Education
University of Michigan

Dear Dr Pintrich,
I am a Doctoral student and I am examining nursing students' self-regulatory learning practices for some of the courses they study at university. I am seeking your permission to use the MSLQ in my research. I have a copy of the MSLQ (1991), which was obtained through the ERIC database (ED 338 122) and this is the version I plan to use.
Thankyou for considering my request.

Sharon Andrew
PhD candidate
Graduate School of Education,
University of Wollongong
NSW 2522 Australia
Email: sja05@uow.edu.au

Message 13/17 Paul Robert Pintrich   Mar 30, 98 09:28:21 am -0500
Re: MSLQ permission

Precedence: first-class
X-Sender: pintrich@galaga.rs.itd.umich.edu

that is fine, good luck with it, paul.

****
Paul R. Pintrich, Ph.D.
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CONSENT FORM-Academic Staff

First Year Students' Self-Efficacy, Self-Regulated Learning and Academic Performance in Science and Nursing

Sharon Andrew
PhD student, MSc(Hons), BAppSc, RN, CM

This research project is being conducted as part of my PhD and my supervisors are Dr W. Vialle Senior Lecturer, and Prof J Hedberg Associate Dean & Head, of the Graduate School of Education, University of Wollongong.

You are being asked to participate in an interview about your academic observations and expectations for your students and the teaching and assessment methods you use. All the data will be kept strictly confidential and anonymous and you have the right to withdraw your consent for the research at any time without penalty.

If you have any enquires regarding the conduct of this research please contact the Secretary of the University of Wollongong Human Research Ethics Committee on (02) 42214457.

I understand that the interview will be taped for data collection only, and that this data will be used for research purposes. I hereby give consent for the data to be collected and used in this manner.

If you consent to participating in the research please sign below:

..../....../.......
(Signature) (Date)

APPENDIX 2

Semester One Questionnaire

FIRST YEAR NURSING STUDENTS' SURVEY
Semester One 1998

Purpose

This survey will help identify factors that influence results in the first year of an undergraduate nursing program Your information can help nursing students by determining which factors are important. This will assist in developing ways to improve university nursing courses.

Confidentiality

All information provided will be kept strictly confidential and anonymous. The survey has been reviewed by the University Of Wollongong Human Research Ethics Committee. If you have any enquiries regarding the conduct of this research, please contact the Secretary of the University of Wollongong, Human Research Ethics Committee on (02) 42214457. While your contribution will be extremely valuable, participation in the survey is voluntary. Thank you for your opinions and time taken to complete this questionnaire.

What You Need To Do

Everyone's opinion is useful whether it is positive, negative or neutral. Please read each question carefully.
Select your answer from the categories provided to give the answer that best fits you.
Please tick or number the relevant box or boxes, preferably using a black or blue pen.

Sharon Andrew RN, CM, MSc(Hons)
PhD student (PH: 02-42214178),
Dr W Vialle Senior Lecturer
Assoc/Prof J Hedberg Associate Dean, Head
PhD Supervisors,
Graduate School of Education
University of Wollongong

Below are descriptions of some science tasks. Please indicate on the scale the confidence you have in your ability to successfully perform each of these tasks by ticking the appropriate box.

1 Dissolve sugar in a drink by changing the drink's temperature.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

2 Read a cake recipe and decide what the raising agents are.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

3 Work out if a 120 V electric razor (bought in the U.S.A.) would work if plugged into your electrical powerpoint.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

4 Determine why the rake you left out in the rain has gone rusty.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

5 Calculate whether the 4 kW electrical circuit in your kitchen will enable you to run a 2.4 kW space heater, 600 W toaster and a 1200 W kettle.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

6 Make a paper dart and choose a shape that will make it fly faster.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

7 Decide whether a still or windy day is better for drying your clothes.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

8 Convert John's dietary intake of 2500 cal to kJ given that 1 calorie=4.185 kJ.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

9 Decide whether oiling your bicycle will make it go slower or faster.

Not confident — Very confident

☐ ☐ ☐ ☐ ☐

10 Calculate how much water you will need to make a 600ml 1:20 solution of disinfectant for your toilet.

Not confident — Very confident

☐ ☐ ☐ ☐ ☐

11 Work out if a white spot on your overalls, caused by splashing it with bleach, can be removed by machine washing.

Not confident — Very confident

☐ ☐ ☐ ☐ ☐

12 Give examples of an electrical conductor and insulator.

Not confident — Very confident

☐ ☐ ☐ ☐ ☐

13 Figure why the aircraft moving away from you has a lower frequency compared with its frequency when overhead.

Not confident — Very confident

☐ ☐ ☐ ☐ ☐

14 Decide whether covering a water filled saucepan with a lid will increase or decrease the time it will to boil.

Not confident — Very confident

☐ ☐ ☐ ☐ ☐

15 Suck some water up in a straw and work out how to keep it in the straw.

Not confident — Very confident

☐ ☐ ☐ ☐ ☐

16 Calculate the changes in the thoracic cavity if the pressure in the lung changes from +1 mmHg to -8 mmHg with respect to normal atmospheric pressure of 760 mmHg.

Not confident — Very confident

☐ ☐ ☐ ☐ ☐

17 Convert a pressure reading of 120 mmHg into kPa given that 660 mmHg=87.9 kPa.

Not confident — Very confident

☐ ☐ ☐ ☐ ☐

18 Estimate the cost of running a 800 W radiator for 6 hours at a charge of 14 cents/kW.

Not confident — Very confident

❑ ❑ ❑ ❑ ❑

19 Choose whether it would be sensible to wear smooth soled or ripple soled shoes to a wet football oval.

Not confident — Very confident

❑ ❑ ❑ ❑ ❑

20 Understand why water droplets are running down the inside of a misty window pane on a cold day.

Not confident — Very confident

❑ ❑ ❑ ❑ ❑

21 Decipher a can labelled "contains baked beans, sucrose, and sodium chloride" to see if it contains salt and sugar.

Not confident — Very confident

❑ ❑ ❑ ❑ ❑

Below are descriptions of nursing skills that you may acquire during your nursing program. On the scale below indicate how confident you are that you could learn the skills listed.

	Very Unsure 1	2	3	4	5	6	7	Very Sure 8	9	10
22 Take a record of a client's ECG (record of the heart beats).	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
23 Assist the anaesthetist in inducing and maintaining an anaesthetic.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
24 Organise the equipment for, and maintain an intravenous drip (monitor flow rate, infusion regulator, change containers as necessary).	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑

	Very Unsure 1	2	3	4	5	6	7	8	9	Very Sure 10
25 Catherise a female patient (remove urine via tube).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
26 Give a baby or child an injection.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
27 Nurse a client in isolation (barrier nurse).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
28 Give a client drugs by injection as ordered.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
29 Teach a child how to self-inject insulin.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
30 Assist at an operation (hand instruments to a surgeon).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
31 Give prescribed drugs at the correct time and supervise the drug trolley during this routine.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
32 Collect a wound specimen from a client.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
33 Give a client an enema or suppositories (make their bowels move or pass their motion).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
34 Remove a client's stitches.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
35 Clean and instill medication in a client's eyes, ears or nose.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
36 Establish and maintain continuous catheter/urodome drainage.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
37 Attend to a body after death.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

	Very Unsure 1	2	3	4	5	6	7	8	9	Very Sure 10
38 Reassure or comfort a distressed client and help them to cope.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
39 Cope with working with new staff and in new environments following ward changes.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
40 Advise a doctor about his/her client's conditions or contact a doctor in an emergency.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
41 Ask for clarification of instructions or for help with any procedures not understood.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
42 Explain to the client about treatment to be given (dress wound, take out stitches, give injection).	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
43 Form a positive working relationship with the charge nurse and other nursing staff.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
44 Form an interpersonal relationship that assists clients to ask for my help (i.e. get on so well with clients that they are able to seek my help without embarrassment).	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
45 Discuss problems with a client and help in finding solutions, keeping their disclosures in confidence.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑

Below are some educational requirements . Please indicate on the scale below how confident you are in learning each of the listed educational requirements.

	Very Unsure 1	2	3	4	5	6	7	Very Sure 8	9	10
46 Nursing management skills related to client care.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
47 Individual differences in people's abilities.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
48 How people communicate and apply this knowledge to my interaction with others.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
49 Administrative skills related to ward management.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
50 The different theoretical explanations of health, illness and abnormal behaviour.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
51 Pathophysiology and apply this knowledge to infections, trauma, tumours and allergies.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
52 Nutrition needs in health and illness.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
53 Obstetrics (maternity and baby) and gynaecological (female reproductive) health care.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
54 The principles of physics as they apply to radiology, radioactivity and nuclear medicine.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
55 Sufficient chemistry to understand the mechanisms of breathing, micturition (urination), reproduction and pharmacology.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑

	Very Unsure 1	2	3	4	5	6	7	8	9	Very Sure 10
56 Sufficient physics to understand mechanics, basic electricity and electrical safety.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
57 Sufficient physics to understand equipment management, unit measurement, body mechanisms and pressure processes.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
58 Aspects of chemistry such as atomic structure, chemical bonding, acids and bases and biological molecules.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
59 The legal and ethical aspects of professional nursing.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
60 How emotional and social needs are modified during illness.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
61 The emotional and social needs of clients and their families.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
62 Roles people occupy and their attitudes.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
63 Sufficient microbiology to understand the body's immune system.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
64 The neural (nervous) control system.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
65 Sufficient microbiology to understand infection control.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

	Very Unsure 1	2	3	4	5	6	7	8	9	Very Sure 10
66 Sufficient pathophysiology to understand the effects of disease on cells, tissues, organs and systems of the body.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
67 The body's endocrine (glandular) control system.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑

The following questions ask about your motivation and attitudes for your first semester courses Nursing Practice and Science . Indicate on the scale how well each of these statements best describes you in relation to these courses.
(If you are not enrolled in Nursing Practice answer for the science course only)

Statement		Not at all true of me 1	2	3	4	5	6	Very true of me 7
68 I think I will be able to use what I learn in this course in other courses.	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
69 I believe I will receive an excellent grade in this course.	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
70 I'm certain I can understand the most difficult material presented in the readings for this course.	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
71 It is important for me to learn the course material in this course.	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
72 I'm confident I can learn the basic concepts covered in this course.	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑

Statement		Not at all true of me 1	2	3	4	5	6	Very true of me 7
73 I'm confident I can understand the most complex material presented by the lecturers in this course.	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
74 I am very interested in the content area of this course.		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
75 I'm confident I can do an excellent job on the assignments and tests in this course.		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
76 I expect to do well in this course.		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
77 I think the course material in this course is useful for me to learn.		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
78 I like the subject matter of this course.		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
79 Understanding the subject matter of this course is very important to me.		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
80 I'm certain I can master the skills being taught in this course.		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑

Statement	Not at all true of me 1	2	3	4	5	6	Very true of me 7
81 Considering the difficulty of this course, the lecturer and my skills, I think I will do well in this course.							
Nursing	❑	❑	❑	❑	❑	❑	❑
Science	❑	❑	❑	❑	❑	❑	❑

The following questions are about your learning strategies and study skills for the Nursing Practice and Science courses. Indicate on the scale how well each of these statements best describes you in relation to these courses.
(If you are not enrolled in Nursing Practice answer for the science course only)

Statement	Not at all true of me 1	2	3	4	5	6	Very true of me 7
82 During class time I often miss important things because I'm thinking of other things.							
Nursing	❑	❑	❑	❑	❑	❑	❑
Science	❑	❑	❑	❑	❑	❑	❑
83 When reading for this course, I make up questions to help focus my reading.	1	2	3	4	5	6	7
Nursing	❑	❑	❑	❑	❑	❑	❑
Science	❑	❑	❑	❑	❑	❑	❑
84 I often find myself questioning things I hear or read in this course to decide if I find them convincing.	1	2	3	4	5	6	7
Nursing	❑	❑	❑	❑	❑	❑	❑
Science	❑	❑	❑	❑	❑	❑	❑
85 When I become confused about something I'm reading for this course, I go back and try to figure it out.	1	2	3	4	5	6	7
Nursing	❑	❑	❑	❑	❑	❑	❑
Science	❑	❑	❑	❑	❑	❑	❑
86 If course readings are difficult to understand, I change the way I read the material.	1	2	3	4	5	6	7
Nursing	❑	❑	❑	❑	❑	❑	❑
Science	❑	❑	❑	❑	❑	❑	❑

Statement		Not at all true of me 1	2	3	4	5	6	Very true of me 7
87 When a theory, interpretation, or conclusion is presented in class or in the readings, I try to decide if there is good supporting evidence.	Nursing	☐	☐	☐	☐	☐	☐	☐
	Science	☐	☐	☐	☐	☐	☐	☐
88 I treat the course material as a starting point and try to develop my own ideas about it.		1	2	3	4	5	6	7
	Nursing	☐	☐	☐	☐	☐	☐	☐
	Science	☐	☐	☐	☐	☐	☐	☐
89 Before I study new course material thoroughly, I often skim it to see how it is organized.		1	2	3	4	5	6	7
	Nursing	☐	☐	☐	☐	☐	☐	☐
	Science	☐	☐	☐	☐	☐	☐	☐
90 I ask myself questions to make sure I understand the material I have been studying in this course.		1	2	3	4	5	6	7
	Nursing	☐	☐	☐	☐	☐	☐	☐
	Science	☐	☐	☐	☐	☐	☐	☐
91 I try to change the way I study in order to fit the course requirements and the lecturer's teaching style.		1	2	3	4	5	6	7
	Nursing	☐	☐	☐	☐	☐	☐	☐
	Science	☐	☐	☐	☐	☐	☐	☐
92 I often find that I have been reading for this course but I don't know what it was all about.		1	2	3	4	5	6	7
	Nursing	☐	☐	☐	☐	☐	☐	☐
	Science	☐	☐	☐	☐	☐	☐	☐
93 I try to think through a topic and decide what I am supposed to learn from it rather than just reading it over when studying for this course.		1	2	3	4	5	6	7
	Nursing	☐	☐	☐	☐	☐	☐	☐
	Science	☐	☐	☐	☐	☐	☐	☐

Statement		Not at all true of me 1	2	3	4	5	6	Very true of me 7
94 I try to play around with ideas of my own related to what I am learning in this course.	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
95 Whenever I read or hear an assertion or conclusion in this course, I think about possible alternatives.		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
96 When studying for this course I try to determine which concepts I don't understand well.		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
97 When I study for this course, I set goals for myself in order to direct my activities in each study period.		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
98 If I get confused taking notes in class, I make sure I sort it out afterwards.		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑

I would like to know some information about your choice of nursing as a field of study and any previous nursing experience.

99 **Was this program your first preference?**

1 ❑ Yes
2 ❑ No

100 **Have you ever worked in a nursing or nursing-related capacity?**

1 ❑ No
2 ❑ Yes______________________________(Please Specify)

To assist in the analysis of the survey, I would like some basic information about yourself.

101 What is your gender?

1 ❑ Male
2 ❑ Female

102 Age (at 1st March, 1998): ❑❑ years

103 Type of Student: 1 ❑ Full Time 2 ❑ Part Time

104 How did you gain entry into University? *(Tick one)*

1 ❑ HSC/TER (or equivalent) *(Now go to 105)*
2 ❑ TAFE qualifications *(Now go to 107)*
3 ❑ Mature Age Entry *(Now go to 107)*
4 ❑ Other (Please Specify) __________ *(Now go to 107)*

105 In what range was your TER score?

1 ❑ 0-35
2 ❑ 36-45
3 ❑ 46-55
4 ❑ 56-65
5 ❑ 66-75
6 ❑ 76-85
7 ❑ 86-100

106 Which of the following subjects did you study for your HSC/TER?

Subjects

English 1❑ Biology 2❑

1 unit Mathematics 3❑ 2 unit Mathematics 4❑

3 unit Mathematics 5❑ Other Mathematics-based subject__________
6 *(please specify)*

Chemistry 7❑ Other Chemistry-based subject__________
8 *(please specify)*

Any Physics 9❑ Other Chemistry-based subject__________
10 *(please specify)*

Any other science-based subject not covered above __________
11 *(please specify)*

107 What is your mother's and father's occupation?

Father's occupation (please specify) ____________________

*Mother's occupation (please specify)*____________________

108 What are your Father's and Mother's highest level of education? *(Tick one for each parent)*

	Father	*Mother*
Degree	1❑	1❑
Trade qualification/Certificate/Diploma	2❑	2❑
Completed highest level of secondary school available	3❑	3❑
Did not complete highest level of secondary school available	4❑	4❑

109 Where were you born?

1 ❑ Australia/New Zealand/U.K.
2 ❑ Other

110 What is the usual language spoken at your home?

1 ❑ English
2 ❑ Other

111 What is the birthplace of your parents? *(Tick one for each parent)*

	Mother	*Father*
Australia/NZ/UK	1❑	1❑
Other	2❑	2❑

112a *To analyse the factors influencing university results, information about your grades are needed. This information will be stored separately from your questionnaire which will be coded for confidentiality and anonymity and used only in statistical analysis. I need your signature so that I can obtain your grades/mark for your first year subjects.*

I agree to participate in this survey, including the collection of my grades and/or mark for all my first year subjects.
Student No.________________________ Student Signature.________________
Date _________________

112b To increase my understanding of some of the issues covered in this questionnaire I would like to briefly discuss them with some students. If you are interested in participating please give your telephone number.
________________________ Telephone Number

You have the right to withdraw your consent for this survey at any time. Enquires about the conduct of the research can be made to the Secretary of the University of Wollongong Human Research Ethics Committee on (02) 42214457.

APPENDIX 3

Semester Two Questionnaire

FIRST YEAR NURSING STUDENTS' SURVEY
Semester Two 1998

Purpose

This survey will help identify factors that influence results in the first year of an undergraduate nursing program. Your information can help nursing students by determining which factors are important. This will assist in developing ways to improve university nursing courses.

Confidentiality

All information provided will be kept strictly confidential and anonymous. The survey has been reviewed by the University Of Wollongong Human Research Ethics Committee. If you have any enquiries regarding the conduct of this research, please contact the Secretary of the University of Wollongong, Human Research Ethics Committee on (02) 42214457. While your contribution will be extremely valuable, participation in the survey is voluntary. Thank you for your opinions and time taken to complete this questionnaire.

What You Need To Do

Everyone's opinion is useful whether it is positive, negative or neutral. Please read each question carefully.
Select your answer from the categories provided to give the answer that best fits you.
If you filled out this questionnaire last semester, select the categories that apply to you now. Your answer may be similar or different to last semester. It is not a test to see what you remember, but what your opinion is now.
Please tick or number the relevant box or boxes, preferably using a black or blue pen.

Sharon Andrew RN, CM, MSc(Hons)
PhD student (PH: 02-42214178),
Dr W. Vialle Senior Lecturer
Prof J. Hedberg Associate Dean, Head
PhD Supervisors,
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Below are descriptions of some science tasks. Please indicate on the scale the confidence you have in your ability to successfully perform each of these tasks by ticking the appropriate box.

1 Dissolve sugar in a drink by changing the drink's temperature.

Not confident ❑ ❑ ❑ ❑ ❑ Very confident

2 Read a cake recipe and decide what the raising agents are.

Not confident ❑ ❑ ❑ ❑ ❑ Very confident

3 Work out if a 120 V electric razor (bought in the U.S.A.) would work if plugged into your electrical powerpoint.

Not confident ❑ ❑ ❑ ❑ ❑ Very confident

4 Determine why the rake you left out in the rain has gone rusty.

Not confident ❑ ❑ ❑ ❑ ❑ Very confident

5 Calculate whether the 4 kW electrical circuit in your kitchen will enable you to run a 2.4 kW space heater, 600 W toaster and a 1200 W kettle.

Not confident ❑ ❑ ❑ ❑ ❑ Very confident

6 Make a paper dart and choose a shape that will make it fly faster.

Not confident ❑ ❑ ❑ ❑ ❑ Very confident

7 Decide whether a still or windy day is better for drying your clothes.

Not confident ❑ ❑ ❑ ❑ ❑ Very confident

8 Convert John's dietary intake of 2500 cal to kJ given that 1 calorie=4.185 kJ.

Not confident ❑ ❑ ❑ ❑ ❑ Very confident

9 Decide whether oiling your bicycle will make it go slower or faster.

Not confident Very confident

❏ ❏ ❏ ❏ ❏

10 Calculate how much water you will need to make a 600ml 1:20 solution of disinfectant for your toilet.

Not confident Very confident

❏ ❏ ❏ ❏ ❏

11 Work out if a white spot on your overalls, caused by splashing it with bleach, can be removed by machine washing.

Not confident Very confident

❏ ❏ ❏ ❏ ❏

12 Give examples of an electrical conductor and insulator.

Not confident Very confident

❏ ❏ ❏ ❏ ❏

13 Figure why the aircraft moving away from you has a lower frequency compared with its frequency when overhead.

Not confident Very confident

❏ ❏ ❏ ❏ ❏

14 Decide whether covering a water filled saucepan with a lid will increase or decrease the time it will to boil.

Not confident Very confident

❏ ❏ ❏ ❏ ❏

15 Suck some water up in a straw and work out how to keep it in the straw.

Not confident Very confident

❏ ❏ ❏ ❏ ❏

16 Calculate the changes in the thoracic cavity if the pressure in the lung changes from +1 mmHg to -8 mmHg with respect to normal atmospheric pressure of 760 mmHg.

Not confident Very confident

❏ ❏ ❏ ❏ ❏

17 Convert a pressure reading of 120 mmHg into kPa given that 660 mmHg=87.9 kPa.

Not confident			Very confident	
❑	❑	❑	❑	❑

18 Estimate the cost of running a 800 W radiator for 6 hours at a charge of 14 cents/kW.

Not confident			Very confident	
❑	❑	❑	❑	❑

19 Choose whether it would be sensible to wear smooth soled or ripple soled shoes to a wet football oval.

Not confident			Very confident	
❑	❑	❑	❑	❑

20 Understand why water droplets are running down the inside of a misty window pane on a cold day.

Not confident			Very confident	
❑	❑	❑	❑	❑

21 Decipher a can labelled "contains baked beans, sucrose, and sodium chloride" to see if it contains salt and sugar.

Not confident			Very confident	
❑	❑	❑	❑	❑

Below are descriptions of nursing skills that you may acquire during your nursing program. On the scale below indicate how confident you are that you could learn the skills listed.

	Very Unsure							Very Sure		
	1	2	3	4	5	6	7	8	9	10
22 Take a record of a client's ECG (record of the heart beats).	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
	1	2	3	4	5	6	7	8	9	10
23 Assist the anaesthetist in inducing and maintaining an anaesthetic.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑

	Very Unsure 1	2	3	4	5	6	7	Very Sure 8	9	10
24 Organise the equipment for, and maintain an intravenous drip (monitor flow rate, infusion regulator, change containers as necessary).	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
25 Catherise a female patient (remove urine via tube).	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
26 Give a baby or child an injection.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
27 Nurse a client in isolation (barrier nurse).	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
28 Give a client drugs by injection as ordered.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
29 Teach a child how to self-inject insulin.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
30 Assist at an operation (hand instruments to a surgeon).	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
31 Give prescribed drugs at the correct time and supervise the drug trolley during this routine.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
32 Collect a wound specimen from a client.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
33 Give a client an enema or suppositories (make their bowels move or pass their motion).	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
34 Remove a client's stitches.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑

	Very Unsure 1	2	3	4	5	6	7	Very Sure 8	9	10
35 Clean and instill medication in a client's eyes, ears or nose.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
36 Establish and maintain continuous catheter/urodome drainage.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
37 Attend to a body after death.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
38 Reassure or comfort a distressed client and help them to cope.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
39 Cope with working with new staff and in new environments following ward changes.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
40 Advise a doctor about his/her client's conditions or contact a doctor in an emergency.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
41 Ask for clarification of instructions or for help with any procedures not understood.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
42 Explain to the client about treatment to be given (dress wound, take out stitches, give injection).	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
43 Form a positive working relationship with the charge nurse and other nursing staff.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑

	Very Unsure 1	2	3	4	5	6	7	Very Sure 8	9	10
44 Form an interpersonal relationship that assists clients to ask for my help (i.e. get on so well with clients that they are able to seek my help without embarrassment).	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
45 Discuss problems with a client and help in finding solutions, keeping their disclosures in confidence.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑

Below are some educational requirements . Please indicate on the scale below how confident you are in learning each of the listed educational requirements.

	Very Unsure 1	2	3	4	5	6	7	Very Sure 8	9	10
46 Nursing management skills related to client care.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
47 Individual differences in people's abilities.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
48 How people communicate and apply this knowledge to my interaction with others.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
49 Administrative skills related to ward management.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
50 The different theoretical explanations of health, illness and abnormal behaviour.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
51 Pathophysiology and apply this knowledge to infections, trauma, tumours and allergies.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
52 Nutrition needs in health and illness.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑

	Very Unsure 1	2	3	4	5	6	7	Very Sure 8	9	10
53 Obstetrics (maternity and baby) and gynaecological (female reproductive) health care.	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
54 The principles of physics as they apply to radiology, radioactivity and nuclear medicine.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
55 Sufficient chemistry to understand the mechanisms of breathing, micturition (urination), reproduction and pharmacology.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
56 Sufficient physics to understand mechanics, basic electricity and electrical safety.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
57 Sufficient physics to understand equipment management, unit measurement, body mechanisms and pressure processes.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
58 Aspects of chemistry such as atomic structure, chemical bonding, acids and bases and biological molecules.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
59 The legal and ethical aspects of professional nursing.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑
60 How emotional and social needs are modified during illness.	1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑	10 ❑

	Very Unsure							Very Sure		
	1	2	3	4	5	6	7	8	9	10
61 The emotional and social needs of clients and their families.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
62 Roles people occupy and their attitudes.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
63 Sufficient microbiology, to understand the body's immune system.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
64 The neural (nervous) control system.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
65 Sufficient microbiology to understand infection control.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
66 Sufficient pathophysiology to understand the effects of disease on cells, tissues, organs and systems of the body.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
67 The body's endocrine (glandular) control system.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

The following questions ask about your motivation and attitudes for your second semester courses Nursing Practice and Science . Indicate on the scale how well each of these statements best describes you in relation to these courses.
(If you are not enrolled in Nursing Practice answer for the science course only)

Statement	Not at all true of me						Very true of me
	1	2	3	4	5	6	7
68 I think I will be able to use what I learn in this course in other courses.							
Nursing	☐	☐	☐	☐	☐	☐	☐
Science	☐	☐	☐	☐	☐	☐	☐
69 I believe I will receive an excellent grade in this course.	1	2	3	4	5	6	7
Nursing	☐	☐	☐	☐	☐	☐	☐
Science	☐	☐	☐	☐	☐	☐	☐

Statement	Not at all true of me 1	2	3	4	5	6	Very true of me 7
70 I'm certain I can understand the most difficult material presented in the readings for this course.							
Nursing	❑	❑	❑	❑	❑	❑	❑
Science	❑	❑	❑	❑	❑	❑	❑
71 It is important for me to learn the course material in this course.	1	2	3	4	5	6	7
Nursing	❑	❑	❑	❑	❑	❑	❑
Science	❑	❑	❑	❑	❑	❑	❑
72 I'm confident I can learn the basic concepts covered in this course.	1	2	3	4	5	6	7
Nursing	❑	❑	❑	❑	❑	❑	❑
Science	❑	❑	❑	❑	❑	❑	❑
73 I'm confident I can understand the most complex material presented by the lecturers in this course.	1	2	3	4	5	6	7
Nursing	❑	❑	❑	❑	❑	❑	❑
Science	❑	❑	❑	❑	❑	❑	❑
74 I am very interested in the content area of this course.	1	2	3	4	5	6	7
Nursing	❑	❑	❑	❑	❑	❑	❑
Science	❑	❑	❑	❑	❑	❑	❑
75 I'm confident I can do an excellent job on the assignments and tests in this course.	1	2	3	4	5	6	7
Nursing	❑	❑	❑	❑	❑	❑	❑
Science	❑	❑	❑	❑	❑	❑	❑
76 I expect to do well in this course.	1	2	3	4	5	6	7
Nursing	❑	❑	❑	❑	❑	❑	❑
Science	❑	❑	❑	❑	❑	❑	❑

Statement		Not at all true of me 1	2	3	4	5	6	Very true of me 7
77 **I think the course material in this course is useful for me to learn.**	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
78 **I like the subject matter of this course.**		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
79 **Understanding the subject matter of this course is very important to me.**		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
80 **I'm certain I can master the skills being taught in this course.**		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
81 **Considering the difficulty of this course, the lecturer and my skills, I think I will do well in this course.**		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑

The following questions are about your learning strategies and study skills for your second semester courses the Nursing Practice and Science courses. Indicate on the scale how well each of these statements best describes you in relation to these courses.
(If you are not enrolled in Nursing Practice answer for the science course only)

Statement		1 Not at all true of me	2	3	4	5	6	7 Very true of me
82 **During class time I often miss important things because I'm thinking of other things.**	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
83 **When reading for this course, I make up questions to help focus my reading.**	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
84 **I often find myself questioning things I hear or read in this course to decide if I find them convincing.**	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
85 **When I become confused about something I'm reading for this course, I go back and try to figure it out.**	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
86 **If course readings are difficult to understand, I change the way I read the material.**	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
87 **When a theory, interpretation, or conclusion is presented in class or in the readings, I try to decide if there is good supporting evidence.**	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑

Statement		Not at all true of me 1	2	3	4	5	6	Very true of me 7
88 I treat the course material as a starting point and try to develop my own ideas about it.	Nursing	☐	☐	☐	☐	☐	☐	☐
	Science	☐	☐	☐	☐	☐	☐	☐
89 Before I study new course material thoroughly, I often skim it to see how it is organized.		1	2	3	4	5	6	7
	Nursing	☐	☐	☐	☐	☐	☐	☐
	Science	☐	☐	☐	☐	☐	☐	☐
90 I ask myself questions to make sure I understand the material I have been studying in this course.		1	2	3	4	5	6	7
	Nursing	☐	☐	☐	☐	☐	☐	☐
	Science	☐	☐	☐	☐	☐	☐	☐
91 I try to change the way I study in order to fit the course requirements and the lecturer's teaching style.		1	2	3	4	5	6	7
	Nursing	☐	☐	☐	☐	☐	☐	☐
	Science	☐	☐	☐	☐	☐	☐	☐
92 I often find that I have been reading for this course but I don't know what it was all about.		1	2	3	4	5	6	7
	Nursing	☐	☐	☐	☐	☐	☐	☐
	Science	☐	☐	☐	☐	☐	☐	☐
93 I try to think through a topic and decide what I am supposed to learn from it rather than just reading it over when studying for this course.		1	2	3	4	5	6	7
	Nursing	☐	☐	☐	☐	☐	☐	☐
	Science	☐	☐	☐	☐	☐	☐	☐

Statement		Not at all true of me 1	2	3	4	5	6	Very true of me 7
94 I try to play around with ideas of my own related to what I am learning in this course.	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
95 Whenever I read or hear an assertion or conclusion in this course, I think about possible alternatives.		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
96 When studying for this course I try to determine which concepts I don't understand well.		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
97 When I study for this course, I set goals for myself in order to direct my activities in each study period.		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑
98 If I get confused taking notes in class, I make sure I sort it out afterwards.		1	2	3	4	5	6	7
	Nursing	❑	❑	❑	❑	❑	❑	❑
	Science	❑	❑	❑	❑	❑	❑	❑

Personal or Family matters can influence academic performance

99 Have you had any of the following significant life changes over this year?

1❑ severe/prolonged personal illness
2❑ severe illness/bereavement of close family member
3❑ moved/or changed accomodation
4❑ relationship difficulties eg divorce, separation, break-up
5❑ severe financial difficulties
6❑ other______________________________
please specify

To assist in the analysis of the survey, I would like some basic information about yourself.

100 What is your gender?

1 ❑ Male
2 ❑ Female

101 Age (at 1st March, 1998): ❑❑ years

102 Type of Student: 1 ❑ Full Time 2 ❑ Part Time

103 Were you born in Australia?

1 ❑ Yes
2 ❑ No ______________________________
Please specify where you were born.

104 Did you fill out a first year nursing students' questionnaire in semester one?

1 ❑ Yes Please go to question 105
2 ❑ No Please go to question 106

105 *I would like to determine the changes that occur in students' learning during their first year. Can you please give your student number so I can compare first and second semester questionnaires to measure any changes that have occurred over the year. If you didn't give your student number last time please go to question 106.*

Student No.________________________

106 *To analyse the factors influencing university results, information about your grades are needed. This information will be stored separately from your questionnaire which will be coded for confidentiality and anonymity and used only in statistical analysis. I need your signature so that I can obtain your grades/mark for your first year subjects.*

I agree to participate in this survey, including the collection of my grades and/or mark for all my first year subjects.
Student No.________________________ Student Signature.________________
Date _________________

You have the right to withdraw your consent for this survey at any time. Enquires about the conduct of the research can be made to the Secretary of the University of Wollongong Human Research Ethics Committee on (02) 42214457.

APPENDIX 4

Telephone Interview Schedules

Telephone Interview Schedule First Semester

Introduction

I want to ask you some questions about your academic background, motivation and learning strategies. You indicated on your questionnaire that you may be willing to participate in a telephone interview. All the information you tell me will be kept strictly confidential. The survey has been reviewed by the University of Wollongong Human Research Ethics Committee and your participation is voluntary. You have the right to withdraw you consent for this survey at any time. Are you willing to participate in the interview?

Questions

1 Why did you choose nursing as a career?

2 Is the program what you expected?

Science Course

3 Did you study science at school?

4 Tell me about your Science course?

5 Do you think the science content is relevant to clinical practice?

6 How do you study for your Science course?

7 How do you expect to go (academically) in your Science course?

Nursing Practice

8 Tell me about your Nursing Practice course

9 Is the Nursing Practice course relevant to clinical practice?

10 How do you study for your Nursing Practice course?

11 Do you expect to go (academically) in your Nursing Practice course

Can I ring you next semester to ask you about your motivation and learning strategies?
yes no

Telephone Interview Schedule Second Semester

Introduction

I want to ask you some questions about your motivation and learning strategies. You indicated on your questionnaire that you may be willing to participate in a telephone interview. All the information you tell me will be kept strictly confidential. The survey has been reviewed by the University of Wollongong Human Research Ethics Committee and your participation is voluntary. You have the right to withdraw you consent for this survey at any time. Are you willing to participate in the interview?

Questions

1 Are you still enrolled at uni?

Science Course

2 How do you find your Science course this semester?

3 Is the Science course relevant to clinical practice?

4 How do you study for Science this semester?

5 Have you made any changes to way you study for Science this semester?

Nursing Practice

6 How do you find your Nursing Practice course this semester?

7 Is the Nursing Practice relevant to clinical practice?

8 Have you made any changes to the way you study for Nursing Practice this semester?