Different subject areas, different self-regulated learning strategies?

Sharon Andrew and Wilma Vialle

Faculty of Education, University of Wollongong, NSW Australia 2522

AARE-NZARE Conference 29 November-2 December 1999

Academic disciplines may have widely varying subjects that require students to employ general and subject-specific learning strategies to be academically successful in that discipline. It has been increasingly recognised that more research is required on the subject-specific nature of self-regulation.

The purpose of this study was threefold: to determine whether students report using different learning strategies to study for two subject areas of a nursing program; to examine these differences in relation to academic performance; and to explore the changes in students' strategy use, in the two subject areas, over the academic year. The study focused on first and second semester Science and Nursing Practice courses (subjects) of first year Bachelor of Nursing programs.

The study involved semi-structured telephone interviews of first year students, from three university campuses, which were conducted early in the first semester and late in the second semester of a first year nursing program. In both interviews, students were asked questions pertaining to the learning strategies they used when studying for their Science and Nursing Practice courses. Students were divided into High and Low Achiever categories based on their academic grades for these courses. Results for the study are presented in the paper, and may increase our understanding of students' self-regulatory behaviours for two subject areas of a tertiary program.

Introduction

To be academically successful in a university program a student may need to employ general learning strategies such as monitoring and to develop discipline and course-specific strategies. In the first year of a Bachelor of Nursing program, for example, in addition to discipline-specific strategies students may need to develop specific strategies for courses such as Science, Psychology and Nursing Practice. To assist students to be academically successful, educators may need an understanding of the general and specific strategies students need to acquire for the course they are teaching, if they are to assist students in the development of these strategies.

One way of identifying the strategies students need to develop for a course is by the examination of high achiever students, as they have been found to use more self-regulated strategies than low achievers (Risemberg & Zimmerman 1992; Archer 1998), and to use more general and course-specific strategies (Pressley et al 1987).

The next step is to determine the best way of teaching these strategies to students. This may be done through 'Learn to Learn Courses'. However 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 as part of a course (Zimmerman & Paulsen 1995).

Whilst the difficulties students have with the Science courses of nursing programs have been the source of a number of studies (Trnobranski 1993; 1997; Caon & Treagust 1993), little is known about the strategies students employ when studying for their science courses which may explain why courses aimed at reducing students' difficulties have had limited success (Gillies & Soars 1992; Nicoll & Butler 1996). There is also a paucity of research about the nursing courses in Bachelor of Nursing programs, possibly because these courses cause students less difficulties. Nevertheless, not all students are successful in these nursing courses.

The purpose of this study was threefold: to determine whether students report using different learning strategies to study in their first year Science and Nursing courses; to examine these differences in relation to academic performance; and to explore the changes in students' strategy use, in the two courses, over the academic year. The study focused on first and second semester Science and Nursing Practice courses of first year Bachelor of Nursing programs.

Method

Context

Semi-structured telephone interviews were conducted with first year students in the first and second semester of Bachelor of Nursing programs. Whilst these interviews covered several issues, only the area of self-regulation is discussed in this paper. To understand the interviews in context, they formed a qualitative part of a multi-method, multi-site study that was conducted to examine the relationships among Bachelor of Nursing students' self-efficacy, self-regulatory learning strategies and academic performance for two first year course areas–Science and Nursing Practice. As part of this study, early in the first semester of a Bachelor of Nursing program, 303 students at three university campuses were given a structured questionnaire during a science tutorial or lecture. On this questionnaire was an item asking students to give their telephone number to discuss some of the issues covered in the questionnaire. It also contained a consent form seeking students' permission to collect their academic marks/grades for their first year. Ethics approval for the study was obtained from the appropriate university committee and personnel. Students' questionnaires, and telephone interviews were coded for confidentiality and anonymity.

Apart from extracting some data pertaining to students' background (see Table 1), the telephone interviews and analyses were conducted independently to the questionnaire. That is, students' responses to the questionnaire items were not consulted before the interviews, and therefore were not used to guide the interviews.

Courses

The study focused on two courses–Science and Nursing Practice–that students study in the first and second semester of Bachelor of Nursing programs. The Science courses covered chemistry and physics topics and human bioscience. The Nursing Practice course had a theoretical component and a practical–clinical skills (for example measuring a person's Blood Pressure) component. In both semesters the science courses were assessed by assignment and examination.

A major part of the Nursing Practice assessment for both semesters was the workbook which contained case studies, and questions appropriate to the students' level of nursing knowledge. There were also some additional assignments, and in second semester students had to do a clinical skills (practical) assessment.

Participants in the study

First Semester

It was not possible to interview all the students (80) who put their telephone number on the questionnaire. It was decided to interview 40 students in the first semester as there was no way of predicting how many students would be available for a second telephone interview at the end of the first year.

Nursing students may have widely varying backgrounds and experiences that may influence their approach to the study of their first year Science and Nursing Practice courses. To understand how and why students use certain study strategies, it was decided to employ purposeful sampling. This would ensure that variations in students' backgrounds as identified by the questionnaire and considered relevant to the present study, were represented in the telephone interview sample (Maxwell 1996). The 40 students who were interviewed were a purposeful sample of students from the 80 who had provided their telephone number. Students' questionnaires were scrutinised to determine their: method of entry to university (mature age/high school leaver), whether they were from Non-English speaking backgrounds (NESB) or had any previous nursing experience and whether they had studied biology or chemistry for their High School Certificate (HSC). This information was used to guide the selection of the telephone sample, who were chosen to reflect the heterogeneity of the questionnaire sample of students. If a student could not be contacted after 4 telephone calls the next student on the list was telephoned. A comparison of selected background details of the questionnaire and telephone interview sample of students are given in Table 1 and show that the samples are very similar.

Table 1

Comparison of the questionnaire and telephone interview sample students' background details

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	22.5	17.5
Gender-Female	85	92.5
Gender-Male	15	7.5

Second Semester

In second semester, 19 of the 40 students who were interviewed in the first semester were interviewed again in the second semester. By this stage, ten students had left the program and 11 students had moved or were unable to be contacted after repeated telephone calls.

Telephone Interview Schedule

The telephone interviews were semi-structured. In the first and second semester students were asked how they studied for their Science and Nursing Practice courses. In the second semester, if students mentioned using reading as a strategy for studying science, they were then prompted and asked if they tested themselves to see if they knew or understood what they were reading (monitored reading). In the second semester students were also asked if they had changed the way they now studied for these courses.

Conduct

The telephone interviews were conducted by the first author, who had been responsible for the questionnaire distribution. This presented us with 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 had contact with the students during the questionnaire phase, it seemed to help in the establishment of rapport, during the telephone interview, between the student and the researcher . 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, p367).

The first telephone interviews were conducted over a period of two weeks which was approximately the middle of the first semester. Students were interviewed again in study recess at the end of the second semester. Telephone interviews were conducted on weekday and Sunday evenings, afternoons on the weekend and daytimes on Fridays. These times and days were selected after consulting the academic time-table 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. At the end of the interview, which ranged in time from 15-40 minutes (average 25 minutes) the researcher asked the student if she/he were willing to be interviewed again in the second semester.

The conduct of the second interview was similar to that of the first semester although the length of the interview was shorter–average 15 minutes. The researcher made certain that she thanked students for their participation in the research and informed them that this was their final telephone interview.

The researcher recorded students' comments by hand during the interview. Occasionally there were pauses while the researcher finished writing down a student's comment. It has been reported that some interviewers dislike pauses especially in telephone interviewing (Hertzog & Rogers 1988) whilst another who also hand-recorded telephone interviews, felt that the pauses may help the participants to relax (Carr 1999). The researcher (Andrew) felt that the pauses were beneficial as they allowed the students time to reflect on the topic being discussed and think about what they wanted to say. To ensure accuracy, the interviews were transcribed onto computer files as soon as possible, usually the same or the following day after the interview.

Data Analyses

To understand students' strategies for studying science and nursing practice, the telephone interviews were analysed using the coding techniques described by Miles and Huberman (1994 p58-76) and derived from Strauss (1987), Strauss and Corbin (1990) and Lincoln and Guba (1985). Students' comments about their study strategies were coded by word and phrases or sentences where appropriate. Codes were revised frequently, and those that appeared to be related were then grouped into categories. Some of the categories were similar to those of the research instrument the Motivated Strategies for Learning Questionnaire (Pintrich et al 1991), and were named accordingly.

Students' academic results for their Science and Nursing Practice courses were used to divide students 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. 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 & Pons 1986) for each category of strategy for the two achiever groups for science and nursing practice (Table 3 & 5).

Findings

First Semester

Many students made comparisons between their Science and Nursing Practice courses, which was to be expected given that they were asked similar questions about these courses. Science was seen as 'knowledge-based', whereas Nursing Practice was seen as 'experience-based'. These comparisons are given in Table 2.

Table 2

Students' comparisons of their Science and Nursing Practice Courses: categories with explanation 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 Approaches to Study	Descriptions by students about their approach to studying
4a) 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.'
4b) emphasises clinical skills	Descriptions by students indicating that they emphasise clinical skills practice and ignore the theoretical aspect of the Nursing Practice course.

	eg: 'I study [Nursing Practice] differently to science. I get friends to practise [nursing skills] in [our] free-time. Don't need to study [Nursing Practice] much. It's practically-orientated and very different [to the Science course].'
4c) combines clinical skills practise and theory	Descriptions by students indicating that they recognise that the Nursing Practice course has theoretical and practical aspects and studies/practise for both aspects.
	eg: 'You need to do hands-on things as nursing is not theoretical but practical. I study Nursing Practice the same as Science if it applies. I don't tape lectures etc, but I study the same. I read textbooks and make notes.'

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 3 and 4 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 identified and are included although they are not actually self-regulatory learning strategies.

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, as to do extra clinical skills practice, for example, 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 are more generic strategies.

Table 3

Explanations and examples of students' self-regulated learning strategies for their first semester Science courses

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 self-regulation	Descriptions by students of 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 have 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 work 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.'
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.'

Table 4

Explanations and examples of students' self-regulated learning strategies for Nursing Practice course for semester one

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 work personnel	eg: 'I speak to a nurse to get help.'

7 Other	Descriptions by students of general behaviours indicating difficulties with study or comments that could not be classified.
	eg: 'I am uncertain [how to study].'

Academic Performance

Science Course

Organisation and reading were the two main strategies used by both achiever groups to study science (Table 5). Unlike High Achievers however, Low Achievers tend not to monitor their reading or use other metacognitive self-regulatory strategies very frequently. Table 6 shows that except for reading, High Achievers use all of the other strategy groups more frequently than Low Achievers.

Nursing Practice

Low Achievers find their Nursing Practice course less difficult and put less time and effort into studying for it than their science course. Whilst this does applies to a certain extent to High Achievers they are more likely, however, than Low Achievers, to see the need for studying in the Nursing Practice course. They will also use similar study skills, in Nursing Practice, that they employ for science and engage in skills specific to the Nursing Practice course although they have difficulty in conceptualising engaging in clinical skills practice as a method of studying.

Low and High Achievers are most likely to use elaboration strategies when studying for their Nursing Practice course although High Achievers are equally likely to use metacognitive self-regulation strategies (Table 5).

Apart from elaboration and help-seeking–which is the strategy least used–Low Achievers are equally likely to mention using, albeit infrequently, workbook, reading, clinical skills practice or metacognitive self-regulation strategies.

Clinical skills practice and workbook are the strategies that are likely to be described by High Achievers as being used next after elaboration and metacognitive self-regulation strategies. Like Low Achievers, High Achievers are least likely to describe using help-seeking strategies to study for their Nursing Practice course.

Table 5

Low Achievers, High Achievers and both (total) strategy means for first semester Nursing Practice and Science courses

	Nursing Practice				
Strategies	LA	HA	Total		
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		
	Science				
Strategies	LA	HA	Total		
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 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*	0.55	0.29			

* Includes strategies 9, 10 & 11 (see Table 2)

Second Semester

Due to the smaller number of students interviewed in the second semester, students' approaches to study are discussed according to their achievement group.

Science

Most students remained in the same achievement group in the second semester. Low Achiever students did not seem to make any significant change to the way they study. 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 said 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.

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 she had in the first semester. Low Achiever students described using a limited repertoire of self-regulatory strategies and when questioned they admitted that they did not monitor their reading or test their knowledge. Reading was once again the strategy most frequently cited as a study strategy.

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.

Some Low Achiever students (17%) improved their academic performance in science over the first year of their nursing program and therefore were classified as High Achievers for their second semester.

These students seem to have made changes to the way they study science 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 that comes with the textbook and do the multiple choice questions they have.

This student had made several changes to her study of science. She had increased the number of strategies she used to study and included metacognitive self-regulatory strategies–namely self-testing–to assess her knowledge.

Students who were categorised as High Achievers for science appeared to recognise 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:

> That's how I teach myself.

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 by:

> 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.

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.

These comments indicate the consistent use of metacognitive self-regulatory strategies, and was reflective of other High Achiever students who also described using these strategies, particularly monitoring and self-testing.

Nursing Practice

Although the second semester was considered 'a lot of work' and 'not as easy' as the first semester, Low Achiever students were not likely to have changed their study strategies. Most Low Achiever students mentioned doing the workbook although they continue to be 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.

Low Achiever students made comments regarding their academic performance and attributed it to 'lecturers for lack of supervision' or being 'bad at explaining things', and having 'three assignments due on one day'.

Some students improved grades and were moved from the Low to High Achiever category. One such student, said in the first semester that for the Nursing Practice course:

> I tend to read the lecture notes and what I don't understand I re-read.

In the second semester this student had significantly improved her performance and her comments indicated that she had made some changes to her study strategies:

> I didn't do any extra reading [for Nursing Practice]. The lecture relates to the workbook so I do that work. When I go home I do the workbook. [And] I just do the assignments.

High Achiever students clearly recognise the theoretical and practical aspects of their Nursing Practice course. Some students mentioned the presence of more assessments for the Nursing Practice course in the second semester and adjusted their study accordingly:

> 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.

In preparation for the clinical skills examination one student said :

> I think like you have to practice more. I make sure I know the basics eg taking temps. [temperatures]. I need to know how to do it. I don't do much study.

This student's comment indicates the continued confusion students have in recognising that doing extra clinical practice is a strategy of studying for the Clinical Practice course.

Conclusion

This study found that students report using general and course-specific strategies when studying for their Science and Nursing Practice courses. 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 eg 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. 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 difficult 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 et. al. (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.

With regards to academic performance in the Science course in the first semester, Low Achiever students 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 Achiever in their Nursing Practice courses were not likely to report changing their study strategies, and were most likely to use to 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 main 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.

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.

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