Fostering Self-Regulation and Deep Approaches to Learning: End-User Computing Courses in Higher Education

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Abstract

This thesis examines student approaches to learning and self-regulation within a higher education computing environment. Traditional end-user computing teaching methods emphasise a skills approach that does not encourage effective use of information technology as it evolves and does not consider how students approach their learning. This research was designed to promote student use of self-regulated learning to see if it would encourage deep approaches to learning.

The revised two-factor Study Process Questionnaire (R-SPQ-2F) was used to measure approaches to learning, at the beginning and end of a semester, to see if students' learning had shifted towards a deeper approach. The sample was taken from two end-user computing classes in a diploma programme. The teaching of strategies to foster self-regulatory practices was introduced. Focus group discussions were held at the beginning, middle and end of the study to record student perceptions of learning. Academic journals, recording student reflection, were collected.

The results from the R-SPQ-2F questionnaire showed no shift had occurred. The participants began the semester with a tendency toward a deeper learning approach, leaving little room for change. There was no difference found between approaches to learning of ethnic groupings. Qualitative results revealed deep and surface learning approaches are not necessarily mutually exclusive and may overlap, suggesting a combined approach. The course grades suggested that the adoption of teaching strategies fostering self-regulation helped student learning in the researched classes. A link was suggested between strategy use and student approaches to learning.

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I would like to dedicate this thesis to Ronald James Burton who was here for the beginning of this project, but sadly not at the end.

To a father who would have been so proud.

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CHAPTER 1

Introduction

Many business programmes provided in tertiary education include a compulsory computing paper. End-user computing is considered a necessary skill, essential to provide students with the skills needed to cope, not only as a student, but also in today's information rich business society.

There has been a great deal of research associated with computers in education which, historically, has been dominated by measurement of the machine effects of learning. This was followed by research interest in the contextual variables related to how computers are used in education. Currently there has been little that has investigated the need for teaching learners to apply their information technology (IT) skills in complex situations. (Dougherty, Clear, Cooper, Dececchi, Richards, & Wilusz, in press).

Traditionally, end-user computing has been taught using a didactic approach where the teacher is seen as the fount of knowledge, whose role is to transmit that knowledge and the student is expected to have a passive role in the learning process. Traditional computing workbooks, which are used to aid student learning, have compounded this issue by allowing learners simply to press keys without any thoughtful responses. This teach-by-numbers approach is not favoured by recent research (Dougherty, et al., in press) as it tends to emphasise skills alone and is referred to as *IT literacy*, which does not teach learners to use computers effectively over time. Recent trends in IT research have indicated a move away from IT literacy towards *IT fluency* (Snyder, 2002), a term used to describe a more fundamental understanding of IT. A current view, according to

Dougherty, et al. (in press) is that if a person is *fluent*, it implies that the person has control over an issue and is able to manipulate it.

Teaching IT fluency however presents an instructional challenge for educators in higher education. To become fluent, learners need not only to have the skills to "use" computer applications, but also to have the fundamental concepts for understanding IT as it evolves. Learners need to build on their knowledge of IT continually to apply it more effectively in their lives, but learning how to use specific software is becoming less important as the information itself rapidly becomes outdated. How do we know what software will be in use in the future?

The challenge for IT teachers is to ensure our students have the transferable skills to deal with the new technological demands of the future. Teaching end-user computing ought to be based on and align with what research reveals about how people learn. Learning environments, computing or otherwise, must be congruent with how students learn and the nature of the learning task (Goodman, 2001).

Research has shown that there are different ways learners attempt various academic tasks (Biggs, 1999). Deep and surface approaches to learning have become generic terms used by educators wishing to improve student learning in the classroom. These terms indicate two different ways in which a learner may approach their learning. A deep approach implies that when learners attempt a task they tend to focus on ways to maximise understanding, and a surface approach implies learners use strategies that require little understanding (Biggs, 1999; Prosser & Trigwell, 1999; Entwistle, McCune & Walker, 2001; Watkins, 1996).

As theories of learning have evolved and changed, the focus of much research on *how* learners learn has shifted from viewing learning as a change in behaviour, to an individual cognitive view where learners constructed their own knowledge, to the study

of learning in social contexts. This latter phase has introduced models of learning where both the learner and teacher are seen as active participants in the learning process and take into account the social process of learning in context.

Globalisation and increasing numbers of international students in the tertiary sector mean the cultural diversity of students has increased. This is an important aspect to consider when investigating learners' approaches to learning, because of the cultural variations that students bring to the classroom.

Current views of learning emphasise that the quality of learning and teaching is enhanced by the constructive alignment of the course objectives, the teaching methods, assessment tasks and learning activities (Biggs, 1999). Different learning activities call for different learning strategies to be applied. Students can be taught how to apply various strategies through the fostering of self-regulation skills.

Evolving theories of self-regulated learning place the focus on how the learners initiate, change and sustain specific learning practices. Among researchers of self-regulation, there is a general view that learning is something that happens *by* the learner, as opposed to the view that learning is something that happens *to* them. (Zimmerman, 2001).

There is, however, a gap in the literature that specifically links approaches to learning, with the fostering of self-regulating activities, in the context of end-user computing in higher education. There is also a gap in the literature that reviews the effects of cultural differences upon approaches to learning in this context. Therefore, it is timely for research to take place that particularly investigates how all students approach their learning in a computing environment. The culturally diverse student population has been problematic for teachers who need to find out how to encourage optimal learning for all students. It is therefore also timely to investigate alternative ways of improving

learning and teaching in order to make a significant contribution to knowledge in this field.

CHAPTER 2

Literature Review

This chapter is written in two parts. Part One reviews the literature on concepts, theory and research on student approaches to learning and self-regulated learning. It shows the links between the two constructs and how they are related within a computing environment. Attention is also paid to the cultural effects of approaches to learning in an increasingly diverse society. Part Two reviews the literature on the fostering of self-regulation and deep approaches to learning. This chapter concludes with a statement of the aim of the study, the objectives and the research questions.

Part One: Approaches to Learning and Self-Regulation

2.1 Approaches to Learning and Study

Approaches to learning have become generic concepts in the area of educational research. The actions that stem from students' conceptions of learning relate to the different ways in which they attempt various academic tasks. The original well-cited research by Marton and Säljö (1976) asked Swedish university students to read an academic article and then to describe what they had learned and how they had gone about their learning. This research showed that what the student learned was dependent upon their perception of what they would gain from the exercise. The students applied a suitable strategy to achieve that gain. If the students' intention was just to remember the article and recall key terms, they tended to focus on specific

aspects and concentrate on individual words and facts, however, if the intention was to gain the author's meaning from the article, they focussed on ways to maximise understanding. This analysis led to two notions of approaches to learning: *deep* for those who read to discover meaning and *surface* for those who are concerned with the reproduction of words and facts. The first approach was associated with high abstract level accounts of the article, whereas the latter was associated with simple factual statements about details that missed the author's point, by overlooking the interconnections between them.

The burgeoning literature that followed this research broadened the terms somewhat to describe general approaches to studying (Biggs, 1987a, 1987b, 1999; Entwistle, et al., 2001; Prosser & Trigwell, 1999; Watkins, 1996):

> *Deep approach:* The deep intention or motive is based on intrinsic motivation and interest in the task at hand. Typically individuals will: be prepared to invest time and effort in their studies; tend to operate on an abstract level of conceptualisation; reflect metacognitively; and use optimal strategies for processing a task.
>
> *Surface approach:* The surface intention or motive is extrinsic. Typically individuals will: carry out the task with minimal effort; try to get the task finished as soon as possible; treat information as unrelated bits of knowledge; rote learn and memorise facts without understanding; have limited interest in a task and study without reflection of purpose and strategy.

Further research saw another approach identified; the *achieving approach*. Whereas the strategies involved in the first two describe ways in which individuals engage the context of the task itself, the achieving strategy describes ways in which individuals organise the temporal and spatial contexts surrounding the task at hand (Biggs,

1987a). Although it may be sometimes useful to refer to an achieving approach, it has recently been considered less relevant for educators when trying to discover how students are approaching their learning in the classroom (Kember, Wong & Leung, 1999; Biggs, Kember & Leung, 2001; Kember, Charlesworth, Davies, McKay & Stott, 1997).

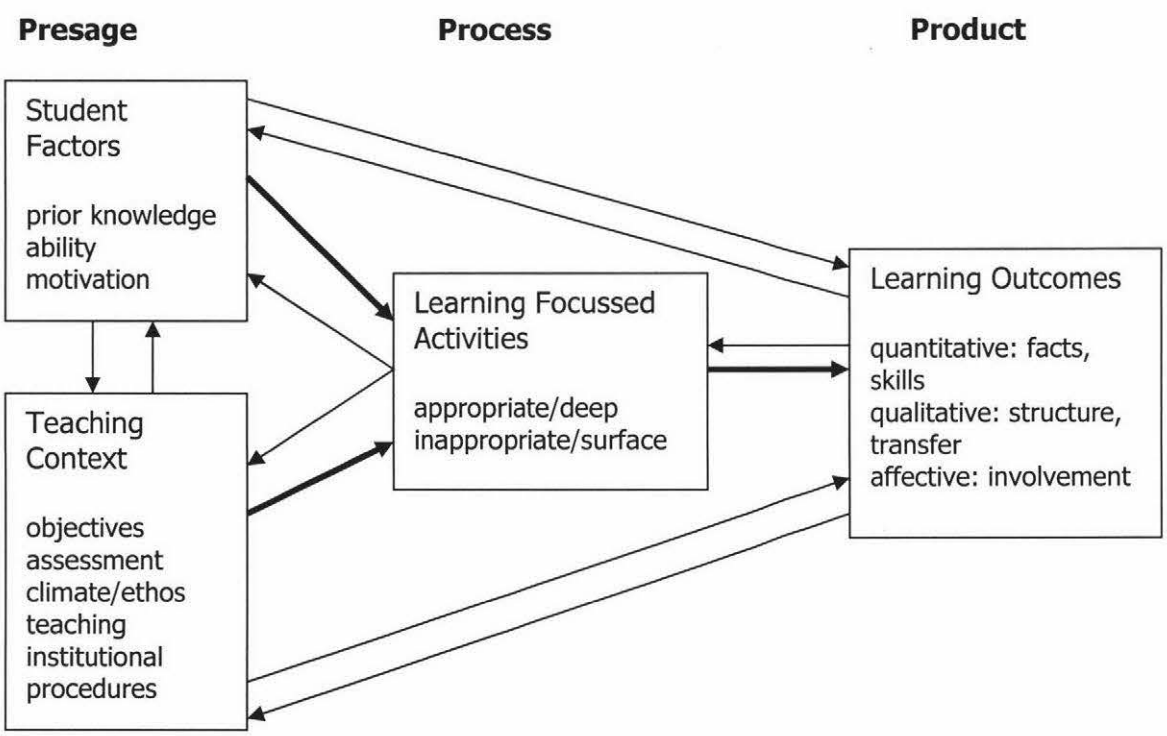
The literature on students' approaches to learning (SAL) has proceeded with two contrasting, but not incompatible, directions (Watkins, 1996; Biggs, 1999; Prosser & Trigwell, 1999, Biggs, 2001) with one stream basing its research on the metatheory of constructivism and another on phenomenography. Studies in phenomenography take into account that students enter higher education with substantial variation in their prior knowledge, their conception of learning and the way they have previously approached their learning. From this point of view, student perceptions of their learning situation are believed to evoke prior learning experiences that will relate to their approach to learning (Prosser & Trigwell, 1999).

Constructivist theorists, on the other hand, perceive SAL from a theoretical point of view that has its roots in cognitive psychology (Cullen, 2001; Biggs, 1993, 1999; Prosser & Trigwell, 1999). Contemporary constructivists have added to that view and conceive the learner as an active agent, constructing their own learning, both individually and socially. From this point of view, the context, and particularly the social context, is important (Biggs, 1993, 1999; Prosser & Trigwell, 1999; Cullen, 2001). Students react differently to their teaching environment in ways that lead them into surface or deep learning approaches. The complex interrelationship of content knowledge, together with individual and social processes of learning, play an important part in students' approaches to learning. Although students may have a disposition to

adopt a deep or surface approach (Kember, et al., 1999) approaches are by no means stable psychological traits. A preferred approach could be modified in the classroom.

The focus on individual and social processes in learning has been useful, allowing for studies to concentrate on discovering alternative ways of improving learning. In the belief that studying does not occur in a vacuum and that the learning environment had profound effects on SAL, Biggs (1993) developed a framework that incorporated contextual aspects. He adapted a Model of Teaching (Dunkin & Biddle, 1974, cited in Biggs, 1993) to a model for teaching and learning, as shown in Figure 2.1. This 3P Model of Teaching and Learning focuses on the relationships between the characteristics of the learner and the learning context (presage), student approaches to a particular learning task (process), and outcomes of learning (product).

Figure 2.1 3P Model of Teaching and Learning



(Biggs, 1999, p18).

The diagram of the 3P Model of Teaching and Learning (Biggs, 1999) uses heavy arrows to indicate the progression of interacting factors. The light arrows indicate how all the factors interact to form a system. This model shows how the factors at the presage level are both related to the student and the context in which learning takes place. Both these factors interact at the process level to determine an approach adopted by the learner. Students who are already familiar with the teaching context and have prior knowledge or interest in a subject may be predisposed to adopt a deep approach, whereas students who have little prior knowledge or experience of a subject or the teaching environment may be predisposed to adopt a surface approach. Even though a learner might normally be predisposed to adopt a deep approach to learning, they may adopt a surface approach if the learning-focussed activities at the process level do not encourage deep learning, especially when the learning outcomes are not aligned. The contextual aspects of this model make it useful for developing a framework in which to develop innovations to encourage deep approaches to learning.

2.1.1 Assessment Demands

Perceived assessment demands determine the learning approaches a student will adopt (Biggs,1999). It could well be that an academically successful student may be one who chooses to use a strategy that best models the assessment at hand. Students are unlikely to spend time learning a topic if they think it will not be tested, or if they perceive that a good grade is impossible no matter how hard they try (Pressley, Van Etten, Yokoi, Freebern & Van Meter, 1998). Although a deep approach is thought to be necessary to produce a high-quality outcome, such an approach is not always rewarded by the assessment system (Biggs, 1999). Universities can sometimes offer an environment that actually encourages passive involvement on the part of the student, relying on memorisation and regurgitation as a means of pedagogy. This tends to encourage a surface approach to learning. Therefore, one of the most

important contextual factors that can influence students' choice of learning approaches and the strategy adopted is the method of assessment (Scouller & Prosser, 1994).

Research of SAL in relation to assessment demands has been helpful for educators who wish to align their teaching constructively. Constructive alignment refers to the model of a well-planned course, balancing the close relationships between the course objectives, the content, the teaching, learning activities and the assessment (Biggs, 1999; Dart & Boulton-Lewis, 1998). Constructive alignment addresses not only the behaviour of the student learning, but also the design of the teaching. Poor assessment setting that does not allow for constructive alignment in teaching is likely to result in students adopting a surface approach to learning (Biggs, 1999). A constructively aligned course of study relates to the 3P Model of Teaching and Learning.

The relationship between learning outcomes and approaches to learning are supported by research that indicates that those students who have higher quality learning outcomes were those who tend to adopt a deep approach to learning (Prosser & Trigwell, 1999; Chan, 2001). Quality learning outcomes can be determined by using the Structure of Observed Learning Outcome (SOLO) taxonomy. This was developed to provide a framework for structuring levels of understanding in order to assess learning outcomes holistically. It describes a hierarchy of five levels from incompetence through to expertise where each level is partially constructed and becomes the foundation upon which to build further learning. (Biggs, 1999; Prosser & Trigwell, 1999). This framework provides a way of describing how a student's performance develops; from quantitatively, which occurs in the first stages of learning, to qualitatively, as detail and prior knowledge become integrated in a structural pattern.

The SOLO taxonomy has been useful for educators by providing a list of verbs that can be used to define the ranges of understanding needed for both the learning objectives and assessment criteria (Biggs, 1999). These verbs, which identify the desired outcome to both students and teachers, range from reflect, apply and hypothesize at the top of the scale (identifying a deep approach) to paraphrase, identify and name at the bottom (identifying a surface approach). The use of constructive alignment that addresses the needs of the students with learning focussed teaching activities, together with a clear statement of the learning objectives help students to adopt appropriate learning strategies (Biggs, 1999). When teaching assessment tasks that utilise the same verbs that have been used in the objectives, the student should have a clearer understanding of what is expected. This may help students adopt a deeper approach to learning.

2.1.2 The Measurement of Student Approaches to Learning

Research into SAL has led to the development of numerous instruments to evaluate students' approaches to learning. Currently the most widely noted instruments used in the tertiary sector are Approaches to Studying Inventory (ASI) (Entwistle, et al., 2001) and the Study Process Questionnaire (SPQ) (Biggs, 1987a) which provide quantitative measures of study approaches.

Learning approaches have a related motive and a strategy element (Kember, et al., 1999). It is the motive with which a learner approaches a task that determines which strategy they adopt to accomplish that task. The SPQ has a motive/strategy combination, related to the learners' intentions and their perceptions of the learning context (Biggs, 1999; Watkins, 1996; Kember, et al., 1997), as represented in Table 2.1

Table 2.1 Motive and Strategy Components of Deep and Surface Approaches to Study

Scale	
Deep Approach:	
Deep motive	Motive is intrinsic; interest in subject and its related areas; wishing to study the material for its own sake
Deep strategy	Strategy is to understand what is to be learnt through inter-relating ideas and reading widely
Surface Approach:	
Surface motive	Motive is instrumental; main aim is to gain qualifications at minimum allowable standard, extrinsic to the real purpose of the task
Surface strategy	Strategy is to reproduce bare essentials often using rote-learning

(Adapted from Watkins, 1996, p.8)

It is inappropriate to categorise learners as "surface" or "deep" learners on the basis of SPQ responses because the measured approach is not a stable trait but a function of both individual characteristics and the teaching context as indicated in the 3P Model of Learning and Teaching. However, responses to the SPQ can be used as indicators as to whether or not meaningful learning has occurred and is an appropriate technique for evaluation of innovations within the classroom (Kember, et al., 1997). Any innovation that shows an increase in the use of the deep approach could be considered quite significant. It could even be considered significant, judging by past history of research into higher education, if deep approach scores do not decline by the end of the course because students tend to become more orientated to a surface approach after they arrive at university (Biggs, 1999; Kember, et al., 1997).

The SPQ has been completed by students from a wide range of socio-economic, religious and cultural backgrounds in higher education and it has consistently proved its reliability in various countries. Although the orientation towards comprehension of

material learned was consistent between countries (Biggs, 1987b), recently there has been some question regarding the dimensions of SAL, with recommendations that a simple two-factor, deep and surface, instrument would be more suitable for research by educators who want to evaluate teaching and learning in the classroom (Kember, et al., 1999). It was suggested that measuring deep and surface approaches would allow for a more thorough examination of the influences that cultural background has upon approaches to learning. The result has been that the original SPQ has been updated into a simple two-factor version; The Revised two factor Study Process Questionnaire: R-SPQ-2F (Biggs, et al., 2001).

2.1.3 Cultural Effects on Students' Approaches to Learning

One area of concern for researchers who wish to use inventories of SAL is cultural validity. The student population at New Zealand tertiary institutions is changing, with far greater numbers coming from the international scene than ever before (New Zealand, Ministry of Education, 2001). The number of full fee-paying students (FFP) has increased dramatically since 1994 with the predominant number coming from Asia. In July 2001 there were 12,651 FFP students enrolled in New Zealand tertiary institutions and over 10,500 of these (83%) were from Asia, as Table 2.2 shows.

The greatest increase of students is from mainland China whose numbers have increased by a factor of 95 over the seven year period to more than five thousand by 2001, as shown in Table 2.3, whereas the numbers from other countries of origin have remained at somewhat similar levels. There is nothing to suggest that the current trend of increasing numbers of students from China will not continue. It would be prudent to suggest that all studies that are conducted within tertiary institutions should take note of cultural differences within the student population.

Table 2.2 Full Fee-Paying Students in New Zealand Public Tertiary Institutions by Region of Origin from 1994-2001.

	1994	1995	1996	1997	1998	1999	2000	2001
Pacific	338	387	462	578	604	615	817	741
Asia	3,322	4,076	5,568	6,697	6,241	6,664	9,100	10,546
North America	166	214	267	306	382	484	639	455
Central and South America	15	19	20	28	38	40	62	56
Africa	28	28	31	37	63	75	82	97
Europe	180	204	263	323	352	528	757	680
Middle East	21	19	24	21	19	20	41	70
Not Stated	622	293	92	99	51	157		2
Total	**4,692**	**5,240**	**6,727**	**8,089**	**7,750**	**8,592**	**11,498**	**12,651**

(New Zealand, Ministry of Education, 2001)

Table 2.3 Asian Full Fee-Paying Students in New Zealand Public Tertiary Institutions.

	1994	1995	1996	1997	1998	1999	2000	2001
China	55	61	82	88	127	720	2,894	5,237
Japan	643	546	806	1,240	1,175	1,103	1,159	766
Korea	154	218	352	585	427	533	778	753
Malaysia	1,191	1,844	2,508	2,769	2,332	1,913	1,630	1,126
Other	1,279	1,407	1,820	2,015	2,180	2,395	2,639	2,664
Total Asia	**3,322**	**4,076**	**5,568**	**6,697**	**6,241**	**6,664**	**9,100**	**10,546**

(New Zealand, Ministry of Education, 2001)

Bearing in mind the current cultural diversity in the student population in New Zealand, it would be wise to take note of Watkin's (2001) concern. He advises caution when stating that inventories or questionnaires of SAL are culturally valid due to the fact that these questionnaires were designed with the Western student in mind. Although it has

been argued that the constructs of deep and surface approaches are generally comparable in non-Western cultures (Biggs, 1996) there may be culturally specific aspects that do not match, for example, the way specifics of a deep approach might translate across cultures (On, 1996). The generic term *deep approach* focuses on making meaning from a task and performing the task appropriately, however there may be cultural differences on how students might interpret what is appropriate or not.

Research has shown that Asian students from a Confucian-heritage learning culture (CHC)[1] view education and the whole learning environment quite differently from their Western counterparts (On, 1996; Biggs, 1996; Marton, Dall'Alba & Kun, 1996; Li, Baker & Marshall, 2002, Volet & Renshaw, 1996). Generally speaking, the Asian people have a positive attitude towards education (On, 1996). Individuals who have been educated in the Confucian tradition view education as important from both internal and external perspectives; internally, because studying is important for personal development and externally, because education is considered necessary for social mobility and economic progress. There is a tremendous emphasis on effort, willpower and concentration in the pursuit of learning. Failure is believed to be due to a weak willed person making no effort to succeed. In contrast, someone who keeps trying and puts in the effort will succeed in the end.

This predisposition to seek meaning by putting in effort and to persist even at the expense of boredom, has led the Asian student generally to consider themselves to be deep learners (Biggs, 1996). However, students from Asia appear to employ strategies such as rote-learning and, from a Western perspective such strategies are associated

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[1] CHC refers to the education culture of countries such as China, Hong Kong, Taiwan, Singapore, Korea and Japan (Biggs, 2001).

with a surface approach leading to poor academic outcomes (Kember, et al., 1999). Consequently the stereotype of the Asian student seems to be that they are passive participants who do not respond in class and use rote-learning techniques to pass exams. Yet as research has revealed Asian students frequently outperform Western students, even though in their own country they are taught in conditions which according to Western standards are not conducive to good learning, for example, large classes, expository methods and norm-referenced assessment (Watkins & Biggs, 2001; Biggs, 1999, On, 1996). This phenomenon has become known as the *paradox of the Asian learner*, (Biggs, 1996; Watkins & Biggs, 2001).

The complex issues surrounding the paradox are, according to Watkins and Biggs (2001), related to cultural differences in perception and interpretation of educational issues. These authors state how relationships between student and teacher and general patterns of socialization help to explain the paradox, for example, how students and teachers interact and relate to each other. Also CHC children are trained for education even from the first day of school, whereas our students are not.

There appears to be little literature available that specifically identifies SAL across cultures within the New Zealand context. However Li, et al. (2002) conducted studies in New Zealand to identify the possible causes for mismatched educational expectations of Asian students and New Zealand teachers, in a tertiary institution. These authors argue that, when Asian students become aware of New Zealand educational expectations and become exposed to new ideas, concepts and teaching practices, they will change their pre-conceived ideas of how to approach their study. This finding is consistent with Volet and Renshaw (1996) who found that students in Australia had changed their learning approaches to adapt to their new learning environment, for example by using surface approaches, within their first year of study.

This sustains the view that SAL are not inherently fixed and unchangeable, but are instead contextually dependent. This emphasises the importance of the 3P Model of Learning, which takes into account the learning context and the process of learning.

2.2 Self-Regulated Learning

Self-Regulated Learning (SRL) has become a popular topic for researchers who want to understand how students become independent learners. Schunk and Ertmer (2000) refer to SRL as involving "self-generated thoughts, feelings and actions, that are planned and systematically adapted as needed" (p. 632). More precise definitions tend to vary on the basis of a researcher's theoretical perspective (Zimmerman, 2001).

The variety of research shows its relevance to many aspects of learning and control. There has, over time, been a shift from decontextualised and highly controlled research in laboratory settings, which have sought to describe characteristics of students who are self-regulated, to that of less controlled classroom environments (Schunk & Zimmerman, 1994; Cullen, 2001) where educators have sought to find out ways to encourage the use of meaningful learning. Literature has shown that SRL is beneficial to educators who want to enhance learning and teaching practices, because much of the current research on self-regulation has been carried out in the context of the classroom. This type of study has been referred to as ecologically valid research (Pintrich, 1995; Paris & Paris, 2001). The importance of SRL for students in higher education is because unlike school learning experiences, students can have some control over how they go about their learning (Pintrich, 1995).

Various SRL models have been developed which focus on "how" students activate, alter and sustain their learning practices using a variety of self-regulating processes. The broad scope of SRL however makes it difficult to give an exact definition as to how

it applies to the learner, although most models of SRL have in common basic assumptions; that students can actively regulate their motivation, behaviour or cognition (Hofer, Yu & Pintrich, 1998).

Theorists differ on the motivational aspects of SRL (Zimmerman, 2001). Motivation has been defined as "the process whereby goal-directed activity is instigated and sustained" (Pintrich & Schunk, 2002, p. 5). The self-regulation of motivation involves controlling and regulating motivational beliefs, so that learners adapt to the demands of learning a particular task. Motivation as a construct summarises inferences from behavioural observations. Motives are hypothetical constructs that help to explain why people do what they do, distinguished from other related constructs such as goals (the objectives of a sequence of behaviour) and strategies (the methods used to achieve goals).

Motivation has historically been described as having two constructs; intrinsic and extrinsic motivation. Intrinsic motivation refers to an individual engaging in a particular activity simply for the enjoyment of doing so. Extrinsic motivation refers to how an individual engages in an activity to achieve some separate outcome. This could be when students perform activities or tasks with indifference, resistance or resentment because they feel forced into action to satisfy an extrinsic demand. However, as argued by Ryan and Deci (2000), another type of external motivation represents intentional behaviour, but brings with it an element of choice. This is when students are willing to perform the learning activity because they have accepted its value.

The value that students ascribe to their learning is a central component of motivation (Schunk, 2000). Value is an important factor because no one wants to be bothered engaging in a task if it is seen as worthless. If a student thinks he/she has no chance

of success, it will be seen as a waste of time. Most approaches to motivation fit within this common sense theory of expectancy x value theory (Good & Brophy, 2000; Biggs, 1999; Schunk, 2000).

Three perspectives of self-regulation are given below which help to explain how value and motivation fit within the construct of self-regulation and how SRL can fit in solitary as well as in social contexts.

2.2.1 Social Cognitive View.

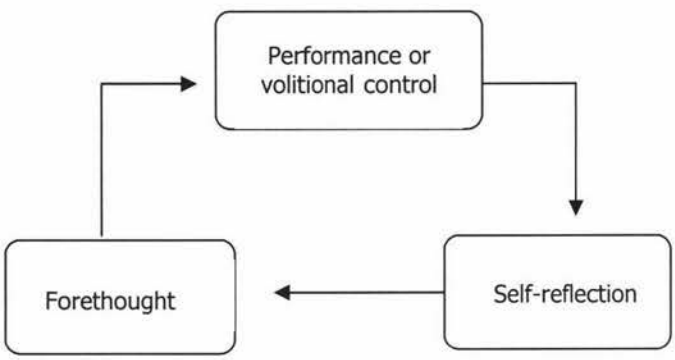
Within this view the assumption is made that cognition and social development is inter-dependent. Value is considered an important aspect of motivation. Schunk, (2000) believes that students will be motivated to learn and will selectively engage in activities that promote learning, if they value the learning and believe it will lead to rewarding consequences. Social cognitive theorists place particular emphasis on students' beliefs concerning their capabilities to exert control over important aspects of their lives (Stipek, 2002). These theorists claim that student interpretations and expectations affect their behavour, a vital aspect to consider when teaching diverse students with different cultural values. Stipek (2002) claims that self-efficacy is a more powerful predictor of academic performance than more general perceptions of academic competence. Self-efficacy relates to "students' beliefs about whether they have the ability to successfully master an academic task" (Hagan & Weinstein, 1995, p.45).

Self-efficacy is a necessary ingredient in creating the motivation to engage actively in a learning situation as students must have the belief that the strategy they adopt will help them achieve their goals. Within this framework self-regulation is also considered to be situationally specific in that it is context dependent. This view contends that self-regulation is not considered to be a trait or level of development and people are not

generally self-regulating. They become self-regulating when the conditions are conducive to building self-efficacy (Schunk, 2001).

Zimmerman (1998, in Pintrich & Schunk, 2002) believes that self-regulation is a cyclical process because the interaction of personal, behavioural and environmental factors change during learning and can be monitored. A model has been produced to describe how this three-phase cycle relates to self-regulation, as shown in Figure 2.2 below.

Figure 2.2 Self-Regulation Cycle Phases



(Zimmerman 1998, in Pintrich & Schunk, 2002, p.180)

The Forethought phase is where optimal strategies would be developed. The next phase involves the processes that take place during learning that affect motivation and action. Volition is defined by current researchers as "part of a larger self-regulatory system that includes motivation and other cognitive processes" (Pintrich & Schunk, 2002, p.182). There are many strategies that students can use to control motivation and effect, such as trying to increase intrinsic motivation by making the task more interesting, or trying to find value by attempting to make it more relevant or useful to a chosen career path (Pintrich, 2000). The self-reflection phase is useful for looking back on efforts that may lead to future changes in levels of self-efficacy and expectations for success, as well as value and interest. Important outcomes for the

self-regulation process are related to the reflection of quality of both the attributions for success and failure and the emotions experienced.

2.2.2 Phenomenological View.

This research approach notes the internal relationship between individual students and the world and is informed by the belief that the context in which learning takes place forms an integral part of any experience or relationship (Prosser & Trigwell, 1999). The view takes an individual and learner-centred approach to address the problem of how to motivate students in order to value and self-regulate their learning. McCombs (2001) maintains that student motivation is facilitated primarily through the development and use of practices that promote individual self-awareness of their learning practices through the use of goal-setting, self-monitoring and self-reflection (McCombs, 2001; Zimmerman, 2001).

Phenomenologists believe that students have a natural tendency for self-regulation (McCombs, 2001). This depends on the development of self-systems, in particular students' self-concept and self-image as active agents that are responsible for self-regulating learning behaviours.

2.2.3 Social Constructivist View.

Social constructivist theorists believe that it is the values and identities of an individual's social group that are associated with academic achievement. Paris, Byrnes and Paris (2001) contend that the sense of "self" is constructed by the individual by drawing upon the history and culture of social groups, community or society. In this contextualised view of learning, academic tasks and activities within communities have an impact on what is of value to the students and the type of motivation they will adopt. Within this view, social value comes from opinions of people considered to be important in their lives, and in order to gain group membership students imitate,

monitor and regulate their behaviour to fit. Whatever learning is to be regulated is therefore specified by significant others (Paris, et al., 2001). This can be evident in the Confucian heritage cultural tradition where families have a high regard for education and see education as upward social mobility (Watkins, 1996). Social value is therefore relevant when encouraging students to adopt self-regulating processes, considering the high numbers of international Asian students in New Zealand.

This interactive view of learning stresses the part that others can play in an individual's development through scaffolded support and guided inquiry, which is thought to encourage a deep engagement in learning (Paris & Paris, 2001; Prosser & Trigwell, 1999). Scaffolded support is the term used to describe how students can be supported in their learning in a responsive and adjustable way. Salomon (1990) describes this as the teacher taking the role of a coach giving guiding instruction, leading to the transference of control to the student. Collective learning experiences also play an integral part of learning and within this view is the notion that learning occurs collaboratively in the context of shared interests and events. The collective nature of knowledge emphasizes the value of shared meanings that grows from participation in joint activity (Cullen, 2001). Recent literature has been quite explicit in that both experience and the context in which learning takes place contribute not only to students' self-regulation (Paris & Paris, 2001), but also to continuing motivation, self-efficacy and sense of well-being (Salili, Fu, Tong & Tabatabai, 2001).

This social perspective looks at what is happening in the classroom, which is characterised as *teaching and learning* rather than simply *learning.* This approach has a particular relevance when designing ways in which teachers and learners can work together in a computing environment. The environment in which learning and teaching take place is just as important for the teacher as it is for the student because the

teacher's understanding is influenced by the context in which teaching and learning takes place (Ramsden, 1992). Therefore, to make learning relevant, there is a need for reflective thinking so that both learners and teachers can link past knowledge with new and learn from experience. Research that suggests learning and teaching are active and constructive processes (De Corte, 1990; Jonassen, Peck & Wilson, 1999) contradicts the prevailing traditional practice in end-user computing that seems to encourage the information transmission model of "spoon fed" learning. "Spoonfeeding" is a common metaphor that describes a way of teaching where the teacher gives all the information to the student who only has to "swallow", thus hindering deep approaches to learning (Biggs, 1999).

Barriers to successful learning with this viewpoint are when the student's prior knowledge of learning is limited, subject knowledge is not understood and the lack of opportunities for the students to engage in strategic learning behaviours.

The self-regulation of learning corresponds well with the idea that learners actively contribute and construct their own learning (Schunk, 2000) and that self-regulation is learnt well in social situations and through participation in activities. An argument, however has been put forward in higher education with regard to placing learning activities within the control of the learner. There is an assumption in adult learning theories that adult learners are able to take responsibility for their learning. Leach (2001) found that while some students were happy to be self-directive, others wanted the teacher to be in control. Leach (2001) therefore suggests that there is a need to review current practice regarding how adults learn and to cater for the more diverse learners that contribute to our tertiary population. If higher educational practices direct learners to be self-directed (which includes an element of regulation and choice) it may take away the choice of how they wish to learn. It is important therefore, not simply to

expect students to be self-directing but to provide scaffolded support so they can learn how to become self-regulating.

Caution is noted by Chan (2001) who comments that the majority of research that supports any constructivist approach comes from Western sources and therefore approaches to learning need to be examined in relation to all cultural contexts and characteristics of learners.

2.3 Linking Approaches and Self-Regulated Learning

Providing meaningful learning tasks to encourage a deep approach to learning is critical but not necessarily sufficient. Some current instructional studies have focussed on the process of learning, not the product, producing evidence that the teaching of strategy instruction has been effective in fostering a deep approach to learning (Chan, 2001). This research indicates that constructivist instruction is particularly relevant for Chinese students when promoting students' deep approaches to learning. It is argued that Chinese learners may not necessarily be predisposed to different learning approaches, but approaches may develop in response to different environments. If this is so, constructivist strategy instruction might facilitate the development of deeper learning among Chinese students (Chan, 2001).

Another link between SAL and SRL may be found in Brophy's (2001) suggestion that strategies such as making meaning from text, are more likely to be remembered and transferable to other contexts if they are implemented with metacognitive awareness and self-regulation. Making meaning from text is associated with a deep approach to learning. This is consistent with research investigating teacher-student interactions that foster SRL (Perry, Vandekamp, Mercer & Nordby, 2002), that found when students were offered little chance to self-regulate, the students adopted attitudes and actions

that were associated with defensive and self-handicapping approaches to learning. In comparison, when students were given ample opportunities to self-regulate the students communicated attitudes and approaches to learning that focussed on personal progress with high self-efficacious beliefs.

The R-SPQ-2F (Biggs, et al., 2001) is an appropriate questionnaire to use when attempting to measure any improvement in the learning environment, because of the operationalisation of the constructs of SAL in terms of motive/strategy combination. Watkins (1996) shows the link between motive and strategy in each construct, as shown in Table 2.1. Students who are intrinsically motivated give the appearance of being highly self-regulated and are likely to adopt a deep approach to learning (Biggs, 1999; Ryan & Deci, 2000). The close link between motivation and self-regulation has also been researched extensively (Salili, et al., 2001). This indicates that both SAL and SRL are suitable constructs for instructional studies that aim to improve student learning.

From the literature reviewed thus far, it seems likely to suggest that the motives, goals and strategies that students develop in the classroom depend on prior knowledge and learning experiences, the type of task or activity and the type of assessment offered. Because approaches to learning are not fixed characteristics, as the 3P Model of Learning and Teaching suggests, there is an implication that the student can be encouraged to use a deep approach. It therefore seems possible to suggest that the teaching of self-regulating strategies may be a good way to start.

2.4 Student Approaches to Learning and Self-Regulated Learning in a Computing Environment

There is a gap in the literature that specifically links approaches to learning with self-regulating activities in the context of end-user computing in tertiary education.

Historically there has been a great deal of research on the use of computers in education. However, a major weakness in that research has been that much of our past knowledge was dominated by technical thinking where the computer was put at the centre of the learning process, not the learner (Ryba, 1991). In the 1990s some researchers moved toward interest in the contextual variables related to computing education (Nastasi & Clements 1992, Salomon, 1990; Jones & Mercer 1993) relating to students' prior knowledge and taking into account their past history of learning and teaching. However, even though instructional courses in computing are necessary to enable students to use computers directly, there is little research globally that has investigated the need for teaching students to apply their IT skills in complex and sustained situations (Dougherty, et al., in press).

In the IT field, teachers generally use an instructional model to teaching characterised as "outcome based practice sessions" (Boekaerts, 1997, p. 162) and described in a computing environment as a skill-and-drill approach. This instructional model assumes that students already have the cognitive tools to use strategies successfully to produce the required satisfactory outcomes. However this is not always the case; students may not always become self-regulated and independent learners without being taught (Boekaerts, 1997). This is increasingly apparent in New Zealand today where students attend universities from various backgrounds of schooling and teaching contexts where independent learning may not have been an acceptable practice.

Unfortunately, higher educational institutions tend to foster the use of surface learning (Biggs, 1999). This is no different in a computing context if instruction and assessment tasks require students to elicit only low level or superficial learning. Rote-learning or skill-and-drill type activities are traditionally taught in end-user computing classes which may encourage students to adopt a surface approach to learning. For the most

part, instruction includes the teaching of seeing and copying, together with memorisation of formulae, without any thought of how individuals acquire information with understanding (Goodman, 2001). In other words, instructors spoonfeed the information. This traditional approach to teaching tends to lead to a weak learning environment (Scrimshaw, 1997; De Corte, 1990), which is strongly contradicted by research that takes the view that learning is an active and constructive process (Goodman, 2001; Jonassen, et al., 1999).

One of the problems is that that the majority of end-user computing based workbooks tend to produce surface learning (Reiman & Neubert, 2000) using paint-by-numbers instruction that does not require the learner to make any thoughtful responses (Dougherty, et al., in press).

Experiential teaching approaches to using a computer are not without their problems either. This is because, according to Reiman and Neubert (2000), when novice learners use a new software interface using this approach, they tend to play around with the software until they get a response that they understand, instead of strategically planning what they need to know and do. This type of learning is described as a hill-climbing method (Reiman & Neubert, 2000). This is an easy analogy to understand in that as one climbs a hill, there is a need to attain one safe and comfortable step before attempting the next step. However, for novices this type of exploratory or trial-based learning is not an effective way to acquire knowledge and skill about complex software (Loveless, 1995; Reiman & Neubert, 2000). Software is often programmed such that one single action (which may have no visible result on the screen) may, with a combination of two or more subsequent actions, lead to significant changes in the software environment. In other words, one wrong move may prevent a desired outcome further along the process.

The computing teacher is faced with a dilemma. They have the choice of following the traditional method of teaching with spoon-feeding the material, followed by much skill-and-drill practice, which leads to surface learning, or to use experiential-type learning that may not produce satisfactory outcomes. Goodman (2001) suggests that a good balance is needed between learning and personal exploration on the one hand and systematic instruction and guidance on the other. To teach computing successfully a scaffolding approach could be used. This provides explicit instruction first, and then encourages knowledge construction by transferring control to the student, through the use of self-regulated learning activities that promote deep learning approaches. This is in line with Paris and Paris' (2001) view of stressing the cognitive nature of development, utilizing prior knowledge together with experience in the use of reflective practice. When students already have a foundation of topic knowledge and procedural skills to apply, they are better equipped to handle activities that promote deep learning, for example, problem solving. This will allow students to try out different solutions and see the consequences of their decisions and actions before planning the next move (Loveless, 1995; Scrimshaw, 1997).

In practice, teachers can employ software in ways that fit their own educational philosophies. Studies have shown that software packages and the way they are presented for teaching purposes are, as far as the teacher's role is concerned, open to a fair amount of interpretation (Scrimshaw, 1997). The computing teacher is faced with similar choices when using computing packages as they are when using other kinds of curriculum materials, in relation to how they adopt and interpret the packages to fit their own teaching philosophy. Lai (1993) also adopts a similar stance in the belief that any success of innovations in a computing context is influenced by teachers' belief systems.

An educator's task is to enable students to deal not only with today's knowledge but also the knowledge of the future. This may seem to be a paradox for the teacher of computing applications, because what is taught today almost certainly will not be in use in the future. Therefore, it seems unreasonable to suggest that in order to cover the current curriculum, students learn rules and regulations in the form of drill and practice that may be redundant in a few years. It is impossible to predict with any accuracy the directions in which IT knowledge will grow, or what software applications will be in place in the future. Much of what will come under the heading of *basic computing skills* does not yet even exist. Any computing learning environment, now or in the future, must be congruent with how students learn and the nature of the learning task (Goodman, 2001).

To become fluent in IT, one needs to have not only the skills to use computer software but to understand IT as it evolves at an alarmingly fast rate (Dougherty, et al., in press). The educational objective of today should be to ensure students have the transferable skills to deal with the new demands of the future. This will only be possible for students who already have self-regulating skills and the ability to use deep approaches to learning. It is therefore advisable to follow Scrimshaw's (1997) advice that teachers need to teach the process of learning rather than its product, and for teachers in a computing environment, this means that they should focus on the learner – not the software (Goodman, 2001).

There are some generic features of good teaching that can be applied in any context and Brophy (2001) even argues that these general principles apply across countries and cultures. Some of these principles will be discussed in the next section.

Part Two: Fostering Self-Regulation and Deep Approaches to Learning

"The first step in improving teaching..... is to avoid those factors that encourage a surface approach" (Biggs, 1999, p.16).

2.5 Teaching Strategies to Foster Self-Regulation

To create meaningful learning that will shift students' learning approaches from a surface to a deep approach, it is helpful to see the various ways in which students may perceive tasks in a learning situation. Table 2.4 compares the difference between surface and deep approaches to a learning task.

Table 2.4 Perceptions of Approaches to a Learning Task.

Surface Approach	Deep Approach
• See tasks as external impositions which have to be completed • Focus on unrelated parts of a task • Separate treatment of related parts (such as principles and examples) • Focus on factual data and their symbolic representation • Reproduction of the essentials • Rote memorizing of information for assessment purposes rather than understand the material • Involved in study without reflection on purpose or strategy • Focus of study on words and formulae • Perceptions that subject encourages memorisation and recall • Perceptions that workload is too high	• Have an intrinsic interest in the task and an expectation of enjoyment in carrying it out • Aim to understand ideas and seek meanings • Adopt strategies that help satisfy student curiosity, such as making the task coherent with their own experiences and integrate the task with existing awareness • Look for patterns and underlying principles • See parts of a task as making up a whole • Relate what is understood from other parts of the same subject, and • See relationships between elements of understanding in other subjects • Reflect on progress • Focus on meanings of words and formulae • A clear awareness of goals and standards required in the subject

(Biggs, 1999; Biggs, 2001; Morgan, 1993; Watkins, 1996)

Table 2.4 shows a clear difference in individuals' perception of learning tasks and how they should go about them. In order to help shift students' perceptions to a deeper learning approach, one part of the teacher's role should be to introduce tasks that make the student aware of the process of learning and how to implement change.

As well as offering tasks that will promote self-regulated learning and a deep approach to learning, the teacher must look at how they present the material to be learnt and also the context in which learning takes place. This is crucial to the way in which an individual may become a deep learner. No two people can have the same set of experiences as every person constructs their own knowledge that, in turn, affects the perceptions of the experiences that they have and share. As students have had different prior experiences of using a computer, they have different perceptions of how they learn computing skills.

There are various learning theories that have different perspectives of how to make learning meaningful, as already discussed in section 2.1. Historically there has been a tendency to view the alternative perspectives as competing theories. However Sfard (1998) advises that different learning perspectives need not necessarily be in direct competition with others and a unified position could produce better results in relation to student learning. Therefore instead of taking a specific theoretical perspective within which to build a framework for this study, a contemporary view will be adopted which recognises tenets from social cognitive and social constructivist theory, and incorporates them into one approach for the teaching of learning strategies, depending on the context and purpose of the learning experience (Sfard, 1998).

Contemporary and traditional approaches to teaching and learning are compared in Table 2.5 that follows.

Table 2.5 Two Perspectives of Teaching and Learning

	Contemporary	Traditional
Knowledge	• Constructed • Situated in action or experience	• Didactic • Transmitted • Stable • Fixed • Decontextualised
Learning	• Knowledge construction • Interactive • Authentic • Experiential • Reflective • Process-oriented	• Knowledge transmission • Reflecting what teacher knows • Encoding • Retention-retrieval • Abstract-symbolic • Product-oriented
Instruction	• Modelling • Coaching • Apprenticeship • Reflecting multiple perspectives • Explorative • Learner-generated	• Lecturing • Instruction derived and controlled • Abstract rules • Basics first • Deductive • Individual • Competitive

(Adapted from Jonassen, et al., 1999)

For a contemporary perspective to take place, a particular kind of relationship is needed between the student and teacher. It is one where the teacher and learner work together to construct meaning and knowledge with the material to be learned. In this way the taken-for-granted assumptions of traditional teaching and learning at higher education are left behind in that the teacher must become an organiser and

facilitator of learning rather than a didactic lecturer who is simply there to impart knowledge (Jonassen, et al., 1999; Grabe & Grabe, 1998; Lai, 1993; Ryba, 1989).

Within this contemporary view it is possible to teach self-regulating activities that promote a deep approach to learning. From the mountain of literature that is available about SRL it is possible to suggest that self-regulating activities can be taught by:

- Direct explanations about cognitive and metacognitive strategies
- Stressing the value of strategy use
- Encouraging directed reflection
- Setting appropriate goals
- Self-appraisal (evaluating what you know/do not know)
- Facilitating opportunities for transfer
- Instructional scaffolding

These activities can be used in several ways. They can be prompted indirectly by modeling and by activities that entail reflective analyses of learning and studying, through feedback and discussion of learning and by encouraging motivation. They can also be enhanced in different ways, indirectly through experience, directly through instruction and elicited through practice. Helping students to adopt strategies that arouse curiosity, such as making the task coherent with their own experience; looking for patterns and underlying principles; integrating the task with prior knowledge; and seeing the parts of a task as making up the whole are all associated with a deep approach to learning (Trigwell & Prosser, 1991; Biggs, 1999).

2.6 *Setting Learning Goals*

Associated with cognitive theories and how individuals construct beliefs about what causes success and failure is the notion of goal setting. Goal theorists believe that reasons for attempting tasks are not equal, and that the nature of student's goals affects their individual approaches to learning (Stipek, 2002). Goals help individuals to direct attention to learning and increase their efforts to pursue a task (Zimmerman & Paulson, 1995; Hagan & Weinsten, 1995). Goals are critical for self-regulation because they can be seen as points around which behaviour is regulated (Carver & Scheier, 2000) and provide the standard against which to gauge progress. Therefore, if students are encouraged to make a commitment to pursue a goal, they are more likely to compare their performances with these set goals.

Archer (2001) also found that when students set goals to do well, the goals seemed to have provided them with a framework to develop effective study strategies. For example, students related new information to prior knowledge, looked for major themes and used effective note taking techniques. These strategies are all associated with a deep learning approach. Those who did not achieve so well used no sophisticated strategies and had set goals to obtain a pass by doing the minimum amount of work. This is associated with a surface learning approach. Current research on goal setting has been quite specific – students who set a goal perform better than those who set no goal at all. Having a clear sense of what one is working toward has motivational benefits, especially in the first year of tertiary study (Conti, 2001).

It is necessary for students to view performance outcomes as controllable, therefore it is important to subdivide goals into shorter-term objectives (Schunk & Ertmer, 2000) that are realistic, challenging and measurable (Hagan & Weinsten, 1995). One way to enhance the setting of learning goals is to ask students to think about present or

future goals and ask them to relate the course material to these goals. If students can see that their short-term goal is going to help them achieve their long term goals, it will enhance a mastery orientation toward learning the material and increase motivation (Patrick & Pintrich, 2001). Motivation will be higher if students reflect on how this course relates to their individual goals rather than if the teacher just tells them it is important to do the course.

2.7 Fostering the Use of Learning Strategies

There are many ways a teacher can provide meaningful activities that foster deep approaches to learning. However, providing activities and learning tasks is important but not sufficient (Chan, 2001) as learners need to be taught how to self-regulate their learning. Learners first must understand what skills, strategies and resources a task or activity may require, for example, finding main ideas, rehearsing information, organizing material and forming associations or images. Secondly learners need to know when to use these skills and strategies to ensure a successful completion of the task, for example, evaluating and reflecting on the effectiveness of efforts and predicting outcomes (Schunk, 2000).

Two strategies will be discussed here: developing strategies to read a textbook and developing problem solving methods.

2.7.1 Developing Strategies to Read a Text Book

Many students do not actually know how to study and learn the material needed to meet their goals. This can result in lowered expectations, motivation and negative feelings towards the content of a course as well as towards their own abilities. An example of a short term goal that students may set is *to read the relevant chapter of*

text before coming to class, however the student needs to know how to use the text in a self-regulated manner to be successful in this goal (Coppola, 1995).

Students may be unaware of how to read a textbook, never having been shown. As Coppola (1995) reveals, students are inclined to read in a linear and deliberate fashion because they feel they must finish and assimilate all the information on one page before they progress to the next and therefore do not get the whole picture of what the course is about. Every discipline has its linguistic representations because without them we would be unable to facilitate communication between teacher and student. Computer terminology is often quite confusing and daunting for beginners, consequently students often put learning the correct words in the "too hard" basket. Coppola (1995) uses the analogy of an artist painting a portrait to explain how to sketch out their student understanding by concentrating on what they can understand as a starting point and then filling in the gaps. When painting a portrait, it is not a good idea to give too much detail too early, but instead painters first sketch the portrait and then refine "with an eye on relationships between details and the whole" (Coppola, 1995, p.93). This fits with a deep approach to learning which is concerned with relating ideas together, finding the main points and constructing meaning from the learning material, (Morgan, 1993).

It is important to teach how to read a textbook in the prevailing tertiary climate because of the increasing number of International students in New Zealand. There is a large amount of literature that suggests the teaching styles in Asian countries are teacher-centred and text-based, in a culture of knowledge transmission (Li, et al., 2002; Tang & Biggs, 1996; Biggs & Watkins, 1996). The research showed that Asian students expected lessons would be structured around the textbook and therefore would follow the textbook, in the same order, in a linear style. To be competent and

successful in New Zealand education, Asian students therefore need to be aware of our teaching expectations. We expect students to have the ability to learn autonomously as well as in a group, to be independent thinkers, to be able to take part in group discussions, to be able to analyse and to apply theories, case studies and projects. Therefore, it is beneficial for students, that teachers make explicit the implicit and explain their expectations in reading a textbook. This is in line with Brophy (2001) who maintains that successful teachers are clear and consistent in expressing their expectations that they believe will lead to meaningful learning.

2.7.2 Problem Solving Methods

Providing students with the opportunity to apply what they are learning can lead to a deeper approach to learning. Problem solving activities can be built around case studies that involves:

- Identifying the problem and important issues
- Evaluating relevant information and assessing the relevance
- Planning solutions, executing the plan
- Validating and justifying what has been done, monitoring solutions
- Reflecting on what has been learnt

These are basic steps that assist students to become teacher-independent thinkers (Treagust & Chittleborough, 2001; Ryba & Anderson, 1993; Antonietti Iganzi & Perego, 2000) and are general methods for problem solving employing certain principles that generally lead to a solution of the problem.

The problem with strategy use is that even if learners are taught to use an SRL strategy, it does not mean that they have become self-regulatory unless they can use that strategy or apply it to other areas of their study. Likewise, just because learners have been taught to use a strategy, it does not mean they will continue to use it (Hofer, et al., 1998; Pintrich, 1995; Schunk & Zimmerman, 1998). When introducing strategies that increase metacognitive awareness, in conjunction with single tasks, students may see the strategy as applying only to that single task which may not foster transfer.

The issue of transfer is a central question for educators concerned about the feasibility of providing strategy instruction (Hofer, et al., 1998; Weinstein, Husman & Dierking, 2000). The problem of transfer highlights the debate about where to include SRL in the curriculum, in learning to learn courses or integrated into subject classes. In either case if transfer to other academic coursework does not occur, the training of strategy use has no value (Weinstein, et al., 2000).

2.8 Planning for Assessment

A constructive teaching system aligns teaching methods and assessment to the learning activities stated in the objectives (Biggs, 1999; Rhodes & Tallantyre, 1999; Dart & Boulton-Lewis, 1999) as explained in section 2.1. This is as important in computing education (McNabb, 2000) as elsewhere. The assessment process should therefore be based upon sound principles that allow for transparent outcomes for the student and a learning programme described in terms of outcomes of performance that specifically identify the key skills and knowledge required. Students may guess what they think will be in assessments and learn topics accordingly. However, if assessment requirements mirror the learning outcomes and the curriculum objectives, the students will benefit by learning what they are supposed to be learning. If the

course has been well designed using a constructive alignment process the student should be using the appropriate learning approaches.

An assumption among researchers, (Brophy, 2001; Biggs, 1999) is that different types of learning call for different kinds of teaching, however, all the parts of any course of study should be constructively aligned. Even though individual lecturers may not be able to influence their faculties' *standard* rationale for assessment demands, they may be able to influence the way the students prepare for exams. Whilst acknowledging that there are certain concepts that must be learnt in computing theory, for example computing terminology where memorisation may be appropriate, there need to be challenges in assessments that demand the demonstration of understanding and the construction of meaning (Scouller & Prosser, 1994; McNabb, 2000). Strategies can be introduced which help develop curiosity and integrate the task with prior knowledge, all of which are associated with a deep approach to learning (Trigwell & Prosser, 1991; Biggs, 1999).

2.9 Keeping an Academic Journal

Writing in journals is a way of helping students to develop a greater awareness of their own behaviour, motivation and cognition. Perceptions of progress are important aspects of motivation and self-regulated learning, (Schunk & Ertmer, 2000). If students believe that their efforts will have an effect on how much they learn, they are more likely to have higher motivation and put in a greater level of effort. On the other hand if students think that their efforts will not make a difference, they are less motivated to continue to try (Hagan & Weinstein, 1995).

Journal writing encourages students' self-regulation and enhances their practice as self-reflective learners (Hofer, Yu & Pintrich, 1998) because it encourages the

construction and reconstruction of their learning. Schunk (2000) suggests that monitoring comprehension is an effective technique of self-regulation and that reflecting on set goals enhances performance (Conti, 2001). Reflective practice is important because it helps students to develop metacognitive awareness; understanding how they are learning, in terms of the "why and how" (deep learning) instead of the "what" (surface) learning. Conti (2001) also believes that reflecting on set goals enhances performance.

Brookfield (1995) suggests that reflection challenges the truths about one's progress and helps break the self-fulfilling prophecies and prejudices that may lead to low self-efficacious beliefs about learning. When students write about their learning, they not only become aware of existing learning behaviours, they also become aware of how they can evaluate and improve them. In this way writing in journals can become a vehicle for learning.

It is important for lecturers to give timely and effective feedback on journal writing, so that students know how they are achieving and to help them learn from their mistakes. Feedback enhances learning and motivation by complementing the learning process. If feedback is effective it will contribute to reflection, better learning and development, but if feedback is destructive it may produce cynical reactions that will produce no potential change in learning. Studies in higher education in the UK reveal that students were often unhappy with feedback they received, citing reasons that the teacher feedback was often vague, used unfamiliar academic language and usually had a preoccupation with mistakes (Brockbank & McGill, 1998). The provisions of feedback is then of little value unless the recipient of that feedback can understand it, relates it to their learning practices and use the feedback to enhance learning.

Journal writing is only one effective way of encouraging self-reflection; however it can be encouraged in any classroom context and is relatively easy for the teacher to introduce.

2.10 Summary

Literature has been reviewed that has explained students' approaches to learning, distinguishing between the two distinct approaches of deep and surface. Students who adopt a deep approach to learning appear to interact with a learning task in a more complex way and are more likely to achieve optimal success and personal satisfaction of learning than those who adopt a surface approach. Different contexts, different individual perspectives and prior knowledge lead to various strategy combinations that learners may adopt. Literature has also been reviewed that explored the self-regulation of learning from theorists who believe that students can initiate, change and sustain specific learning practices. Contemporary views that recognize tenets from social cognitive and social constructivist theories have been explored in terms of building a framework for fostering the use of self-regulation strategies to encourage student use of deep approaches to learning within a computing environment.

2.11 Aims and Objectives

Although historically there has been a great deal of research into the use of computing in education, the literature was dominated by experimental studies investigating the measurement of machine effects of learning with very little study in end-user computing. More recently there has been movement towards a greater interest in the contextual variables related to how computers are used in education. It has been argued that teachers need to focus on the learner, not the computer or the software.

Recent trends in IT research (Dougherty, el al., in press) have indicated that there needs to be a shift away from IT literacy towards IT fluency.

The traditional skill-and-drill approach to teaching end-user computing has been ineffective in that it tends to promote a surface approach to learning, as it offers no challenge to higher levels of thinking. One way to help students achieve a deeper approach to learning is with the specific use of self-regulating learning activities that promote the use of goal-setting, problem-solving ability and reflection.

Relatively little information is available that specifically relates either to student approaches to learning or self-regulating learning in an end-user computing context within tertiary education. The increasingly culturally diverse student population has been problematic in that many teachers are floundering to find the best way they can present material to be learnt. Thus, there is a need to ascertain and document the effects of different teaching and learning methods that will advance and contribute to tertiary teaching practice in end-user computing.

2.12 Main Aim

This study investigates whether the introduction of learning strategies to encourage self-regulating learning will shift students' approaches towards a deeper approach to learning, within the context of end-user computing in a higher educational institution in New Zealand.

2.13 Specific Objectives

- Document the results of the R-SPQ-2F (Biggs, et al., 2001) at the beginning and end of the semester in a computer course in higher education.

- Explore student perceptions regarding their approaches to learning in a computing environment.
- Identify any cultural differences in student perceptions of approaches to learning.
- Introduce activities designed to encourage self-regulated learning.
- Identify whether students perceive the introduction of strategies to encourage self-regulated learning has improved the adoption of a deep approach to learning.
- Identify whether a shift has occurred towards a deeper approach to learning during the semester.

CHAPTER 3

Method

This chapter outlines the overall methodological approach taken. It presents the sample of participants and makes justification for using a sample of convenience. A timeline is presented to represent visually the research procedures taken. Attention is given to validity and reliability of the research process, together with ethical considerations imposed. A detailed account of the data collection and steps taken for the data analysis are presented. A flowchart concludes the chapter, showing the process of data analysis from the research questions to the presentation of the findings.

3.1 Research Design

This research was designed to meet the specific aims within what has been phrased a multidimensional paradigm (Cresswell, 2002), using both quantitative and qualitative methods of data collection. This paradigm is based on the selection of methods and techniques that will best answer the research questions and provide a complete picture of the research problem. There has been some argument as to whether qualitative and quantitative approaches are incompatible (Lincoln & Guba, 2000; 1985). Quantitative research is used for measuring and quantifying phenomena, using deductive strategies and usually starting from a theory and testing it. Qualitative research, on the other hand, uses inductive strategies to study knowledge and practice. It seeks to explain the world as experienced by those in it and Merriam (1998, p. 202) states "one of the assumptions underlying qualitative research is that reality is holistic, multidimensional and ever-changing; it is not a single, fixed objective phenomenon waiting to be

discovered, observed, and measured as in quantitative research". Both inductive and deductive strategies are used in this study as both can give different, yet relevant analysis of data. No method or collection of methods "is the royal road to ultimate knowledge" (Lincoln & Guba, 2000, p.178).

A case study approach was chosen for this research because of its effectiveness when researching specific educational instructional strategies within the setting of a classroom. The case study approach can be used in a variety of ways, but whatever the particular style, one of its main purposes is to gather rich collections of descriptive information. It is useful for taking a fresh look at what is happening in context and for monitoring trends and changes (Stake, 2000). In this case, it will be utilised as a resource for the potential to improve practice in the area of teaching computer fluency in line with contemporary research that advocates reflection in practice.

3.2 Participants

In line with current trends in educational research, the researcher is also the teacher and the students are the participants. This purposeful sample was considered necessary, not only because of convenience, but also to critique existing practice of end-user computing education, and to provide a description of the perceptions of students from diverse backgrounds within a tertiary setting. Perhaps the strongest argument for classroom research using a convenience sample is one given by Tolich (2001, p. 88) that "the alternative can be unexamined educational practice". Thus the results of this research have the potential to be used to contribute to the improvement of practice, reflecting current views of using the classroom as a means for action learning (Kember, 2002).

The sample was taken from the Diploma in Business programme in a New Zealand university. Two classes were selected at random from a total of 13 streams taking a first year compulsory paper in end-user computing in Semester One, 2002.

Out of those two classes:

44 students completed the R-SPQ-2F questionnaire (Biggs, et al., 2001) at the beginning and end of the semester

Out of these participants:

15 attended focus group discussions at the beginning, middle and end of the semester.

13 agreed to the collection and analysis of their academic journals (not necessarily those participants who had attended the focus group discussions).

Participants were asked to state their ethnicity for the following reasons:

a) The student population was expected to be varied. The trend of increasing numbers of international full fee-paying students enrolling in New Zealand tertiary institutions, especially from Asia, is expected to continue as shown in Table 2.3.

b) Use of the R-SPQ-2F is permitted by the authors (Biggs et al., 2001) provided a copy of the data collected is sent to the them for purposes of comparison and establishing cultural validity in New Zealand.

Table 3.1 shows participants' ethnicity and forms of participation.

Table 3.1 Ethnicity of Participants

Ethnic Group	R-SPQ-2F	Focus Group Interviews	Collection of Journal
Asian	30	7	5
European	7	5	5
Maori	1		
Pasifika	2	1	1
Indian	1	1	1
Fijian Indian	1	1	1
African	1		
Total	**43**	**15**	**13**

3.3 The Context

The particular aims of the course in which the participants were enrolled, is to give students basic knowledge of how to use relevant software packages used in general business such as spreadsheet, word processing, database management, presentation packages and browsers. The paper also aims to make students familiar with the components of a computer system, for example, a knowledge of hardware and peripherals, together with a basic introduction to the digital representation of data and connectivity with relevance to the internet.

The teacher contact time for this paper was for two hours of practical sessions, a one-hour tutorial and one-hour theory session per week, for one full semester. Further self-directed study in a computer lab is expected but not monitored. There were three assessments: Week 7, Word Processing and Theory test; Week 10, Spreadsheeting test; and Week 14, Database and Theory final exam.

3.4 Procedure

A timeline of the procedure during the semester from Week One to Week 14 is represented in Figure 3.1.

Figure 3.1 Timeline for Study Weeks 1-14

Procedure	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
Information Sheet and Consent Form 1	↔													
First R-SPQ-2F	↔													
Information Sheet/ Consent Form 2	↔													
Focus Group 1	↔													
Assessment One/ Spreadsheet							↔							
Focus Group 2							↔							
Assessment Two/ Word Processing and Theory										↔				
Focus Group 3														↔
Information Sheet/ Consent Form 3													↔	
Assessment Three/ Database and Theory														↔
Second R-SPQ-2F														↔
Collection of Journal														↔
Teaching Strategies														
Goal Setting	↔													
Fostering Strategy Use	←	—	—	—	—	—	—	—	—	—	—	—	→	
Developing Self - Reflection		←	—	—	—	—	—	—	—	—	—	—	→	
Planning for Assessments					←	—	—	—	—	—	—	—	—	→

3.4.1 Measurement Of Student Approaches To Learning

The Revised two-factor Study Process Questionnaire R-SPQ-2F (Biggs et al., 2001) was used to measure participants' approaches to learning and was administered both at the beginning and end of the semester. This questionnaire contains 20 questions, using a Likert five-point scale. Responses were used to categorise students into two approaches of learning, deep and surface, each with motive and strategy subscales. A deep approach is characterised by an intention to understand the material by relating it to a wider context; a surface approach is characterised by an intention just to complete the requirement of a task with a reliance on memorisation. The questionnaire, answer sheet and scoring information (Biggs, et al., 2001, pp.148-149) are included as Appendix A.

This revised version of the SPQ relates to the quality of learning through its distinction between surface and deep approaches. A large number of findings confirm the construct validity of the original SPQ (Biggs, 1987b), and factor analysis of responses has supported the underlying structure of deep and surface approaches to learning and their related subscales (Biggs & Watkins, 1996). Reliability was confirmed showing reasonable stability, yet allowing for some movement over time. The revised model was validated, based on studies in Hong Kong and confirmatory factor analysis indicated a good fit to the 2-factor structure (Biggs, et al., 2001).

3.4.2 Focus Group Discussions

Focus group discussions were held with participants at the beginning, middle and end of the semester, facilitated by a research assistant. There were three groups in all, each with five participants attending. The responses in the discussion were used to obtain student perceptions regarding learning and study approaches and to monitor if change had occurred over time. Audiotapes were used to record responses.

Guidelines for the discussions were prepared and a copy is included as Appendix B. The questions used to generate discussion in the groups appear as Appendix C.

The focus group method was chosen because it is consistent with education sector research trends that seek understanding of what students think and feel. In this way the data that result from these focus group discussions lend themselves to the inductive, qualitative research paradigm (Vaughn, Shay, Schumm & Sinagub, 1996). Traditional research interview techniques historically have centred on stimulus/response-type questions and although this made responses easily transferable into qualitative data and easy to analyse, Mishler (1986) argued it did not give credence to how individuals understand their social, cultural and personal circumstances.

One of the strengths of the focus group, according to Vaughn, et al., (1996) and George and Cowan (1999), is that every student is bringing with them their own experiences and view of reality. In a focus group, diverse opinions and perspectives can be enhanced in open dialogue, as opposed to closed questionnaires that have been articulated from a lecturer's point of view.

Participants also have the security of being amongst their peers who may share similar feelings, opinions and experiences. Unlike structured interviews or surveys, the permissive atmosphere of focus group discussions encourages an open forum where participants clarify their point of view and even provide examples to back up their beliefs. In addition, the interaction between the facilitator and the group participants is "recognised as having potential to add depth and dimension to the knowledge gained" (Vaughn, et al., 1996, p.16).

3.5 Teaching Strategies To Foster Self-Regulation

Strategies to encourage self-regulated learning were introduced to help students adopt a deeper learning/study approach. The intervention took place in four different areas:

- Setting learning goals
- Fostering the use of strategies for meaningful learning
- Developing self-reflection
- Planning for assessments

Table 3.2 outlines the task, the learning strategy involved and the teaching perspective and approach taken. Teaching was the same for all the students enrolled in the two papers, whether or not the students were participating in the research.

3.5.1 Set Learning Goals

Students were asked to set individual goals at the beginning of the semester. They were asked to set at least two short-term goals and one long-term goal that were realistic, challenging and measurable. Students recorded these goals in journals and were told that they would need to reflect on them at a later date. To make the goal setting relevant to this paper, students were asked to think about staircasing opportunities available to them from a diploma to degree programmes. This highlighted the link between achieving goals at this level to reach the goal of the future. This is likely to enhance a mastery orientation towards learning the material and increase motivation (Patrick & Pintrich, 2001).

Table 3.2 Developing Self-Regulated Practices

Task	Learning Strategy	Teaching Perspective and Approach
Set learning goals	• Effective planning • Reflect on progress • Direct student attention to learning tasks • Commitment to learning	• Learner-generated • Modeling processes • Reflecting multiple perspectives
Foster the use of learning strategies	• Develop strategies to read a text book • Problem-solving methods	• Modeling processes • Reflecting multiple perspectives • Guided inquiry
Plan for assessments	• Identify prior knowledge • Make task coherent with own experience • See parts of a task as making up a whole • Self reflection on progress	• Interactive • Explorative • Scaffolded support
Develop self-reflection	• Keep an academic journal for explicit self-reflection • Reflection on learning process • Relate learning processes to other areas of study (transfer)	• Learner generated • Feedback enhanced

3.5.2 Foster the use of Learning Strategies

As many students arrive at tertiary institutions totally unaware of how to read a text book in a self-regulated manner (Copolla; 1995), ways of doing this were demonstrated from week one. The students were guided through the first chapter of the text book with the special learning aids being pointed out, shown how to pick out of the text the important information versus the supporting material, and how the summary points and review questions at the end of each chapter could be utilised. Throughout the semester, students were reminded of how to make use of existing and new information and how to read a book in a non-linear fashion through the use of case studies and problems, encouraging students to predict, refine and reflect. Students were given both theory and practical problems to solve, but were advised to use the computing workbook sparingly to discourage the adoption of rote-learning strategies. Reflection on what methods and strategies the students found helpful was encouraged through the use of journal writing.

3.5.3 Plan for Assessments

The assessments for the paper consisted of 3 practicum tests assessing end-user computing skills totalling 65% of the final grade; spreadsheet, 25%; wordprocessing 20% and database, 20%. Fifteen percent of the objective testing of the theory component consisted of multiple choice and short answer questions. Case study problems assessing application and professional skills comprised the final 20%. The researcher did not write the learning outcomes, assessment format and marking criteria, therefore limiting constructive alignment between curriculum objectives and assessment tasks. All assessments were group-marked to achieve consistency among the 13 streams.

To plan for practical assessments, students were given the learning outcomes, the assessment criteria and an example of a question that could occur in an assessment, in line with the notion of constructive alignment that helps to encourage students to adopt a deep approach to learning (Biggs, 1999). Worksheets were given that allowed for identification of prior knowledge, reflection upon that knowledge, identification of any information gaps, planning how to achieve what was needed and the monitoring of individual progress with the teacher. Two examples are included as Appendix D. Helping students to adopt strategies that help curiosity, such as making the task coherent with individual experience; looking for patterns and underlying principles; integrating the task with existing awareness, and seeing the parts of a task as making up the whole, are all associated with a deep approach to learning (Trigwell & Prosser, 1991; Biggs, 1999).

To plan for theory assessments, students were given case studies to revise. They were given an example of a business and asked to relate their revision to that particular case study. An example is shown as Appendix E. This encouraged students to use a deep approach to their study by applying their understanding to the bigger picture, rather than rote learning parts of the textbook.

3.5.4 Develop Self-Reflection

In addition to the set course work, the students were asked to keep an academic journal throughout the semester to record their goals and respond to questions that prompted critical reflection of their learning. The focus of the journal was for students to reflect on their learning and motivation in this course. Any learning strategies students acquired in this course may have a spin-off effect and benefit them in other courses. Students were expected to describe in their journals the specific strategies they utilised and in particular the effects this had on their studying and performance.

Journal questions were given over 11 weeks and appear as Appendix F. Any replies to the questions were optional. The journals were not graded and did not form part of the overall course grade, but were handed in weekly for responsive feedback. After the final assessment had been completed and marked, the research assistant collected participating students' journals. Copies were taken and the journals returned to the students. The copies were coded for identification, in the same way as the focus groups.

3.6 Validity and Reliability

All research studies should have both validity and reliability. These concepts however are more difficult to prove for qualitative than they are for quantitative research. Merriam (1998) notes that researchers are still developing a consensus as to the appropriate criteria for assessing validity and reliability in qualitative research. Questions relating to validity and reliability come from assumptions underlying positivist and quantitative research paradigms. If, as Merriam (1998) suggests, we start research from the world-view of the qualitative paradigm where there are "multiple constructions of reality, where the researcher is the primary instrument of data collection and analysis, and where understanding and meaning are of paramount importance, these same issues take on a new slant" (p. 212).

Researchers holding fast to the qualitative paradigm maintain that the concepts of trustworthiness and authenticity are more sound than validity and reliability. However Lincoln and Guba (2000) show that validity cannot be dismissed within any criteria, as all researchers have to prove the study's authenticity and trustworthiness. Within the concept of validity, all researchers should ask "would I feel sufficiently secure about these findings to construct social policy or legislation?" (Lincoln & Guba, 2000, p.178) based on the results. Both internal and external validity will be addressed below.

3.6.1 Internal Validity

Internal validity addresses the match between research findings and reality. This asks whether the study is credible and how closely the findings identify what is really there. In order to answer these questions it is important to consider the exact nature of reality in the context of this study. The research findings of this study are based on the participants' perceptions and opinions of their study experiences. Individual perceptions and experiences affect how participants view reality and in this context the reality is those perceptions of life experiences. Merriam (1998) argues that if reality is viewed in this manner, internal validity can be seen as a definite strength of qualitative research designs. This is especially true when incorporating focus group discussions where participants are given a chance to relate and discuss how they personally view reality.

Internal validity is strengthened by the use of triangulation, (Davidson & Tolich, 1999; Mertons, 1998; Merriam, 1998). Triangulation is the process of comparing and justifying data from one method of evaluation against that from another to enhance credibility (Kember, 2000). Although Walford (2001) points out that triangulation may not be theoretically possible, it is noted by Bassey, (1999) and Lincoln and Guba, (2000) that generating data through several means and using a mixed method design (Cresswell, 2002) reduces the likelihood of misinterpretation, which strengthens confidence in the findings. This study has followed the recommendation by Kember et al., (1997), using a questionnaire to measure students' approaches to learning, in conjunction with other evaluation techniques (focus group interviews and collection of academic journal entries), thus performing a triangulation procedure of collecting data by multiple methods from the same population of students.

3.6.2 External Validity

External validity is the extent to which the findings of a study can be generalised and applied to other situations when using the same methodology. Transferability can only be possible if the researcher can give sufficient descriptive information to enable the research design to be applied in a similar context, for the purpose of producing similar conclusions. This study, although limited by the small size of the sample, could be replicated in other institutions of further education that are registered to teach the NZ Diploma of Business Programme. However, it would be wrong to suggest that the culture of the sample institution in Auckland is necessarily representative of all New Zealand tertiary institutions.

Mertens (1998) explains that a conflict always exists between internal and external validity. To achieve perfect internal validity and control all extraneous variables then the laboratory would be the best setting for the research. However, to achieve perfect external validity, studies should be conducted in context, i.e. in the classroom where it is more difficult to eliminate the influence of extraneous variables. It follows that the more a study in a classroom is controlled to gain reliability, the more the project departs from an authentic setting. Therefore, a certain amount of internal validity has been sacrificed because of the need to research within the classroom context. On the whole, qualitative research seeks to provide a valid description of what individuals have said or written in a particular research context. It does not seek to generalize the whole population. This study may not be able to be generalized to other locations but the results reflect the opinions and perceptions of the students in this study.

3.6.4 Reliability

Reliability addresses the dependability of the research. In other words, can consistency be guaranteed to obtain the same results when repeating a given research

project with different participants? As individual perceptions and opinions were fostered in the focus group interviews and the academic journal writing, reliability is difficult to clarify. As the participants' individual study experiences will influence their interpretation of reality, there can be no benchmarks by which to judge reliability (Merriam, 1998). It is suggested by Lincoln and Guba (1985) that, rather than repeating a study in an attempt to ascertain if the results are replicable, the research focus should be on obtaining sensible results within the research context.

3.7 Ethical Considerations

As with any research that is carried out on human participants, ethical considerations were paramount. Ethical approval was applied for and granted by the Massey University, College of Education Ethics Committee, and by the institution where the research took place. This study presented a number of ethical concerns in particular, because the researcher for this study was also the set classroom teacher for the paper. Care was taken to gain permission from the institution and any person involved in the research, and arrangements were made for concealing individual identity and settings.

At each stage of the research, great care was taken that the participant names had been withheld from the researcher/teacher during the semester and until all assessments were finalised. Every effort was made by the researcher and the research assistant to minimise disruption to the normal course programme. The participants were fully informed of the purpose of the research, were reminded they could ask any questions about the study at any time, and were free to withdraw at any point in the data collection process. Assurance was given to participants that their responses would not influence their results in any way. The findings of the study will be available for participants to view in both the library of the institution of research and in Massey University library.

3.7.1 Informed Consent

Approval was sought from the Dean, Faculty of Business, before the research began. Once this was granted, students were given information sheets outlining the proposed study, together with consent forms for their approval to take part in the data collection. Three separate information sheets and consent forms were issued for the collection of the R-SPQ-2F, participation in focus group discussions and collection of academic work. Agreement to take part in one element of the study did not assume further participation. Students were assured that participation in the data collection of this research was voluntary and independent of any papers in which any of the students were enrolled, together with any assessment procedure associated with this or any course of their study. Copies of all information sheets and consent forms are shown as Appendix G.

3.7.2 Conflict of Roles

A possible conflict of roles could have existed within this project because the researcher was also the teacher of the sample of students. To avoid a conflict of roles and to ensure student anonymity, a research assistant was appointed and asked to sign a confidentiality agreement, as shown in Appendix G. This assistant was asked to carry out the following functions:

1. Distribute information sheets to the two classes in the study and answer any questions.

2. Assure the students that the researcher would have no knowledge of participants. To be responsible for this anonymity. Assure the participants they could withdraw from the study at any time. To be responsible for the destroying of any data held for any person who may withdraw.

3. Obtain permission from volunteers to collect data from the R-SPQ-2F, focus group discussions and academic journal.

4. Deliver, explain and collect the demographic questionnaire and R-SPQ-2F both at the beginning and end of the semester.

5. Facilitate the focus group discussions, as per guidelines included as Appendix B. Transcribe data from the focus group discussions, devise a code for identification of the source of responses and pass on to the researcher at the end of the semester.

6. At the end of the semester after the final assessment, collect and copy participants' journals. Return the original to the student in the normal course of university procedure.

7. To keep all responses confidential during the study. To hand all information to the researcher after the final assessment and remove data from personal hard-drive.

3.8 Quantitative Data Analysis

The responses to the R-SPQ-2F (Biggs, et al., 2001) were tabulated with the use of SPSS software programme. The computation of the R-SPQ-2F was carried out as per the author's suggestion (Biggs, et al., 2001) by summing up the corresponding 10 items and establishing a mean score of deep and surface approaches. Comparisons were made between the beginning and end of the semester to identify if deeper learning had occurred. The results were compared with results from qualitative data collection.

3.9 Qualitative Data Analysis

The focus group discussions were transcribed by the research assistant and given to the researcher, together with photocopies of the students' academic journals, after the final exam and when all assessment was completed. A copy of transcribed notes from one of the focus group sessions is included as Appendix H, together with a copy of one page of an academic journal as Appendix I.

A framework was adapted from Vaughn, et al., (1996) and Creswell (2002) that comprised a step-by-step analysis method.

Step One: Ensuring Dialogue in Context

To ensure an understanding of the influence of dialogue in context, all sections of text were coded and then photocopied so that any data separated from their original context, for the purpose of categorising, could be traced back to their original source. It was noted how much probing and guiding from the research assistant took place, together with what dialogue flowed naturally. Majority and minority opinions were noted together with distractions in the discussion, for example, when a dominator in the group had had too much emphasis on group discussion.

Step Two: Identify the Main Ideas

Several main ideas were identified to provide the initial framework for the development of the major findings. The main ideas were refined later in the process.

Step Three: Identify Units of Meaning

This step involved identifying small units of meaning from the data. A unit of data can be defined as a "bit" of information that could be as small as a phrase or even a whole paragraph that is informative by itself. For a unit to be considered it had to be information relevant to the study and the research question. The process of breaking

the data down into segments of information allowed for clearer discrimination when allocating criteria for different categories.

Step Four: Categorising the Units

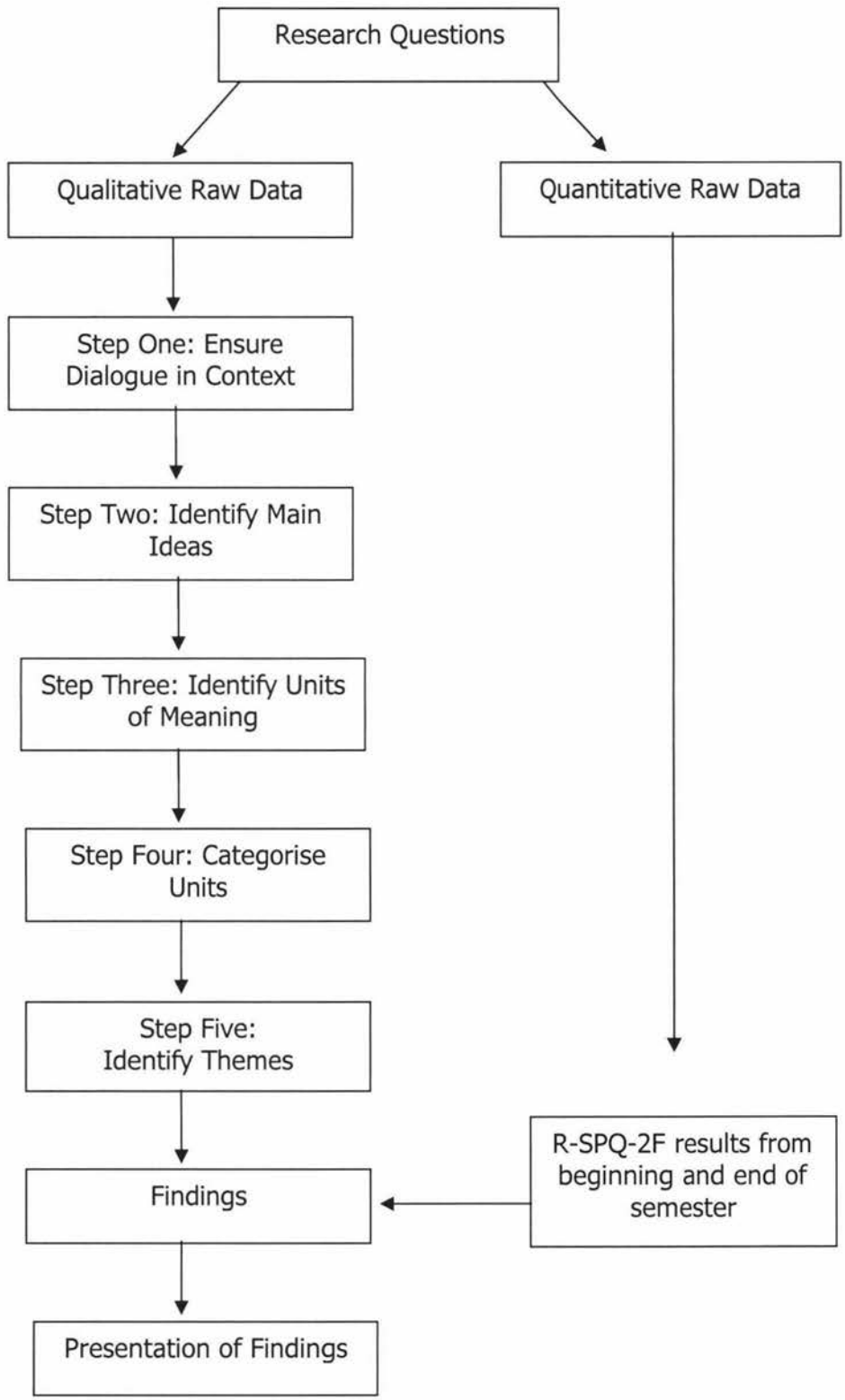
This step involved placing segments of information into provisional categories that reflected the purpose of the study, in that they answered the research questions. This process provided the structure for summarising the findings. Miscellaneous data, that although interesting, but which failed to fit into an established category, were put to one side and reviewed again. If after re-evaluation the units did not fit an existing category and no further categories could be established, the data were discarded as being redundant information.

Step Five: Identify the Themes

The main ideas that were generated in the first step were re-examined to consider if these could be supported by the categories identified and possible relationships among categories were identified. This step provided the structure for summarizing the findings. The categories were then restated to form themes and presented in the findings as a combination of direct quotations.

Creswell (2002) suggests it is helpful to make a diagram of the process taken to analyse data. Figure 3.2 shows the process from the research question to the presentation of findings.

Figure 3.2 Process of Data Collection and Analysis



CHAPTER 4

Results and Discussion

This chapter provides the findings of the research and presents the information in two parts. Part One presents the findings and discussion from the quantitative data, the R-SPQ-2F results from the beginning and end of the semester. Additionally it presents end-of-course results from the research classes and the 11 other streams enrolled in the paper, and discusses the correlations with academic grades. Part Two presents the findings and discussion from the qualitative data which comprises data from the focus group discussions and the students' academic journals. The areas of primary focus are: students' perceptions of learning in a computing environment; perceptions of inhibiting factors towards a deep approach to learning; how students study for tests and exams; and perceptions of developing self-regulating strategies. Because of the cultural diversity of the participants in this study, cultural differences are a common theme that runs throughout the study.

Part One: Quantitative Findings

4.1 Student Approaches to Learning

This section presents data from the R-SPQ-2F given at the beginning and end of the semester. The results from this questionnaire reveal no change between surface and deep approaches from the beginning to end of the semester.

The mean scores were obtained using the method recommended by the authors (Biggs, et al., 2001, p.149). The mean was calculated from the scores of all the students for the questions corresponding to each scale in the inventory, with both scales containing sub-scales of motive and strategy. Of the 20 questions, 10 relate to surface approaches and 10 to deep approaches, which gives a possible maximum score for each approach of 50 points. Whereas the calculated mean values do not have an absolute meaning, they are useful when looking for trends within the study and to identify whether learning approaches have changed over time.

The mean of deep approach was higher than the mean of surface approach at both the beginning and end of the semester. This suggests that as the participants began the semester with a tendency toward a deeper learning approach, there was little room for change. At both the beginning and end of the semester, the mean for surface approach was mid-range and the deep approach mean was 10% above mid-range. The researcher knows of no norm tables available covering deep and surface approaches within similar study contexts in New Zealand. Table 4.1 shows the mean approach, motive and strategy adopted by the participants at the beginning and end of the semester.

Table 4.1 Mean Scores for Deep and Surface Approaches

Semester			Deep Motive	Deep Strategy	Surface Motive	Surface Strategy	Deep Approach	Surface Approach
Beginning	n=43	Mean	15.2	15.2	11.6	13.9	30.3	25.4
		Std. Dev	3.1	3.2	3.3	3.9	5.1	5.9
End	n=43	Mean	15.0	15.2	11.3	13.7	30.2	25.0
		Std. Dev	3.0	3.2	3.3	3.4	5.1	6.1

The R-SPQ-2F results were broken down into ethnic groupings using three categories of European, Asian and Other. It was necessary to collapse all non-Asian and

European ethnic groups into one category because of the small sample size. Table 4.2 shows that the European and Asian students both obtained similar mean scores for both deep and surface approaches. The higher scores for deep approaches in both groups indicate their preference for choosing deep approaches above surface. These results go against the widely held belief that all Asian students are surface learners. No ethnic group reveals changes in their approaches to learning between the beginning and end of the semester.

Table 4.2 Mean Scores by Ethnicity

Semester	Ethnicity			Deep Motive	Deep Strategy	Surface Motive	Surface Strategy	Deep Approach	Surface Approach
Beginning	European	n=7	Mean	17.1	14.1	11.3	13.0	31.3	24.3
			Std. Dev	3.0	4.8	4.2	4.5	6.7	8.3
End			Mean	16.7	14.1	10.9	12.7	30.9	23.6
			Std. Dev	3.1	4.8	4.3	4.3	7.1	8.2
Beginning	Asian	n=30	Mean	15.1	15.6	11.7	13.8	30.7	25.4
			Std. Dev	2.3	2.8	2.6	3.2	4.3	5.3
End			Mean	15.0	15.7	11.4	13.5	30.7	24.9
			Std. Dev	2.2	2.6	2.7	3.3	4.0	5.5
Beginning	Other	n-6	Mean	13.7	14.3	11.4	15.1	28.0	26.6
			Std. Dev	5.0	3.2	5.2	2.9	6.8	6.7
End			Mean	13.4	14.4	11.3	15.3	27.9	26.6
			Std. Dev	5.0	3.4	5.0	2.9	7.1	6.4

As the quantitative results in this study showed little change, an investigation was made to determine if other recent studies have reported similar findings of little change in deep approach scores when using inventories that measure approaches to learning. Sivan, Leung, Woon and Kember, (2002) reference several studies reporting that increases in deep approach scores, measured over time, were difficult to obtain. These authors also maintain that in undergraduate studies, students tend to become decreasingly deep in their approaches to learning, a finding also supported by Kember,

et al. (1997) and Biggs (2001). Contrary to these findings, in this study the students' adoption of deep motives and strategies did not decrease.

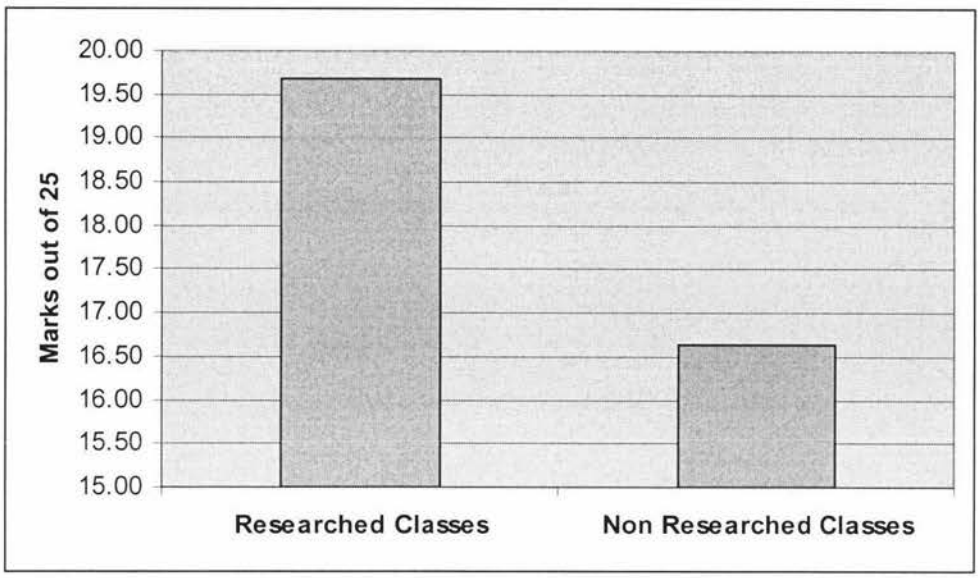
Even though Kember, et al. (1997) advocate repeated applications of inventories of approaches to learning as an appropriate technique for the evaluation of educational innovations, it could be that one semester is not long enough duration to reveal a significant change over time.

A reason why the results of the R-SPQ-2F remained fairly constant from the beginning until the end of the semester could be due to test-retest reliability. Individual scores on the same test on two occasions gives an indication of the stability and reliability of the scores over time. The SPQ (upon which the revised two factor model was based) is "in general, a reliable test" and is "one that gives similar, if not identical, results from occasion to occasion" (Biggs, 1987b, p. 22) and therefore may not be the most suitable indicator of change.

4.2 Student Approaches to Learning and Academic Grades

Regardless of the similar findings of the R-SPQ-2F indicating there was a consistent preference for deep over surface approaches at the beginning and end of the semester, the end of course grades were positive. Figure 4.1 illustrates the average mark for all of the 13 streams in this course, showing the higher average of the researched classes. The researched classes comprised 17% of the students in all the 13 streams.

Figure 4.1 Average Mark for the Spreadsheet Test

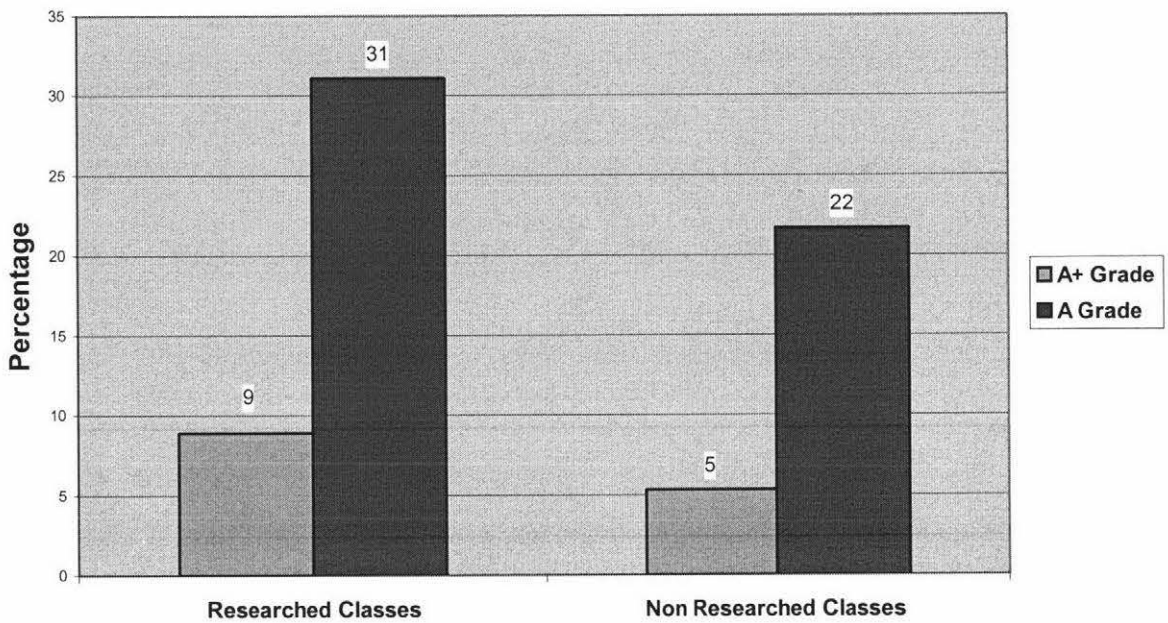


Pearson product-moment correlation coefficients were calculated to establish whether relationships exist between students' adopted approach to learning, as measured by deep and surface scores on the R-SPQ-2F, and the end-of-course percentages. The results indicate that there was no significant correlation between the end of semester approaches to learning scores and the end-of-course percentages. Correlations between course percentages and deep approach scores ($r = 0.093$, $p = 0.276$, NS), and between course percentages and surface approach scores ($r = -0.154$, $p = 0.163$, NS), reveal that in both cases there is no systematic relationship between the two variables. The limitations of small sample size (n=43) and narrow range of scores on the R-SPQ-2F need to be recognised in interpreting these results. In addition it was not possible to achieve full constructive alignment among curriculum objectives, teaching and learning activities, and assessment tasks, as the researcher did not develop the assessment tasks.

Although these results do not show any significant relationships, the end-of-course grades obtained did indicate that the teaching intervention utilised in this study

enabled students to obtain better than expected results. The researched classes obtained a higher percentage of students achieving an A+ or A grade than the non-researched classes as shown in Figure 4.2. The teaching of self-regulating strategies to encourage deep approaches to learning helped to negate the tendency for students in higher education to adopt an increasingly surface approach over time.

Figure 4.2 Percentage of Students Obtaining A+/A Final Grade.



Part Two: Qualitative Findings

For many of the participants, English is not their first language and they are referred to as "English as another language" (EAL) students. The statements below are verbatim quotations from the students, either during focus group discussions or from their individual journals. Direct quotations that contain grammatical errors have not been corrected. To identify the source of the quotations, an unidentifiable code for the participant was used together with identification of either focus group or journal, for example, XR: FG1,1, identifies the participant XR who was in focus group one, quoted on page one of the transcript, and AG: J,3 identifies page 3 of participant AG's journal. Two examples of the original source are shown as Appendix H and I respectively.

4.3 Perceptions of Learning in a Computer Environment

This section presents data pertaining to the research question of how students perceived their approaches to learning how to use a computer. There was a wide range of students' prior knowledge, from a novice learner to being quite proficient. The responses were therefore varied, indicating confusion and frustration, to interest and challenge. Two themes were identified as significant: motivational factors and cultural differences of learning.

4.3.1 Motivational Factors

Many students found that learning how to use a computer at a practical level was easier than learning theory because the computer gave immediate feedback.

> *"It's not like learning Economics or something like that. .....the computer gives you feedback. It's there and you know immediately if you are right or wrong, if you are learning for theory then it's different* "(MG: FG3,2)

At the beginning of the semester only one respondent thought that learning to use a computer was uninspiring because she could not use her imagination.

> *"In other subjects you can use imagination – even after you have research, you to be well organised and imaginative – in computing, there is no imagination, it's press this, press that, very boring – no motivation."* (VC: FG2,2)

Participant XR indicated that interest in a subject increased motivation.

> *"It's my great interest..... Is easier to learn if you have interest."* (XR: FG1,2)

Interest in the subject has been described as an essential characteristic of a deep approach to learning (Biggs, 1999). However XR's individual R-SPQ-2F results, indicate that he is slightly more inclined to use a surface approach compared to deep, which remained fairly stable from the beginning and end of the semester.

Table 4.3 Individual Score for Participant XR

Semester	Participant	Deep Motive	Deep Strategy	Surface Motive	Surface Strategy	Deep Approach	Surface Approach
Beginning	XR	12	14	15	17	26	32
End		13	14	15	17	27	32

The common perception for most students at the beginning of the semester was that learning to use the computer had to be considered "fun" to be motivating. This could be due to student's prior experience with learning and playing computing games. In relation to the 3P Model of Teaching and Learning, presage factors of prior knowledge and experience interact at the process level to determine the learning approach adopted (Biggs, 1999). SW's belief that no learning could take place unless it was considered "fun" may pre-determine his approach to learning. (The R-SPQ-2F results for SW are shown on page 79.)

"...like your mobile phones – you play on them." (JR: FG1,1)

"It has to be fun or you don't learn anything." (SW: FG1,2)

Towards the end of the semester there was a strong indication that opinions were changing and the acquisition of skills were starting to be perceived as more important. The value of the usefulness of skills became the motivating force.

"I only used them to play games but it is useful ..... In Management [paper] I made these tables and I got really good comments about the presentation." (SC: J,3)

"Putting it into everyday use motivates me, I was using the computer last night putting up my netball draw, and I just did it [made a table], *so I am putting it into everyday use now."* (AG: J,4)

These students are indicating that the computer skills they are learning are valuable in their everyday life. This is consistent with research that suggests the value students ascribe to their learning is a central component of motivation (Schunk, 2000).

4.3.2 Cultural Differences

Many participating EAL students expressed differences in their perceptions and expectations of studying in a New Zealand tertiary institution:

"Learning here is certainly different to India. In India we use more books, it's more practical here. Life is different. There is more competition in India." (JM: FG2, 2)

"It's different, parents want to be proud so the pressure is on to succeed, we have to obey." (SC: FG2,2)

"In China they are more hard working than here. We are used to hard work, so study hard." (ZF: FG2,2)

"Not the same. In China we use a lot of memory for learning... we have to work hard to pass." (LQ: FG2,5)

These comments indicate cultural differences in the way students perceive their learning in New Zealand. The interrelated social, cultural and political attitudes of communities are all key indicators of students' perceptions (Biggs, 1999). As students from different cultures have different personal histories of prior learning experiences, their views on approaches to learning may differ from one culture to another. At the presage level of learning, as the 3P Model of Teaching and Learning suggests, these prior experiences and knowledge regarding learning may interact to determine the learning approach taken. In relation to current views of social constructivism, learning is affected by the interplay of both cognitive and social processes in the context of the classroom, and could result in a "mismatch between cultural backgrounds and classroom experience" (Cullen, 2002, p.62).

Literature suggests that students from Asia place a consistently high value on academic achievement, (Volet & Renshaw 1996; Biggs, 1996). These students from India and China consider that in New Zealand, learning is easier, more practical with less competition, which may affect the way these students approach individual tasks and regulate their behaviour. Students from Asia show they believe they have to work hard to succeed indicating they are attributing success to effort. This is consistent with research that shows the CHC tradition is of the belief that a learner's intelligence is not innate and relatively fixed, but something that can be improved upon by putting in a lot of effort (Watkins & Biggs, 1996; On, 1996).

Differences in expectations of study are confirmed by current research which has suggested that international students in New Zealand, especially from Asia, have different expectations of learning thus causing a mismatch between their expectations and their New Zealand study experiences (Li, et al., 2002). The educational and

personal experiences that EAL students bring to this country are therefore the foundations upon which they build their study in any chosen discipline.

4.3.3 English Language Fluency

There was a common theme that EAL students found the level of English required for this course difficult. Lack of language fluency can be a barrier to any learning in any environment. On entering this course, EAL students are expected to have acquired the necessary language skills to cope with their academic studies with an IELTS of 6.0[1]. It could be that this is not a high enough proficiency level to cope with specific linguistic requirements of specialised subjects, which may hamper the process of learning. The response below by EAL students sums up many of the comments made about their learning.

> *"The English – language just too hard."* (AZ: FG3,1)

Many EAL respondents were particularly critical of the fact that they were expected to do group work.

> *"Group work is hard for us, we have English second language and hard to give idea in group in language. We had to give idea on microprocessor, but computing is hard, language so difficult."*(CT: FG1,3)

If students were expected to present their group findings to the class, many considered it a further threat. Most EAL students expressed a fear of speaking in front of others. They found that although they may have had ideas to present, they did not have sufficient time to organise their ideas and language and were too preoccupied with

---

[1] IELTS, (International English Language Testing System). Students with an academic average of 6.0 are considered to be a competent user of the English language.

worrying about the ordeal to be able to benefit from learning from others. XR, explains how he perceived the group learning experience.

> *"When one group have one question and you just do one question and then we not care about another question. Just doing one specific question even though another group just do another question. Would be better if all do the same question because you can't concentrate on other ones, because you're nervous, because English second language so sometimes when the classmates are doing their speech you thinking, thinking about language of how you are going to speak and you do not learn from other group."* (XR: FG1,3)

Although, according to Biggs (1999), CHC students are familiar with an environment that stresses a much heavier workload with more in class instruction than in New Zealand, they are seldom requested to make presentations in front of their peers. EAL students, especially those from the CHC tradition, not only have to experience the discomfort of speaking in front of others for the first time in their lives, but they also have to do it in their second language. The expectations of a New Zealand learning establishment puts pressure on EAL students to perform to our standards. In relation to the 3P Model of Teaching and Learning (Biggs, 1999) it could well be that for these students the process of learning is not aligned to the presage factors. Their prior learning experiences may not have given them the opportunity to work in groups and the process of learning in the way of verbally presenting ideas, especially in another language.

Participant XR appears to have grasped the idea that participating in group work is beneficial to learning, however, he and others go on to criticise their EAL peers because they could not understand them.

> *"When you have some group you will try to dispute to give your ideas for to help in the group. So you can learn a lot but only if students in group can speak English."* (XR: FG1,4)

> *"Sometimes when the classmates from other groups doing their speech, sometimes they speak so they can't speak up so we can't keep up with their speech. Sometimes it's not easy to understand."* (CT: FG1,3)

There is evidence to suggest that EAL students benefit from the effects of group work when they are immersed in group learning with local English speaking students (Biggs & Watkins, 1996). However, in this study the majority of students were of Asian descent that may have resulted in EAL students missing out on the chance to mix with local students in group activities.

An upsetting finding was that although some EAL students would ask questions and seek help from other students, one mentioned that she did not like asking any lecturer for help because of her lack of English language skills.

> *"I don't ask questions from teachers, not in lessons, can't think of language, then it's too late."* (ZF: FG2,2)

This student thought that it took too long to translate the question into English before the class had moved on. Proficient English speakers only have to concentrate on the cognitive side of a task, whilst EAL students must also focus on the linguistic side of the task. Whilst asking questions may not be part of the first learning culture of CHC participants, asking and answering questions is a key feature of New Zealand education. We have an expectation that students will engage in discussions and ask questions as part of the learning process. If Asian students are not asking questions or entering into dialogue with the teacher, they may be presumed passive and adopting a surface approach to learning, supporting the stereotypical view of the paradox of the Asian learner, when in fact they may just need more time to translate and process the information. The results of the R-SPQ-2F indicate that Asian learners have a preference for deep, more than surface approaches as shown in Table. 4.2. However, it should be

noted that as many of the students identified language difficulties, it may be that they did not totally understand the instruments questions.

Another hindrance to learning was that those EAL students who were new to the New Zealand education system did not appear to seek any help from either their lecturers, after class, or through learning support networks established at the university. By far the majority of students sought help from friends of their own culture and language. They felt it was easier to develop working relationships with someone in their own language and cultural tradition of learning.

> *"I talk with classmates, my Chinese classmates."* (XR: FG1,4)
>
> *"I ask help from Chinese friends."* (ZF: FG2,2)

Taking into account that EAL students perceived they found English language skills so hard in this subject, it is surprising that the Asian scores for deep and surface approaches indicate a predilection for deep approaches. Additionally, scores were similar to those obtained by European students who did not perceive the language a problem to their learning.

4.3.4 How Students Study for Tests And Exams

This section presents data pertaining to the research question of how students studied for practical computing tests and theory exams.

Three students indicated a surface approach by making comments revealing they only studied previous exam papers, doing the barest minimum to pass. They showed consistent comments at the beginning and end of the semester.

> *"I only study what the lecturer give."* [past exams papers] (CT: FG1,7)
>
> *"If she* [lecturer] *doesn't give past exams, I ask for them."* (AZ: FG3,6)

"I look at previous exams, if I can answer a question, I feel okay about it." (SW: FG1,7)

Examination of these students' individual R-SPQ-2F mean scores reveal that their tendency to choose surface approaches over deep remained consistent from the beginning and the end of the semester, as seen in Table 4.4 below. Participants AZ and CT reveal a constant preference for choosing surface strategies in their approach to learning.

Table 4.4 Individual Scores for Participants SW, AZ and CT

Semester	Participant	Deep Motive	Deep Strategy	Surface Motive	Surface Strategy	Deep Approach	Surface Approach
Beginning	SW	12	11	14	15	23	29
End		12	12	14	15	24	29
Beginning	AZ	10	13	17	22	23	39
End		10	13	15	22	23	37
Beginning	CT	9	13	15	20	22	35
End		9	14	15	20	23	35

Some participants showed that they made more of an effort to prepare for a test or the final exam. The following statements reveal that some students practised spreadsheeting skills over and over again to master certain functions.

"Those 'IF' statements! [spreadsheeting function] *I just couldn't understand them, so I kept practising until I got it. It's easy now."* (AG: FG3,4)

"I find I must practise to answer some question. I struggled with absolutes [referencing]. *I work at night to revision and familiarise skill."* (TG: FG3,5)

One participant noted that she knew when she was ready for a practical test, simply from the feedback the computer gave.

"With practical [tests] *you get immediate feedback, so that's the anchor. In theory you have to wait until you get into the exam to see if you understand the*

concept and even then you may not be able to relate that back to your understanding." (MG: J,4)

Among other participants, it was apparent that they were beginning to apply some learning strategies to their theory exam preparation.

"Last semester, I just when exam coming, before two or three week I start to study. It's very difficult to absorb in a few weeks. From this semester I learnt something from my classmate. He prepares everything at the end of a class. When exams coming he don't need to prepare anything. He has been doing work all the way through. My friends studies and does his work all the way through the semester and then when exam time comes he doesn't have to study. I would like to do that. This semester I try to do like my classmate." (XR: FG1,6)

"...keep some specific notes, like the teacher give us suggestions and you just keep the notes and then you understand. When you come to study again you don't need to study the whole book, just study your notes." (TG: FG3,5)

Still others revealed more clearly that they understood a self-regulating strategy needed to be in place and gave various examples of how this was working.

"To see if I am ready for a test I try to answer questions I've made up." (JM: J,4)

"I like the lecturer to give direction as to what is needed. Previously [in another paper] *the lecturer had given the possible questions... Some students thought they didn't need to study because they knew the question but there is still a lot of preparation to put into it. Still preparation and study to know exactly what you are talking about. It helps to focus on certain things, that way you remember and understand it"* (MG: J,3)

Below are statements indicating that previous exam questions could be helpful in order to remain focussed. The following respondents indicate they are thinking deeply about the use of seeing previous exam scripts.

"It helps to know what questions are going to be in the exam – helps to focus on certain things except all the information you have learnt ..... you will be asked certain things about certain topics so it makes you study for a greater body of knowledge." (JM: J,4)

"Sometimes it helps to see previous exams, because then you know how they are going to write it but it doesn't really help much on the day. I prefer to make up my own questions." (DC: J,4)

4.3.5 Memorising Information

The following examples show that many EAL students thought that repeated reading was the way to prepare for theory exams.

"I study all chapters – memorise all." (XF: J,2)

"I read the book, and the notes and try very hard to remember." (RS, FG1,6)

According to the traditional western view of studying, this could indicate that these were examples of rote-learning, indicating surface approaches to learning. On the other hand, students may in fact have been reading and rereading to gain understanding in exactly the same way as students practised their spreadsheeting skills until the method became second nature. Memorising and reproduction may be the initial stage in the process of internalising new information, especially if the learner is faced with differing cultural perceptions and linguistic difficulties. Some students may memorise material just to cope with the demands of the specifics of the new language. This is in accordance with Biggs (1996) who believes that students, who have insufficient knowledge and are not confident in their everyday use of English, may resort to superficial memorisation of the material to be learnt and adopt strategies that enable survival within a foreign culture.

It is important to take into account the perceptions held by CHC students regarding repetitive reading and the type of learning strategy used. It could be that the western

concept of rote-learning is culture bound. According to On (1996), students from a CHC culture believe that memorisation precedes understanding and the Confucian learning tradition is inclined towards a deep, rather than a surface approach. Great sages of the Confucian tradition believed that the first step in learning was to learn the words of the text, followed by deeper thinking. Scholars in this tradition of learning are quoted as saying, "Learning is reciting. If we recite it then think it over, think it over then recite it, naturally it'll become meaningful to us. If we recite it but don't think over, we still won't appreciate its meaning" (On, 1996, p.36). These words, from a scholar in CHC educational tradition, show the expectation of making meaning from the text following repetitive reading reciting and thinking. Scholars go on to say that there are three significant aspects of learning. The first is memorising the text, the second is an understanding of what is in the books and the third aspect is incorporating the knowledge learned from the books into an individual's experience (On, 1996). An assumption could well be made that the Confucian tradition expects learners to understand what they are learning, and thus memorising should not be confused with rote-learning without understanding.

The following statements, for example, reveal that some students showed their perception of needing a deep memorisation strategy to understand theory.

> *"...you have to learn the terminology before you can understand how to use it, there are so many steps involved."* (JM: FG3,6)
>
> *"You have to learn the concepts by heart but you have to understand them as well."* (JR: FG1,6)

Another student, MR, gives an account of memorising information. MR already held a degree from China and was extremely dismayed when, last semester, he found he had to attend a disciplinary committee because in his final exam he had quoted the text book word for word. He felt examiners believed that maybe he had taken notes into the

exam and copied them. He explained that he memorised three whole chapters because he knew there would be at least one question from these chapters. Even though MR had used memorising strategies, he felt he understood the concepts involved and thought that the disciplinary meeting was quite unnecessary, causing a lot of unnecessary stress.

> *"But I understand the words. You can ask my wife, I read chapters to her. This is how we learn in past China, maybe it change so quickly, the words are words from years of knowing, from experience, it is not for me to change them. This is difficult for me, take much hard work, I think we must learn your way now...."* (MR: FG3,6)

It could be argued that because MR felt he had understood the concepts involved by attempting to achieve understanding of the text via the use of memorisation strategies, this indicated that he was adopting a deep approach to learning. It does however point out the clear mismatch in expectations of how to study in New Zealand, as pointed out by Li, et al., (2002). MR believed that it was not his right to change the words of an experienced and respected author whose words are based on scholarly experience. This is also in accord with Volet and Renshaw (1996) who found, that to the student from a CHC background, a textbook is a form of authority, something to be valued, revered and respected, but not altered. Wisdom, according to the CHC tradition, is gauged by the ability to understand the accumulated texts of earlier scholars. It could be that expecting Asian students to paraphrase and put texts into their own words may be requiring them to go against the CHC tradition of respect for the printed word.

As sages in the Confucian tradition of learning have indicated, learners are expected to become "intimately familiar" (On, 1996, p.36) with the text. It is not surprising that MR felt the need to memorise the words, but this should not necessarily be confused with rote-learning without understanding. The predisposition to learn text by heart has

generally lead students from Asia to consider themselves deep learners (Biggs, 1999). MR considers himself to be a deep learner as he has shown he felt he understood the material and was willing to change his behaviour to suit his new learning environment in New Zealand. MR's individual scores reveal his tendency to choose deep approaches over surface approaches. Although deep motive and strategy have remained constant beginning and end of the semester, there was a slight decrease in surface motive and strategy adoption, as shown in Table 4.5.

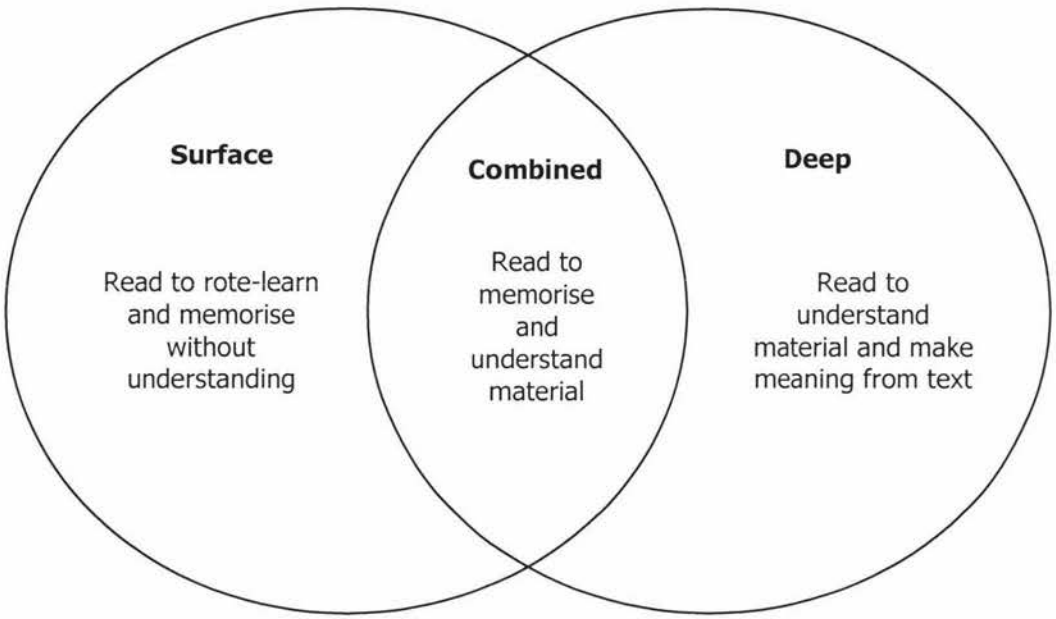
Table 4.5 Individual Score for Participant MR

Semester	Participant	Deep Motive	Deep Strategy	Surface Motive	Surface Strategy	Deep Approach	Surface Approach
Beginning	MR	13	14	8	11	27	19
End		13	14	6	10	27	16

There are two forms of memorisation, mechanical memorisation and memorising with understanding, indicating that deep and surface learning approaches are not necessarily mutually exclusive, as found by a number of researchers (Marton, et al., 1996; Kember, et al., 1999; Watkins & Biggs, 2001) who suggest the existence of approaches to learning which combine understanding with memorisation. The use of this combined approach of reading and memorising material might go some way to explain the stereotypical behaviour that has become known as the paradox of the Asian learner. Figure 4.3 gives a visual representation of how deep and surface learning approaches are not necessarily mutually exclusive. It shows how memorisation of text can fit with either a surface or a deep approach. The suggested combined approach of memorising to understand overlaps both a surface approach, where the motive is to memorise without understanding, and a deep approach, where the motive is to make meaning from the text. It is the motivation prompting the learning that determines the

approach used. This indicates that learning is more complex than placing students in narrow categories of deep and surface.

Figure 4.3 Surface, Deep and Combined Approaches to Learning



The R-SPQ-2F was designed as a simple instrument that could easily be administered in any learning environment (Biggs, et al., 2001) however the scales do not fully characterise the possible combination of memorisation and understanding. Therefore, this instrument was unable to identify this combined approach.

4.4 Perceptions Of Developing Self-Regulating Strategies

This section presents data in relation to the research question of whether students perceived the introduction of self-regulating practices had improved learning. These include a section on how students construct meaning from the text, especially how this aided problem-solving through the use of case studies, how students develop the use of reflection and also planning for assessments.

4.4.1 Constructing Meaning from the Text

One of the main teaching objectives of this study was to develop self-regulating practices that would encourage a deep approach to learning, and one way of doing this was to encourage students to make good use of their textbook. Some participants indicated in their journals that this actually aided their learning.

> *"Read before class, so you have some idea of new things coming up ....I take notes of important details."* (MG: J,2)

> *"I read the book about twice a week, it explains briefly about what I learn in the class and something else, I didn't learn, but useful."* (TG: J,3)

Many respondents noted that they preferred to have some sort of visual representation in the texts, indicating this helped when learning from case studies and enhanced their understanding of the material.

> *"It's a really good book, a lot of visuals and helpful information that helps me understand what is going on behind the scenes. I have to understand what happens so I can understand how to use it* [the computer]. *I can understand because the visual is of the actual thing - like there are actual pictures of digital cameras, microwave dishes, satellites and how the computer works. This helps for case studies."* (AG: J,3)

> *"I read text at least once a week, it has many graph on it, help me to understand meaning more quickly."* (XR: J,2)

> *"I have to know how it works* [the computer] *so I read until I have it sussed."* (MG: J,2)

The tendency for SW to adopt a surface approach (as shown in Table 4.4) is also revealed in his attitude to reading.

> *"I only read the book if the teacher asks us to read it. I suppose it is kind useful but I don't think we need it since we are not majoring in computing."* (SW: FG1,7)

The response to the helpfulness of the practical computing workbook was varied with some participants showing that the workbook aided the learning of a new topic because of the step-by-step approach. However they implied the workbook did not help them to relate concepts learned to the real world of business and was not useful for revision.

> *"I like using the workbook when learning as it takes us through the process step by step, it helps with a new topic, but it's difficult to go past that. You can't use it at home because how do you make up questions that help you to practice for a test? If you haven't worked in business, how do you know?"* (MG: J,4)

Others suggested that they preferred not to use the workbook at all and responded well to the scaffolding teaching approach adopted by the researcher, as recommended by Loveless (1995) and Scrimshaw (1997), emphasising the social constructivist view of learning.

> *"I like the screen* [the data show] *and you putting up examples for the class and helping us is a really good way to do it, it's better than a book."* (DC:J4)

> *"It's better when we have to work through an exercise and we have the answer but have to work out how to do it."* (TG: FG2,6)

These comments are consistent with research that suggests learning through the use of computing workbooks, where students mechanically follow instructions without having to think, is ineffective, because it tends to promote surface approaches to learning (Reiman & Neubert, 2000). If students are asked to analyse a problem, they will be challenged to use higher levels of thinking that encourage a deeper learning approach. This is also in line with current literature (Dougherty, et al., in press) which suggests that there needs to be a move away from the mechanical responses to learning

end-user computing towards an IT fluency approach, offering challenges to higher levels of thinking where students can relate to real world situations and use computers effectively over time.

There were other examples of how the use of a case study problem made students study in a different way. One participant found that in order to fulfil her set goals she had to read the text-book in a non-linear style, which aided understanding.

> Goal set: *"Read each chapter before and after class."*
>
> Reflection: *"I did try and keep the goal to read the text book. I found that because of the case studies we had to skip about all over the place. I think this helped me to understand it a bit better."* (AG: J,4)

This is consistent with research that shows that learners who see parts of a task as making up a whole are using techniques that are associated with a deeper approach to learning (Biggs, 1999; Morgan, 1993) and also in line with Coppola's (1995) view that reading the text in a non-linear fashion encourages the use of self-regulation.

In order to stay focussed another student found that relating ideas through the use of case studies was helpful.

> *"When you put up the questions* [case study] *it's a better way of doing theory that writing it down* [in class] *It sort of helps to stay focussed."* (DC, J,4)

However, one student, AZ, whose surface approach has already been established in Table 4.4, did not find the use of case studies helpful. Asking students to apply acquired knowledge to real world examples in New Zealand might be difficult for those in another culture. Bearing in mind the cultural diversity within this sample, what may be considered a learning approach that advances SRL and deep level thinking in New Zealand may not be considered the same in another culture. Students of other cultures may regard the introduction of a self-regulating exercise as a complete waste of time.

An example of frustration can be seen from the following statement when discussing a critical thinking exercise using a case study.

> *"She* [lecturer/researcher] *know the answer to the problem but doesn't give it, it's hard for us, I cannot find answer in book."* (AZ, FG3,2)

This student is referring to problem-solving when learners were presented with a case study and expected to think, analyse and come up with a solution to a problem. Problem-solving was the important aspect, however students from cultures where the transmission mode of teaching is common may be confused by this method, thinking instead that answers to problems should be provided by the teacher rather than looking themselves for individual responses to the problem. This gives another example of the mismatch of expectations CHC students may hold in a NZ learning environment, as outlined by Li, et al., (2002). In relation to the 3P Model of Teaching and Learning, AZ's frustration and concern is an example of how learning related factors already established at the presage level, influence the process of learning and the choice of approach adopted. The constant preference of AZ to choose surface motive and strategy over deep is already established in Table 4.4.

4.4.2 Developing the Use of Reflection Through Set Goals

This section presents data with regard to student use of reflection through the use of academic journals or focus group discussions. Most data received from students noted the use of reflection in relation to their learning achievements to prior set goals. The majority of the participants had set goals that focussed on passing the course with a good grade to enable them to staircase into the degree.

> *"Get an A grade", "I want an A so I can go to degree."* (VC: J,1) and
>
> *"Finish Diploma with a good grade so I can go to degree."* (ZF: J,1)

When reflecting on set goals, some participants gave no indication that they were aware of any processes or strategies that helped them accomplish this, or that the setting of the goal actually helped them to stay focussed.

Set Goals: "*a) Pass this course with at least a B+*

b) Try my best to study in this course." (XR: J,1)

Reflection: "*I did achieve the goal. I need a B+ so I can go degree. I think I get good grade so far."* (XR: J,4)

Some participants had set goals indicating that steps and strategies needed to be in place first and had set measurable goals.

Set Goals: "*a) I want to improve my computer knowledge. I don't know how yet, but I will learn*

b) I will set some time for practice on the computer and I will get up early for theory reading." (TG: J,1)

Reflection: "*I have improved my computer knowledge, from the one hand this subject is compulsory, from other hand spreadsheet and database are very useful for accounting person. I work through exercises in book until I know them."* (TG: J,5)

A few students had set goals focussing on passing the course at the beginning of the semester, yet upon reflection actually noted that their actions had made a difference to the accomplishment of their goals. One participant reflects at the end of the semester that she had applied self-regulating behaviour in the monitoring of attendance.

Set Goals: "*a) I want to upgrade to BBus*

b) I want to finish the course

c) I must attend all classes." (AG: J,1)

Reflection: "W*e went down to the Mount, with ..... We didn't get back until really late, but I told everyone I would get up to go to class, I'd*

made these goals you see. This is my last chance. If I don't finish the course, I won't get into the BBus. I didn't pass before because I would take time out and then get behind. Yes, I can see how important it is." (AG: J,6)

The motivation here was that this student had failed the paper before and needed to get a good grade to upgrade to a degree programme . Nevertheless, her motivation to succeed was enough to change her behaviour and by doing so, she was self-regulating her study. The goal became a yardstick to set the standard of their behaviour, which is consistent with previous research findings. (Carver & Scheier, 2000; Archer, 2000).

Another student reflects that it was the writing and recording of a goal that had established commitment and motivation on her part to succeed. This is consistent with the findings of many researchers who believe the setting of goals helps individuals to direct their attention to their learning, increase motivation (Patrick & Pintrich, 2001; Stipek, 2002; Zimmerman & Paulson, 1995) and therefore have an effect on their individual approaches to learning.

Set Goals: *"a) To pass this module*

b) To pass all the modules enrolled." (SW: J,1)

Reflection: *"I believe I have achieved those goals. I always start out at the beginning of every semester with good intentions to attend all of the classes, but haven't always. But I guess it was a commitment this semester because I had written it down. Yes, I have achieved them."* (SW: J,3)

4.4.3 Cultural Differences in Establishing Reflection

Although many students reflected on their goals, generally students with an EAL background appeared to find reflection upon other aspects of their learning difficult. The majority of the participants came from the CHC tradition of learning where,

according to On (1996), refined reflection is considered an important attribute of learning. Confucius' own conception of learning was itself a process of "studying extensively, inquiring carefully, pondering thoroughly, sifting clearly and practising earnestly" (On, 1996, p.35). If reflection is considered important for CHC students, it is surprising that students found this difficult. One reason why students found putting reflection into words, either during focus group discussion or through writing in their journals, could be their perceived lack of confidence in using the English language.

"It's difficult to explain, difficult to put in words." (SC: J,5)

Although many EAL students appeared to do well in the course, some reflected upon their lack of English skills. The lack of proficient English language for this student can go some way to understanding how he felt he had not achieved his goals.

Set Goals: a) *"I will attend to this class on time in this semester*

b) I will catch 90% knowledge which I study in the class

c) Learn all the technic from the course." (AZ: J,1)

Reflection: *"English is hard for me. Computing hard. Not do well"* (AZ: J,3)

4.4.4 Reflection upon Transferring Skills to Other Areas of Study

The majority of students who reflected on whether any of the learning strategies they learnt during the semester could be transferred to other areas of learning, reflected in terms of using their practical computing skills.

"I have used this to improve writing my assignment." (JM: J,4)

"It's a useful skill and something I will always use." (AG: J,5)

Only one respondent seemed to reflect, using an analogy, that she understood that strategy use could be applied in other areas of learning to encourage deep learning.

> *"I think I know what you* [lecturer/researcher] *are doing. It's really up to us. It's like baking a cake. We have all the ingredients in our brain because you have taught us, but we have to put it all together in the correct way ourselves, using correct procedures, like having the temperature right and adding the correct amount of ingredients. Then it all comes out right, otherwise it doesn't. I can't bake a cake but I can see how it applies."* (DC: J,6)

This CHC student has revealed in her reflection not only that she is capable of deep thinking, but also that she has grasped the concept of self-regulated learning. Various studies have shown that models of self-regulation have in common that students can actively regulate their cognition, motivation and behaviour (Hofer, Yu & Pintrich, 1998). The above quotation shows the student has an understanding of self-reflection in that the knowledge was taught (strategy use) but it was really up to her (motivation) to put it all together (behaviour) in the correct way (cognition) to produce the desired outcome (the cake comes out right) and a deep approach to learning. DC's individual R-SPQ-2F scores reveal a high tendency to choose deep approaches over surface approaches that remained fairly stable from the beginning to the end of the semester.

Table 4.6 Individual Score for Participant DC

Semester	Participant	Deep Motive	Deep Strategy	Surface Motive	Surface Strategy	Deep Approach	Surface Approach
Beginning	DC	18	22	5	6	40	11
End		18	22	4	7	40	11

4.4.5 Planning for Assessments

A few respondents made note of the planning sheet prepared for the spreadsheet test. Two planning for assessment task sheets were prepared. Unfortunately there are no data pertaining to the database planning for revision exercise, because the database test was held after the students had finished their course work for the semester.

Students found that using a strategy to aid their planning for tests was useful because it made them focus on what they did not know.

> *"I found it was helpful because I didn't realise I didn't know how to do it."* (MG: J,5)
>
> *"I suppose it helped to put it all together, made me focus."* (JM: J,3)

The ability to focus learning is an important aspect of both students' approaches to learning and self-regulated learning. Learners need to know what to look for to be able to make use of information (Coppolla, 1995). Thus, in line with Biggs' (1999) notion of constructive alignment, the worksheets aided in aligning the content, the teaching and the learning strategies used in preparing for exams.

Perhaps the most disturbing aspect from MR's account given earlier is that the assessment that caused him trouble the previous semester was structured in such a way as to allow for a low level recall approach. It could be that the question was not constructively aligned to the aims of the subject, allowing for what Biggs (1999) calls a backwash effect, in that any student may be encouraged to adopt a strategy that meets requirements minimally. A large amount of evidence supports the view that when students study for an exam, they attempt to understand the content in ways they perceive will meet the requirements of the exam (Biggs, 1999; Scouller & Prosser, 1994). If learners perceive that low-level recall responses are expected in an exam, then a surface approach could be taken.

4.5 Link Between Strategy Use and Approaches to Learning

It is significant to note that those students who revealed adopting a self-regulating strategy all appear to be using a deep approach to their study. The comments they made reveal a deep motive in that the main purpose of their study was motivated by interest and the desire to have an understanding of the subject to enable competency.

Those students who adopt a surface approach to their study are revealing external regulating strategies, for example, maintaining that reading over past exam papers is sufficient to meet requirements with minimal effort. As Kember, et al., (1999) propose, this suggests a balance between working too hard on the one hand and failing on the other. Those students adopting a deep approach to learning reveal positive self-regulation by being responsible for their own learning. Table 4.7 shows examples of student comments and the link between approaches to learning and self or external regulation.

4.6 Limitations

It is acknowledged that this research had a few limitations. In view of the small numbers of participants in the study, especially in terms of those who attended the focus group discussions and permitted the collection of journals, the results should be viewed with caution. Generalization of the results may therefore transfer poorly to other contexts.

The research may have been compromised due to the researcher also being the teacher of the sample population. Ongoing data analysis during the semester could not happen because the researcher was not involved in the data collection process. This resulted in fixed data that could not evolve, leaving any further questions that may have been raised from the participants unable to be explored.

As with any teaching practice, the delivery of content for this research was approached within the boundaries of the researcher/teacher's individual teaching style. Consequently, the delivery of the self-regulating teaching might not be able to be reproduced by another teacher with their own individual (and quite possibly different) style.

Table 4.7 Link Between Self or External Regulation and Deep and Surface Approaches to Learning.

Self Regulation	**Student comments revealing a deep approach**
Reading the text book	Read before the class, so you have some idea of new things coming up. I have to know how it works [*the computer]*, so I read until I have it sussed. Those 'IF' statements! I just couldn't understand them, so I kept practicing until I got it. It's easy now. I take notes of important details. It's a really good book, a lot of visuals and helpful information that helps me understand what is going on behind the scenes. I have to understand what happens so I can understand how to use it [*the computer].* I read the book twice a week, it explains briefly about what I learn in the class and something else I didn't learn, but useful.
Preparation for tests and exams	To see if I am ready for a test, I try to answer questions I've made up. I make up questions and then answer them. Sometimes it helps to see previous exams, because then you know how they are going to write it but it doesn't really help much on the day. I prefer to try and make questions from my work. I puzzle it out until it clicks, then I am ready for a test. I like the lecturer to give direction as to what is needed. Previously [*in another paper]* the lecturer had given the possible questions. Some students thought they didn't need to study because they knew the question but there is still a lot of preparation to put into it. Still preparation and study to know exactly what you are talking about, it helps to focus on certain things, that way you remember and understand it.
External Regulation	**Student comments revealing a surface approach**
Reading the text book	I don't read the books much, unless I have to. I only read the book if the teacher asks us to read it, I suppose it is kind of useful but I don't think we need it since we are not majoring in computing. I only read before exams, to pass them.
Preparation for tests and exams	I study what the lecturer give me *[past exams papers].* I look at previous exams, if I can answer a question, I feel OK about it. If she [*lecturer]* doesn't give past exams, I ask for them.

The majority of the participants was identified as having English as a second language and identified language difficulties. It may be that they did not totally understand the questions on the R-SPQ-2F. This could have led to wrong interpretations and answers to the questionnaire, even though participants did not ask for an interpreter or identify any problem at the time of completion.

It was not possible to achieve full constructive alignment among the learning outcomes, teaching and learning activities and assessment tasks, as the researcher did not develop the assessment tasks.

Lastly, although the participants have critically reflected on their own study approaches and their own preferred teaching methods, this does not guarantee that this reflection can be translated into better study practice in the future within or outside a computer environment.

4.7 Summary

This chapter has presented the findings of the research and discussed the results from the R-SPQ-2F (Biggs, et al., 2001) revealing students' preference for deep over surface approaches at both the beginning and the end of the semester. The course grades have also been presented indicating quite positive results for the two researched classes. The qualitative data has presented student perceptions of learning, together with how students prepare for exams and their perceptions of how the introduction of self-regulating strategies may have improved their learning. The findings conclude with the limitations to the study.

CHAPTER 5

Conclusions

This chapter presents the conclusions of the research findings, together with implications and recommendations for practice, research and theory.

5.1 Conclusions

The research was designed with the objective of investigating if it would be possible to shift student learning approaches from a surface to a deep approach, using self-regulating practice. The results from the R-SPQ-2F (Biggs, et al., 2001) questionnaire showed there was a consistent preference for deep over surface at both the beginning and end of the semester, indicating there was little room for change. As there has been a trend for students to become decreasingly deep during undergraduate courses (Biggs, 2001; Kember, et al., 1997), the fact that deep motives and strategies adopted did not decrease was significant. European and Asian students both obtained similar mean scores for both deep and surface approaches, dispelling the myth that all Asian students are surface learners. Many of the students identified language difficulties that could attest to the fact they did not understand the instrument's questions.

The data from the focus group discussions and academic journal showed that some students were starting to foster deep learning approaches. These were apparent in both the practical and theory components of learning to use a computer. The common perception that learning to use the computer had to be seen as "fun" at the beginning of the semester changed, and the value of the usefulness of everyday skills became the motivating force.

Cultural differences were identified in the way students' perceived their learning, which could have an impact on the way students approach and regulate their learning. A common theme shown by participants from Asia revealed they considered learning easier, more practical and with less competition in New Zealand. There was a mismatch of expectations of learning between students from other cultures and our own education culture, as also found by Li, et al., (2002). This mismatch has implications for the adoption of deep approaches made by the students. Some participants, MR and DR, who both revealed deep approach scores, responded well when they knew the expectations of how to study in New Zealand.

There were many perceptions of inhibiting factors towards a deep approach to learning which were related to English language fluency. The entry criteria of IELTS 6.0 did not appear to be sufficient for the linguistic specifics of learning aspects of information technology. Participating in group work was also considered inhibiting, mainly because of the perceived lack of confidence in English. Students from a CHC background were particularly critical of having to present group findings to others and were reluctant to participate.

Students with EAL did not appear to make cultural adjustments with regard to their study practices and preferred to develop working relationships with someone in their own language and culture rather than seek help from their lecturers, or get help through learning support networks established at the university.

Many EAL students indicated that they memorized information to study for exams. This could have been a superficial memorisation strategy used to cope with the demands of a new language. On the other hand it could have been a deliberate strategy used both to memorise and understand the material. Although from a Western perspective, memorising information may indicate rote-learning and a surface approach to learning,

to students from a CHC tradition, memorising information may indicate deep learning. Mechanical memorisation akin to rote-learning should not be confused with memorising for understanding (Kember, et al., 1999; Marton, et al., 1996). Students from other cultures bring their own unique learning approaches to the Western-oriented learning environment that exists here. They may emphasize learning strategies that involve rote-learning, yet this does not mean they are not understanding what they have learnt. It is the Western-oriented assumption that repetitive reading necessarily leads to a surface approach to learning. Deep and surface learning approaches are not necessarily mutually exclusive and may overlap. A combined approach was suggested, allowing for both the reading to memorise and understanding of material at the same time.

The development of self-regulating practice was viewed positively. Different ways of constructing meaning from text was successful, especially in order to stay focussed and for answering problem-solving questions using a case study approach. This encouraged the use of reading the text in a non-linear fashion, relating ideas and putting these together, therefore constructing meaning from the learning material. These are all aspects of adopting a deeper approach to learning (Biggs, 1999) and are also in line with Coppola's (1995) view that reading the text in a non-linear fashion encourages the use of self-regulation.

The practical computer workbook was considered helpful in the learning of a new topic but did not offer challenges or help with problem-solving. This is consistent with current research that suggests mechanical responses to learning end-user computing do not produce IT fluency (Doughety, et al., in press). The spoon-feeding or *paint-by-numbers approach* currently used in end-user computing tends to produce surface

learning (Reiman & Neubert, 2000) by focussing on the end product rather than on the process of learning (Goodman, 2001).

Developing the use of reflection was encouraged through the writing of academic journals and through focus group discussions. Most data received noted the use of reflection in relation to their learning achievements to set and written goals. Not all students reflected positively but many noted that the setting of goals helped them to stay focussed. The self-monitoring of behaviour, for example, being responsible for attending class, produced positive results.

Students with an EAL background found reflection a difficult process, which could be due to cultural differences in learning or the inability to communicate well in English. Only one student reflected, by way of analogy, that she understood well the concept of transferring her learning to other areas of study.

The relatively small amount of data received for the planning for assessments exercise was found useful by providing a focus for revision and aided the constructive alignment of content, teaching and learning strategies adopted.

A link was suggested between strategy use and student approaches to learning by showing that the adoption of surface learning approaches were related to external regulation and the adoption of deep learning approaches were related to self-regulation.

The end-of-course grades suggest that the adoption of teaching strategies fostering self-regulation aided student learning in the two researched classes.

5.2 *Implications and Recommendations for Practice*

This research attempted to initiate new approaches to teaching end-user computing skills. Traditional end-user computing teaching tends to spoon-feed information with the focus on seeing and copying (Dougherty, et al., in press; Reiman & Neubert, 2000). The fundamental teaching practices undertaken in this study, designed to encourage the students to become involved in learning activities that would result in deeper learning, were all generic features of good teaching as implied by research (Biggs, 1999; Brophy, 2001) and could be applied in any environment. The data from student responses indicated that the teaching practices utilised were sound and are therefore recommended for future use.

It would appear timely to recommend that professional development be provided for teachers, especially in the field of end-user computing, to correspond with current research that promotes the student use of deep learning approaches.

In light of the rapid growth in the numbers of international students, it is recommended that more suitable orientation be provided so that the New Zealand rules and expectations of the learning environment can be clearly defined when students first attempt tertiary study in this country. It is also recommended that more professional development be provided for teachers in the management of cultural differences in their teaching. Whilst not advocating that teaching practice be changed solely to suit the contemporary international student climate, it could be, that if teachers understand cultural beliefs and expectations that impinge on learning, this may produce a better learning environment for all. It may also be necessary for tertiary establishments to manage more efficiently the cultural mix of students so that no section of the student body is disadvantaged.

5.3 *Implications and Recommendations for Research*

The one-semester duration for the study was not sufficient to reveal a change in students' approaches to learning over time. It is recommended that longitudinal research be implemented to track students' learning approaches over time. This will be beneficial to all New Zealand students.

It has been suggested in this research that deep and surface learning approaches are not necessarily mutually exclusive. The memorisation of text can fit with either a surface or a deep approach, as shown in Figure 4.3, which may be problematic when trying to determine approaches in the classroom for the purpose of improving practice. It is recommended that further research be undertaken to determine the differences between rote-learning and memorising for understanding. Further clarification of these differences will enable the teacher to produce better learning outcomes.

Lastly, it is recommended that further research be undertaken on implementing teaching practices that foster deeper, more self-regulated approaches to end-user computing.

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Appendix A

Revised Study Process Questionnaire (R-SPQ-2F)

This questionnaire has a number of questions about your attitudes towards your studies and your usual way of studying.

There is no *right way* of studying. It depends on what suits your own style and the course you are studying. It is accordingly important that you answer each question as honestly as you can. If you think your answer to a question would depend on the subject being studied, give the answer that would apply to the subject(s) most important to you.

Please fill in the appropriate circle alongside the question number on the Answer Sheet. The letters alongside each number stand for the following response.

A – this item is *never* or *only rarely* true of me

B – this item is *sometimes* true of me

C – this item is true of me about *half of the time*

D – this item is *frequently* true of me

E – this item is *always* or *almost always* true of me

Please choose the *one* most appropriate response to each question. Tick the square on the Answer Sheet that best fits your immediate reaction. Do no spend a long time on each item: your first reaction is probably the best one. Please answer each item.

Do not worry about projecting a good image. Your answers are CONFIDENTIAL.

Thank you for your cooperation.

1. I find that at times studying gives me a feeling of deep personal satisfaction.
2. I find that I have to do enough work on a topic so that I can form my own conclusions before I am satisfied.
3. My aim is to pass the course while doing as little work as possible.
4. I only study seriously what's given out in class or in the course outlines.
5. I feel that virtually any topic can be highly interesting once I get into it.
6. I find most new topics interesting and often spend extra time trying to obtain more information about them.
7. I do not find my course very interesting so I keep my work to the minimum.
8. I learn some things by rote, going over and over them until I know them by heart even if I do not understand them.
9. I find that studying academic topics can at times be as exciting as a good novel or movie.
10. I test myself on important topics until understand them completely.

11. I find I can get by in most assessments by memorising key sections rather than trying to understand them.
12. I generally restrict my study to what is specifically set as I think it is unnecessary to do anything extra.
13. I work hard at my studies because I find the material interesting
14. I spend a lot of my free time finding out more interesting topics which have been discussed in different classes.
15. I find it is not helpful to study topics in depth. It confuses and wastes time, when all you need is a passing acquaintance with topics.
16. I believe that lecturers shouldn't expect students to spend significant amounts of time studying material everyone knows won't be examined.
17. I come to most classes with questions in mind that I want answering.
18. I make a point of looking at most of the suggested readings that go with the lectures.
19. I see no point in learning material, which is not likely to be in the examination.
20. I find the best way to pass examinations is to try to remember answers to likely questions.

Appendix A (cont)

Answer Sheet to Revised Study Process Questionnaire (R-SPQ-2F)

A – this item is *never* or *only rarely* true of me

B – this item is *sometimes* true of me

C – this item is true of me about *half of the time*

D – this item is *frequently* true of me

E – this item is *always* or *almost always* true of me

	A	B	C	D	E
1.	☐	☐	☐	☐	☐
2.	☐	☐	☐	☐	☐
3.	☐	☐	☐	☐	☐
4.	☐	☐	☐	☐	☐
5.	☐	☐	☐	☐	☐
6.	☐	☐	☐	☐	☐
7.	☐	☐	☐	☐	☐
8.	☐	☐	☐	☐	☐
9.	☐	☐	☐	☐	☐
10.	☐	☐	☐	☐	☐
11.	☐	☐	☐	☐	☐
12.	☐	☐	☐	☐	☐
13.	☐	☐	☐	☐	☐
14.	☐	☐	☐	☐	☐
15.	☐	☐	☐	☐	☐
16.	☐	☐	☐	☐	☐
17.	☐	☐	☐	☐	☐
18.	☐	☐	☐	☐	☐
19.	☐	☐	☐	☐	☐
20.	☐	☐	☐	☐	☐

Appendix A (cont)

Mark Sheet for R-SPQ-2F

The responses to items are scored as follows:

A=1, B=2, C=3, D=4, E=5

To obtain main scale scores add item scores as follows:

DA = 1 + 2 + 5 + 6 + 9 + 10 + 13 + 14 + 17 + 18

SA = 3 + 4 + 7 + 8 + 11 + 12 + 15 + 16 + 19 + 20

Subscale scores can be calculated as follow:

DM = 1 + 5 + 9 + 13 + 17

DS = 2 + 6 + 10 + 14 + 18

SM = 3 + 7 + 11 + 15 + 19

SS = 4 + 8 + 12 + 16 + 20

Appendix B

Guidelines for Focus Group Discussion

Preparation

- Write a general purpose statement that reflects the research interest
- Decide on number of groups
- Determine setting – book room in non threatening atmosphere
- Identify and discuss issues with facilitator
- Prepare interview guide
- Send out invitations to those who have agreed to participate

Conducting discussions

- Prepare room, make sure recording equipment is working
- Set up refreshments
- Greet participants and establish welcoming environment
- Conduct orientation and read guidelines
- Initiate discussion

Transcribe the data

- Type up individual responses
- Keep in locked cabinet
- Hand over information to researcher after the semester has finished and all assessment has been complete
- Delete tapes and files from computer hard drive
- Discuss with lecturer any key ideas you may think relevant

Appendix C

Questions to Generate Discussion

Session one - Start of the semester

This session will focus on aspects of the ways in which students go about learning. Guide the discussion by the following stimulus questions.

1 What do you think is the best way to learn to use the computer? (No right answer, say what you normally do)

2 What has been your experience when learning to use the computer in the past? How would you describe the way you went about learning?

3 What motivates you when learning to use the computer?

4 Do you think the way you learning computing will be different to learning other subjects, (for example economics, introduction to law)?

   a) If so, how, why?

Session two - Mid semester

Guide the discussion by the following stimulus questions

1 Tell me about some of the teaching approaches made so far this semester.

   a) Do you think these have made any differences to your learning?

   b) How – why – in what way?

2 Has there been any learning activity that you have experienced so far this semester that has really motivated you to learn?

3 Tell me how you have used the journal for thinking about your study?

4 Do you think that the way you go about your learning is changing?

   a) In what way?

Appendix C (cont)

Session three - End of semester

This session will focus on students' change, if any, and their reflections on learning/study approaches. Guide the discussion by the following stimulus questions

1 Lets discuss the use of the journals? Has the process of writing about your reflections to learning, helped in any way? How? Why?

2 Tell me about how you studied for the final exam?

3 Have you found any of the strategies you learnt this semester helpful?

4 Do you think that you will be able to use the skills you learnt this semester in other subject?

5 Is there anything else that you feel may have been useful to your learning?

Planning for Assessments (Spreadsheets)

Here is an example of a question that you could be asked in the spreadsheet practical assessment.

Learning Outcome	Assessment Criteria	Example of question
Demonstrates information technologies effectively to satisfy a range of outcomes in a business environment	Creates appropriate graphs to best illustrate comparisons of data	Produce an analytical graph of your choice which best shows comparisons between the selected groups of figures

1. Identify what you need to know and tick off what you know already
2. Now fill in columns two and three below
3. Next week we will reflect again and fill in column four

What I need to know to pass the assessment	Know already	What I need to learn	What I still don't understand
• Produce a chart from spreadsheet data • Select noncontiguous ranges • Distinguish between different types of charts, knowing advantages and disadvantages of each • Edit a chart, e.g. o Change chart type, resize/move/copy, correct data, save as separate sheet • Format a chart to make it look professional, e.g. o Change font, add shading/colour, enhance by using drawing toolbar, format data series			

Planning for Assessments (Database)

Here is an example of a question that you could be asked in the database practical assessment.

Learning Outcome	Assessment Criteria	Example of question
Demonstrates information technologies effectively to satisfy a range of outcomes in a business environment	Creates a professional report from a database	Produce a professional report of your choice (from the given information) suitable for a business audience

1. Identify what you need to know and tick off what you know already
2. Now fill in columns two and three below
3. Next week we will reflect again and fill in column four

What I need to know to pass the assessment	Know already	What I need to learn	What I still don't understand
• Produce a report from a query • Edit a report, e.g. change report, set filter, sort, group, correct, add and delete data, add currency • Format report, e.g. change font, modify display to make it look professional • What a professional report looks like/ what is accaeptable			

Appendix E

Theory Revision: Case study one - Internet.

You are the manager for a retail company called 'Ski Mountain'. You are in the head office based in Queenstown but you have branches in Wanaka, Mt Cook and Taupo. This company sells skis, snowboards, skiing clothes, in fact anything at all to do with snow sports in the winter. In the summer this company is involved with offering scenic helicopter flights in their area. You are about to undergo a major review of the company use of the Internet and you will need to write a report for your CEO. At the present time the company's branches are not networked. You need to think about:

1. What will the Internet be used for? *Be specific.*

2. Write a couple of paragraph outlining the benefits to your company/customers/suppliers?

3. Are there any disadvantages? *Think about safety issues here*

4. What technology do you need to operate successfully? *Be specific.*

5. Draw the network topology you decide upon, label it and then describe how it works.

6. What software do you need?

7. Do you think/don't think you will need to hire expertise? Explain your answer.

Appendix F

Guiding Questions for Students Academic Journal

1. How do you go about learning to use a computer? What have you done in the past? Say what you actually do rather than what you think you should do? (There is no right or wrong answer to this)

2. What is the difference between thinking through a problem to find the best solution and mechanically following an example? When solving a problem on the computer, which method do you prefer, why?

3. How often do you read your textbook? Do you find the practical workbook helpful? What does it mean to successfully read your text book?

4. Do you ever discuss with another person what you have learnt in class? Do you think/find this is helpful?

5. Describe how you studied for this weeks test? Reflect on that preparation. What strategies did you find most helpful?

6. How do you know when you are ready to take a test?

7. Could you have improved your test preparation?

8. Think of the goals you set at the beginning of the semester – reflect on how you have achieved/not achieved those goals.

9. Have you learnt any useful methods/strategies that you have found useful?

10. Do you feel that the way you go about your study has improved this semester? How?

11. Look back over the semester – Is there anything you have learnt this semester about your studying, that you think would be useful in other papers?

Appendix G

Information Sheets and Consent Forms

The Dean
Faculty of Business

Dear

Re: Permission to conduct research in the Faculty of Business

I am currently undertaking research as part completion of a Masters in Education with Massey University. The aim of my research is to investigate whether the inclusion of self regulating learning and teaching approaches will shift students' learning from a surface to a deep approach.

I request permission to undertake this research at
in the Faculty of Business. Ethics approval has been granted by both Massey University and our own Ethics committee in the Faculty of Business.
An Information Sheet outlining the research is attached. Please can you sign the attached consent form and return to me.
Thank you for your time.

Yours sincerely

Jennie O'Connor

Appendix G (cont)

SELF REGULATED APPROACHES TO LEARNING AND TEACHING PRACTICAL COMPUTING IN HIGHER EDUCATION: A CASE STUDY APPROACH.

Researcher: Jennie O'Connor

INFORMATION SHEET – For the Dean

The sample of students chosen for this study will be taken from the NZDipBus programme enrolled in Computer Concepts. There are approximately 11 classes of students in this programme, and two classes will be allocated at random. The study will commence Semester One, 2002.

The intervention proposed for the two classes is that teaching approaches will be used which create an environment in which students will have the opportunity to reflect on their progress and take responsibility for their learning practices. Students will be given the opportunity to promote critically reflective learning through the use of reflective dialogue and the writing of academic journals. In addition, to complement the skill and drill course text book, exercises will be given which allow for greater problem solving, planning and evaluating of course work.

Participation in the data collection of this research is voluntary and is independent of any modules in which any of the students are enrolled, or any assessment procedure associated with this or any course of their study.

Students will be invited to participate, for data collection purposes, in the following ways:

1. Written permission will be obtained from students to participate in this study. The researcher will explain the reason for the study and give out an Information Sheet and consent form. The researcher will then leave the room and the research assistant will collect and keep all consent forms. In this way the researcher will not know which students are participating or not. This first consent form will ask for participants to fill in a demographic questionnaire containing one questions regarding ethnicity and a Revised two-factor Study Process Questionnaire: R-SPQ-2F (Biggs, Kember & Leung, 2001). The research assistant will administer the questionnaires, attach codes, remove all names and keep in a safe and secure place until after the end of the semester and after the final exam.

2. Volunteers from the original sample who have already agreed to participate in the study will then be asked by my research assistant if they wish to take part in three focus group discussions. The discussions will take place pre, mid and post study. The assistant will also facilitate the group discussions and the transcribing of notes, ensuring anonymity.

3. Volunteers from the original sample who have already agreed to participate in the study will then be asked if they wish to allow samples of semester work to be collected for data gathering purposes. The samples of semester work will include student academic journals and will not be used in determining the final overall grade. The samples of work will be handed to the research assistant and returned to the researcher after the end of the semester and the final exam.

Students may withdraw at any time prior to completion of data collection, without being disadvantaged and all relevant data will be destroyed.

A summary of research findings will be available to participants at the end of the 2002 academic year available from the research assistant. The published work will be available in Massey University's Library and the departmental library.

If you have any questions regarding this study please feel free to contact me on x5443. My supervisors can also be contacted:

Dr. A. M. St. George
Dept of Teaching and Learning
Massey University
Palmerston North
Ph: 443 9700 x8627 (direct dial AKL)

or

Mandia Mentis
Dept of Teaching and Learning
Massey University
Auckland
Ph: 443 9700 x9841

To avoid any possible conflict of roles, my research assistant ..... will be the only person who will know who has taken part in this research. ..... will facilitate the focus group discussions, collect course work and will keep the information locked away until after the final examinations have been marked at the end of the semester. I will not have access to that information during the semester.

Thank you for your time.

Jennie O'Connor

SELF REGULATED APPROACHES TO LEARNING AND TEACHING PRACTICAL COMPUTING IN HIGHER EDUCATION: A CASE STUDY APPROACH.

Researcher: Jennie O'Connor

CONSENT FORM - Dean

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I understand that ethics committees from both Massey University, College of Education and have approved this study.

I understand that the information collected from students will be used only for this research and publications arising from this research project.

I agree to this study taking place in the Faculty of Business, under the conditions set out in the Information Sheet.

Signed: .....

Name: .....

Dean,
Faculty of Business

Date: .....

SELF REGULATED APPROACHES TO LEARNING AND TEACHING PRACTICAL COMPUTING IN HIGHER EDUCATION: A CASE STUDY APPROACH.

Researcher: Jennie O'Connor

INFORMATION SHEET (1)

I am currently undertaking research as part completion of a Masters in Education with Massey University. The aim of my research is to investigate the effects of teaching approaches which emphasise self-regulation on student approaches to learning.

In this class teaching approaches will be used which create an environment in which you will have the opportunity to reflect on your progress and learn to take responsibility for your learning practices. You will be given the opportunity to promote critically reflective learning through the use of reflective dialogue and the writing of academic journals. In addition, to complement the skill and drill course text book, exercises will be given which allow for greater problem solving, planning and evaluating of course work.

Please be assured that participation in the data collection process of this research is voluntary and is independent of any modules in which you are enrolled, or any assessment procedure associated with this or any course of your study.

I would like to invite you to complete two questionnaires. The demographic questionnaire has one question to establish your ethnicity and the Study Process Questionnaire has 20 questions about your approaches to learning. At the end of the semester this questionnaire will be given again. No names will be used and all responses will remain anonymous. Any responses will be kept confidential by my research assistant and will be given to me only at the end of the semester after the final exam.

During the course of the semester there will be further research activities planned:

- The opportunity to take part in focus discussion groups at the beginning, middle and end of the semester, and
- Collection of general course work, which will not contribute to your final grade.

Further information and consent forms will be provided for these activities. However if you agree to participate now, this does not mean that you have to take part in any further aspects of the study. You may withdraw yourself or any information that you have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way. If you withdraw, all relevant collected data will be destroyed.

To avoid any possible conflict of roles, my research assistant ..... will be the only person who will know who has taken part in this research. ..... will facilitate the focus group discussions, collect course work and will keep the information locked away until after the final examinations have been marked at the end of the semester. I will not have access to that information during the semester. If you wish to take part in this study please fill in the consent form and hand back to .....

A summary of research findings will be available from ..... at the end of the 2002 academic year. The published work will also be available in the institutions library and the departmental library.

If you have any questions regarding this study please feel free to contact me on 917 9999 x5443. My research assistant ..... on .....
My supervisors can also be contacted:

Dr. A. M. St. George
Dept of Teaching and Learning
Massey University
Palmerston North
Ph: 443 9700 x8627 (direct dial AKL)

or

Mandia Mentis
Dept of Teaching and Learning
Massey University
Auckland
Ph: 443 9700 x9841

Thank you for your time.

Jennie O'Connor

SELF REGULATED APPROACHES TO LEARNING AND TEACHING PRACTICAL COMPUTING IN HIGHER EDUCATION: A CASE STUDY APPROACH.

Researcher: Jennie O'Connor

CONSENT FORM (1)

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I understand that I may withdraw myself or any information that I have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way. If I withdraw, I understand that all relevant data will be destroyed.

I understand that I can decline to answer any particular questions.

I agree to provide information to the researcher on the understanding that my name will not be used without my permission.

The information will be used only for this research and publications arising from this research project.

I agree to participate in this study under the conditions set out in the Information Sheet.

Signed: .....

Name: .....

Date: .....

SELF REGULATED APPROACHES TO LEARNING AND TEACHING PRACTICAL COMPUTING IN HIGHER EDUCATION: A CASE STUDY APPROACH.

Researcher: Jennie O'Connor

INFORMATION SHEET (2) – Focus Group Discussions

In continuation of my research as part completion of a Masters in Education with Massey University I am now investigating the effects of teaching strategies emphasising self-regulation on the ways students approach their learning. I would now like to invite you to participate further in the study by way of student focus group discussions. These discussions will focus on aspects of the ways in which you and your fellow students go about learning in practical computing. You may find that discussing how you and others go about learning and studying is interesting and helpful.

These discussions will be held three times during the course of the semester, one now, one in the middle and one at the end of the semester after the final exam. The discussions will be held in groups of five students and will take approximately 30 minutes of your time. The responses in the discussion will be used to obtain your perceptions regarding your learning and study approaches.

To avoid any possible conflict of roles, my research assistant ..... will be facilitating the discussions, I will neither be present, nor will I know who has participated. Audio tapes will be used to record responses before being transcribed by the research assistant. No names will be used and complete anonymity will be guaranteed. The audio tapes and transcribed notes will be held by ..... in a locked cabinet ensuring complete confidentiality, until after the end of the semester and the final exam. The transcribed notes will then be handed to me for analysis of data and the audio tapes destroyed after the completion of the research.

Discussion will take place immediately prior to the interviews regarding procedures for audio taping and agreement will be sought regarding group confidentiality. You will have the right to refuse to answer any particular question and remain silent at any time.

You may withdraw yourself or any information that you have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way. If you withdraw, all relevant tapes and transcripts, or parts thereof, will be destroyed.

If you have any questions regarding this study please feel free to contact me on 917 9999 x5443. ..... can be contacted on x.....
My supervisors can also be contacted:

Dr. A. M. St. George
Dept of Teaching and Learning
Massey University
Palmerston North
Ph: 443 9700 x8627 (direct dial AKL)

or

Mandia Mentis
Dept of Teaching and Learning
Massey University
Auckland
Ph: 443 9700 x9841

Thank you for your time,

Jennie O'Connor

SELF REGULATED APPROACHES TO LEARNING AND TEACHING PRACTICAL COMPUTING IN HIGHER EDUCATION: A CASE STUDY APPROACH.

Researcher: Jennie O'Connor

CONSENT FORM (2) – Focus Group Discussions

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I understand that I have the right to decline to answer any particular questions. I understand that an audio tape will be used during the focus group discussion.

The information will be used only for this research and publications arising from this research project.

I agree to provide information to the researcher on the understanding that my name will not be used without my permission.

I agree to the discussions being audio taped. I understand that agreement will be reached with the group, immediately prior to the interviews, regarding the procedures for audio taping.

I agree to participate in this study under the conditions set out in the Information Sheet specifically for focus group discussions.

I understand that I may withdraw myself or any information that I have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way. If I withdraw, I understand that all relevant tapes and transcripts, or parts thereof, will be destroyed.

Signed: .....

Name: .....

Date: .....

SELF REGULATED APPROACHES TO LEARNING AND TEACHING PRACTICAL COMPUTING IN HIGHER EDUCATION: A CASE STUDY APPROACH.

Researcher: Jennie O'Connor

INFORMATION SHEET (3) – Collecting of course work

In continuation of my research as part completion of a Masters in Education with Massey University, I am now investigating how you go about your learning over the semester. I would like to invite you to participate further in the study through the collection of general course work:

As part of the course work this semester you have been expected to keep an academic journal where you have responded to questions that prompt your reflection on your learning. If you agree to participate the journals together with my comments, will be collected by my research assistant at the end of the semester, copied and forwarded to me to get some further indepth information about the way you think about and engage in your learning through the semester.. These journals will not be graded and will not form part of the overall grade. Your perspective is important to gain a better understanding of students' learning and the sorts of teaching they find helpful. The copies will be kept in a locked cabinet ensuring complete confidentiality. The original journal will be returned to you at the pre-set NZDipBus handback day.

You may withdraw yourself or any information that you have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way. If you withdraw, all relevant collected data will be destroyed.

If you have any questions regarding this study please feel free to contact me on 917 9999 x5443 and ..... on x.....

My supervisors can also be contacted:

Dr. A. M. St. George
Dept of Teaching and Learning
Massey University
Palmerston North
Ph: 443 9700 x8627 (direct dial AKL)

or

Mandia Mentis
Dept of Teaching and Learning
Massey University
Auckland
Ph: 443 9700 x9841

Thank you for your time,

Jennie O'Connor

SELF REGULATED APPROACHES TO LEARNING AND TEACHING PRACTICAL COMPUTING IN HIGHER EDUCATION: A CASE STUDY APPROACH.

Researcher: Jennie O'Connor

CONSENT FORM – Collecting of course work

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I understand that I may withdraw myself or any information that I have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way. If I withdraw, I understand that all relevant data will be destroyed.

I agree to provide information to the researcher on the understanding that my name will not be used without my permission.

The information will be used only for this research and publications arising from this research project.

I agree to allow my Academic Journal to be collected under the conditions set out in the Information Sheet. I understand that these pieces of work will not be used in determining the final grade in this course.

Signed: .....

Name: .....

Date: .....

SELF REGULATED APPROACHES TO LEARNING AND TEACHING PRACTICAL COMPUTING IN HIGHER EDUCATION: A CASE STUDY APPROACH.

Researcher: Jennie O'Connor

Confidentiality Agreement – Research Assistant

I agree/do not agree to keep the identity of all participants confidential and to keep the names and identity codes in a secure and private place.

I agree/do not agree to store all questionnaires and copies of student work in a secure and private place while they are in my possession.

I agree/do not agree to keep the contents of the audiotapes, including names, locations and any persons or events described, confidential.

I agree/do not agree to store the audiotapes and transcripts from this study in a secure and private place while they are in my possession.

I agree/do not agree to return all printed and electronic copies of the transcripts and audiotapes to the researcher.

I agree/do not agree to return all copies of research material to the researcher and to delete any copies that have been saved on the hard drive off my computer at the end of Semester One, 2002.

Name: .....

Signed: .....

Date: .....

Appendix H

Transcribed focus Group Notes

Focus Group. Session one/group one.

	Code
S1	XR
S2	SW
S3	JR
S4	RS
S5	CT

F: Explain purpose of focus groups again. Read introduction.

F: What has been your experience in learning to use computer in the past?

S1: I come from Taiwan so, I used to have some lesson in the school, some specific classes before I come home

S2: Just play around by myself.

S3: Yes, play around. Its fun, sort of, like your mobile phones, you just play on them

F: What do you think is the best way to learn to use the computer? There is no right answer to this. Just say what you normally do.

S2: Just using the computer every day.

S1: Mainly practice .

S5: I think practice too. I forget

S2: I do know how to use the computer before this course, but it's just general ideas, I think I learned to use computer just by using it.

S1: Sometimes I just jump to a computer and just find out how does computer work.

F: So you are saying that you like to teach yourself?

S1: Yes, most of the time.

S2: Well yes. In other subjects you can't do that. You have to do what the teacher want.

(long pause)

F: Are you saying its more interesting to learn the computer, than say Economics, Law?

S3: Yes, definitely.

S1: Yes – computer just like part of my life – I use computer everyday – its not like economics maybe, Its my great interest – I have to learn computer. Its totally different to compare these two papers.

S5: Law, yes is difficult, language difficult.

S1: Language difficult in computing as well.

S4: The theory is difficult language, yes.

S2: Well, it has to be fun really or you don't learn anything.
(long pause)

F: So if you are interested in the subject it motivates you to learn?

S1: Of course, is easier to learn if you have interest.

S5 searching for word in his EC dictionary.

(Explain motivation)

F: So is there anything else that motivates you when learning to use the computer?

S4: This subject we have to learn. We just do it.

S2: Make it interesting - Just play some games or something. Its not like I want to be a computer scientist or anything.

S3: More fun I think.

F: OK, So I think you are all in agreement that learning to use a computer should be fun?

(All in agreement).

F: How do you like to learn in class?

S1: Like have the teacher to tell us how to do the problem – then give us some time to practice by myself.

S3: Well, I was in the certificate and we learnt spreadsheets. The teacher just showed us. Then we did it. We practiced in class.

S4: We need time to practice, in class. Sometimes not enough time.

F: You mean you would like more class time to practice in the class.

S4: Mmm, yes in class.

S2: Yes but you can practice at home. We should practice at home. It gets kind of boring waiting for everyone to catch up.

S1: Yes, at home you get stuck, but in class you can ask classmate.

S5: In group?

(No response)

F: So you like to work in groups? Tell me about group work.

S2: I think I like to learn by myself .

S1: No. Group work is too hard.

S5: Yes.

F: In what way?

S5: We have English second language and had to give idea in group in language. We had to give idea on microprocessor, but computing is hard, language difficult.

S1 When one group have one question and you just do one question and then we not care about other question. Just doing one specific question even though another group just do another question. Would be better if all do the same question because you can't concentrate on other ones because your nervous, because English second language so sometimes when the classmates are doing their speech you thinking, thinking about language of how you are going to speak and you do not learn from other group.

S5: Sometimes when the classmates from other groups doing their speech, sometimes they speak so they can't speak up so we can't keep up with their speech. Sometimes its not easy to understand.

S1: When you have some group you will try to dispute to give your ideas for to help in the group. So you can learn a lot but only if students in group can speak English.

S2: I don't think we should have to do group work when working on the computer.

S1: I like to ask classmate, sometimes he help me. I talk with my classmates, my Chinese classmates.

S5: Is good to discuss. But in language.

S1: Sometime classmates help because you don't learn in class.

S2: Yeah, but I just prefer to work problems by myself.

S3: Yeah, me too. Sometimes when you're doing things with others on the computer, they get ahead of you and then you are just lost.

S2: I suppose it's different for the theory stuff.

(pause)

F: Yes it may be different learning the practical to the theory side and we will have to discuss that next time as there is no time left. (close etc).

Notes: Bit slow to get going. Two students were late.. English sometimes difficult for S5 and S4.

Appendix I

Copy of Students Journal

Q. What does it mean to successfully read your text book.

Its a really good book, a lot of visuals and helpful information that helps me understand what is going on behind the scenes. I have to understand what happens so I can understand how to use it. I can understand because the visual is of the ~~at~~ actual thing - like there are actual pictures of digital cameras, microwave dishes, satellite and how the computer works. This helps for case studies.

Q. Do I find the practical workbook helpful;

Yes - I soppose so. it makes it easy to study as I can use it at home.