DOCTOR OF PHILOSOPHY

Creating an effective learning environment in higher education

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Award date:
2009

Awarding institution:
Bangor University

Creating an Effective Learning Environment in Higher Education

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September, 2009

This dissertation is submitted in part fulfillment of the requirement for the degree of PhD of Bangor University

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Appendices I – X

Readers may consult the original thesis if they wish to see this material.

Statement of Collaboration

Chapters 3, 5, and 6 were adapted from papers written with co-authors. The author of this thesis would like to state that all the studies derived from her ideas and she was the prime person responsible for collecting and analyzing all the data in this thesis. During the writing process she did collaborate with colleagues to share additional perspectives to the papers. Although hard to quantify the published work was a least 75% generated by the thesis author. The chapters themselves have been further developed by the thesis author herself.

A professional academic editing service (Firstedit) was used to proof read and correct any spelling and grammatical errors in the thesis, this service did not contribute to the actual content or concepts in the work.

Acknowledgments

The initial idea for this thesis was conceptualized on a beach in Greece after attending a conference. It seems fitting that the main write up of the research was conducted from a beach hut in Thailand. For both I make no apology.

I am a great believer that climate is very influential in one's learning and I am lucky enough to have had two sets of people who have always provided me with a climate that has both challenged and encouraged me in my learning to date.

John & Della Fazey – two extraordinary people who manage to bring out the best in those they come into contact with. I remember a conversation with John at dinner where we were talking about teachers who had made an impact on our lives – I didn't like to say that the teachers who had impacted on me most was them to their faces – but my answer is undoubtedly the Fazeys – Thank You.

My mum & dad – my mum once said I was the most independent person she had ever met (I think I was actually just being stubborn at the time) but I am the person I am because of their constant love, support, encouragement and belief in me. I couldn't have asked for better parents – Thank You.

The final write up of this work was difficult for a number of reasons and I would like to thank Jen for her constant belief and motivation, and Taffy and Pearl for dog hugs just when they were needed (although I could have done without the walking on my notes!).

Lastly I would like to thank all the students and staff who willingly participated in these studies, their time is appreciated. To the other authors on the papers I have written in this area. Also the colleagues who have listened to and given feedback to my ideas over the years.

Summary

Higher Education (HE) has changed over the last 40 years, from providing higher level learning for the elite to a provision of education for the wider population. These changes must be accompanied by a consideration of how teaching can promote effective learning in HE with the changed population of students. The aim of this thesis is to examine factors that affect students' learning in HE, and consider how the teaching approaches of university lecturers can facilitate learning at a higher level. Biggs' (1999) 3P model is used as a starting point to examine the different aspects of teaching and learning. Student factors (for example, approaches to learning, concepts of ability, motivational orientation), the teaching context (for example, the type of assessment, the extent to which teaching is constructively aligned), and the training of lecturers in HE are all considered within the thesis. The work informs educationalists and policymakers who are concerned about effective teaching and learning in HE.

Chapter One is a review of literature, looking at current issues within HE in the UK and exploring theories and models that inform teaching and learning. It provides the base for the current research examining the main concepts: constructive alignment (Biggs, 1999), practice and variation (Fazey and Marton, 2002), and the four conditions of learning (Bransford, Brown and Cocking, 2000). Chapter Two is a detailed description of the instruments and methods utilized in the studies, and an examination of the rationale, the procedure, and the scoring for each of the instruments.

Chapters Three through Six report the studies for this thesis. Chapter Three discusses a study that examines the effect of a particular teaching approach, utilizing an oral examination final assessment, on students' approaches to learning and motivational orientation. By emphasising an assessment methodology that required a deep approach to learning, first year students were predominantly intrinsically motivated, and maintained their level of deep approach to learning throughout the module. Previous literature had found decreases in deep approaches to learning when assessment took place.

Chapter Four investigated how students' concepts of ability (i.e. a fixed or incremental concept) affected other psychological variables associated with learning. Its findings support the work of Dweck and colleagues (1995; 1998; 1999), with relationships established between concepts of ability and motivational orientation with approaches to learning. A high incremental concept of ability score was significantly and positively related to intrinsic motivation and to a deep approach to learning. However, these relationships were not strong, and no relationship was found with concepts of ability and perceptions of competence, as was hypothesised.

In Chapter Five, constructive alignment was examined in a variety of teaching settings. Of interest was the extent to which a strongly-aligned teaching approach that fosters deep approaches to learning had an impact on students' approaches to learning and motivation. Two studies are reported. Both consider how strongly the teaching methodology, assessment, and learning outcomes align, and how well these fostered a deep approach to learning. The first study, with modules classified as being strongly aligned and fostering deep approaches to learning, had students who scored significantly higher on deeper approaches to learning and intrinsic motivation than those in modules with low alignment that emphasised a surface approach. In the second study, changes over time in student factors, related to teaching approach and alignment, were recorded.

In Chapter Six, two studies are reported. The first measured, across a course for teachers in HE, teachers' approaches to teaching and beliefs about learning teachers' subject areas. After a three-day induction, the participants significantly increased their scores for a personal epistemology that recognizes justification of knowledge, and a teaching approach that encourages conceptual change in a student-centred environment. The second part of this chapter investigated the impact these lecturers' perspectives had on their students' learning. Strong positive relationships were found between the teachers' and students' personal epistemologies, and also with the approach to teaching that fostered conceptual change. Students scored higher on a deep approach to learning when their teachers had a conceptual change approach.
Chapter Seven presents the overall discussion of the most significant findings, and the implications of these findings for educational practitioners and policy-makers. Future research questions and issues that arise from the findings are also highlighted.

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Chapter 1

Teaching and Learning in Higher Education

You cannot be wise without some basis of knowledge; but you may easily acquire knowledge and remain bare of wisdom

(A.N. Whitehead, 1948)

1.1 Introduction

Universities have changed over the last forty years, and many more people now have the opportunity to study a degree course (Higher Education Statistics Agency (HESA), 2008). These changes mean that it has become important to reconsider how people are taught in universities, accommodating a wider range of students without detrimentally affecting the quality of the learning. The aim of this thesis is to explore teaching and learning in the modern day Higher Education (HE) system in the UK. It aims to investigate some of the theoretical constructs of teaching and learning in HE, for example, observing the impact of assessment on students' approaches to learning and motivational orientation, examining the effect of student factors like concepts of ability on learning behaviour, and studying the impact of constructively aligned teaching on students' learning. It then goes on to consider how university lecturers can be trained to be more effective in educating students by investigating the impact of a teaching and learning course for new academic staff. This work hopes to build on the body of material that is being compiled to advise educationalists on best practice.

This first chapter is written in two parts. The first looks at the thesis, explaining the research that was undertaken, the rationale behind the studies, and the order in which they were conducted. The second part considers the present-day UK HE system, and discusses teaching and learning in UK universities from a theoretical perspective.

1.2 Thesis Overview

The initial question for this research arose when the assessment requirements were altered for a module that the author tutored. The re-designed module required students to undertake a viva voce as their main form of assessment. The viva voce was based around a concept map that the students continually developed throughout the semester. This mapped the concepts introduced in the module, how they related to one another, and provided examples from both empirical studies and practice. The rationale for this alteration was to foster a deeper approach to learning, which according to Trigwell and Prosser (1999), leads to a superior demonstration of learning in students.

Newstead (1998) found that students' approaches to learning changed the closer they got to the time of assessment, with students showing a decline in their deep approach to learning and an increase in both their surface and strategic approaches. Based on the assumption that assessment drives approaches to learning (Bransford, 2000; Gibbs, 2007; Ramsden, 1992; 2003), designing an assessment that required students to demonstrate a higher level of learning was expected to result in the students' adoption of a deep approach to succeed in this assignment. The viva voce assessment required them to demonstrate understanding of relationships, application of theory into practice, and the ability to see variety of perspectives, all of which are higher-level categories of Marton, D'alba and Beaty's (1983) levels of learning. The author decided that this was a sound

basis for a research question, and developed a study (see Chapter 2 for Methodology Rationale) to test whether the adoption of this style of assessment (embedded within a teaching style), designed to foster a deep approach to learning, would in fact result in a contradiction of Newstead's (1998) work, by maintaining students' deep approach to learning levels. The strong relationship between approaches to learning and motivational orientation (Fazey, 1999) was considered, and in order to enhance this study, motivational orientation also was included in the research, to test the relationships between the motivation and approaches to learning, as well as the impact that the assessment method had upon students' motivation.

The results from this first study were very encouraging, showing a decrease in students' surface approach to learning, and maintenance of deep approach levels. The motivational orientation levels were also of interest, showing an increase in the intrinsic elements of the self-determination continuum, and a decrease in all but one of the external motivation categories (introjected). The author and subject leader continued to use this assessment methodology with students, and were able to track the initial students through their full degree, with these longitudinal studies showing similar results to the initial date set.

The author then moved focus to the presage stage of the 3P model. The next study investigated some of the psychological elements that students bring to their learning environment, and in particular their concept of ability, and how and how these elements can impact on the learning process. Concepts of ability are an individuals' perception of their ability to develop in a competence. Students who enter a learning experience with a fixed concept of ability believe that no amount of effort or practice could help them

improve on their competence level, would behave differently (that is show different approaches their learning and have varying motivational orientation) than those students with an incremental concept of ability who believe that with work it is possible to continually improve. Dweck (1995), a lead researcher in this field, had conducted studies that examined motivation, perceptions of competence, and concepts of ability; however, no work had been conducted about how these concepts may affect students' approaches to learning. Therefore, this seemed to be a new area of interest that warranted research. By understanding how concepts of ability impact on motivational orientation and approaches to learning, an environment can be created to help manipulate concepts of ability in the class. This study did not generate strong results, but did indicate similar relationships for motivation to those suggested by Dweck et al. (1995), with learners who had an incremental belief about ability showing higher intrinsic motivation. It also found a significant but weak relationship between deep approach to learning and incremental concepts of ability. Therefore, these concepts of ability do seem to have some kind of relationship with how students approach their learning, and should be considered when teaching, especially recognising those learners with more fixed concepts of ability.

The results of the first two studies were interesting, as they informed us about students' behaviour within different learning situations. The next step in this progression was to examine the teachers' behaviour more closely, investigating how the design and facilitation of academics' teaching impacted the students, in particular the level that to which their module was constructively aligned. Biggs (1999) has conducted considerable research around constructive alignment, and found that learning should be designed in a manner that ensures the assessment method, teaching approach, and learning outcomes

all align with each other. This alignment is most powerful when it is designed to foster a deep approach to learning. The third study looked at the impact of this alignment on students' learning behaviour. It was conducted in two parts; the first part took a snapshot view of how teaching affected students approaches to learning and motivational orientation, measuring these factors midway through a semester. The results were encouraging, with those modules that were strongly aligned and promoting deeper understanding showing higher student scores in intrinsic motivation and deep approach to learning. The author felt that this snapshot view was not enough evidence to make the claim that it was the constructive alignment of the teaching that was causing these relationships, and so the study was repeated, but this time with a pre and post data collection at the beginning and end of the semester. This made it possible to monitor if the students' motivation and approaches were altering as a result of the teaching. This second study also found relationships with students' approaches to learning and motivation and the strength of their teachers' alignment and the degree to which they fostered a deep approach to learning.

The last study examined aspects of staff development. It aimed to investigate how the findings of the first three studies could be disseminated to teaching staff in an effective manner that would encourage these staff to adopt changes in their current practice, where appropriate. It was based around a Masters Certificate in HE, which was run for beginning teachers in HE. The course was designed to work in the context of the staff, making it a portfolio-based qualification. Staff were introduced to the concepts around teaching in HE in a three-day induction at the start of the programme. This induction allowed opportunities for participants to reflect upon and discuss their current

perceptions of teaching in HE, whilst being introduced to current pedagogical theories. The new academics then used this as a platform to plan their development, which was eventually documented in their portfolio. The author saw this as an ideal opportunity to introduce staff to the findings of the first studies in this thesis, to develop their teaching practice. This fourth study again was in two parts. Firstly, it looked at whether a three day face-to-face induction had any impact on new lecturers' epistemological beliefs about their subject and their approaches to teaching. Analysis was also conducted to see if these two elements correlated with each other. It was encouraging to see that by the end of the induction, the approaches to teaching had developed, with the academics' student-focused/conceptual change approach to teaching significantly higher than at the beginning of the induction. When the epistemological beliefs were examined the belief about justification of knowledge had also increased over time. The expected relationships between approaches to teaching and epistemological beliefs were also found. Conceptual change approach to teaching significantly correlated with justification of knowledge, and information transmission approach with the more authority-based beliefs (justification of knowledge, certainty of knowledge, source of knowledge). The second part of the study then tracked these staff into the classroom, to see how these approaches to teaching and their beliefs impacted on their students' learning behaviour. Once again, the results were positive, with staff who held beliefs about justification of knowledge developing students with this belief, and those teachers who adopted a student-focused/ conceptual change approach to teaching fostering a deep approach to learning in their students.

These studies began by looking at a single intervention in a module and the psychological concepts that students bring to a learning experience, and built to examine

how the teacher impacts on the students' learning, and how staff can be developed to try to provide the most effective learning opportunities possible for the students. These are important findings based upon the current HE context in the UK that is focused on widening participation to make more education available to a larger population.

1.3. The Current UK Higher Education System

In 2004, "The Future of Higher Education" white paper was submitted by Charles Clarke (Secretary of State for Education and Skills) to Parliament. This paper outlined the government's policy towards HE in the UK, and recognised that universities are no longer educational institutions for the elite, but currently open their doors to hundreds of thousands of students each year. For example, in the early 1960s, only six percent of students under the age of 21 went to a university, whereas in 2004, around 43 percent of 18 to 30 year olds in England entered HE.

The issues for the UK HE system that were identified in this governmental paper included:

- The need for HE expansion to meet rising skill needs.
- How the social class gap among those entering the university might be reduced.
- The struggle for universities to employ the best academics.
- Reduction in funding per student, which fell 36 percent between 1989 and 1997.
- The need for universities to establish stronger links with business and economy.

With this in mind, areas for improvement were recognised, and the government's Higher Education Bill (2004) reversed the years of under-investment by increasing funding for HE. Some of the measures that were addressed were to:

- Improve and reward excellent teaching;
- Enable more people to enter HE, benefiting both individuals and the economy's need for higher level skills;
- Supporting those from disadvantaged backgrounds by restoring grants, helping with fee costs, and abolishing up-front tuition fees for all students.

The impact of these initiatives on the functioning of teaching and learning in HE will be interesting to monitor in the future. These reforms meant that a higher proportion of people were entering HE from a wider variety of backgrounds, therefore, this initiative was known as "widening participation (Robertson and Hillman, 1997)." At the end of 2006, the Higher Education Funding Council, England (HEFCE) undertook a review of widening participation activities in the sector, which was reported to the Minister of State for Higher Education and Lifelong Learning. The review found that there was evidence of real progress in embedding widening participation as part of the core mission of all HE institutions. However, although the numbers have increased over the last four decades, and the government has attempted to encourage more people from families or social groups who do not usually participate in HE to go to a university, research from the London School of Economics, (cited in Brown, 2006) has shown that the proportion of students from such backgrounds remains low. Statistics from the HESA (HESA, 2006) support this, showing little change in the percentage of students from lower socio-economic backgrounds over the past five years (see Table 1).

Table 1: HESA Statistics for Accepted applicants to HE (2002-2006)

Socio-economic status	**2002**	**2003**	**2004**	**2005**	**2006**
Higher managerial and professional occupations	18.5%	17.8%	17.9%	16.6%	16.5%
Lower managerial and professional occupations	25.2%	24.9%	25.3%	24.2%	23.1%
Intermediate occupations	12.7%	12.2%	12.2%	11.7%	10.8%
Small employers and own account workers	6.1%	6.0%	6.0%	5.7%	5.7%
Lower supervisory and technical occupations	3.9%	4.0%	3.9%	3.7%	3.5%
Semi-routine occupations	10.4%	10.6%	10.6%	10.8%	10.1%
Routine occupations	4.8%	4.6%	4.6%	4.5%	4.4%
Unknown	18.5%	20.0%	19.6%	22.8%	25.9%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

It also has been found that even when these students do enter a university, they are far more likely to drop out (National Audit Office, 2008). Students cite a variety of reasons for leaving that include problems with the course, problems with the institution, financial problems, or personal reasons.

In order to establish the extent of the success that HE was having with these reforms, in particular widening participation, Bekhradnia, Whitnall and Sastry (2006) were commissioned to write a report on the experiences that students have in HE in UK universities. They found, that although on average, the number of contact hours with staff had increased; it could not be assumed that this led to better learning. There were various factors that had to be considered alongside contact hours, for example, teaching styles, course aims, a teacher's experience in teaching, size of the class, and so on. They found that students who received the highest number of contact hours during their degree were the least satisfied with the teaching, as they felt they were taught by less qualified

teachers (often non-academic staff) or they were part of very large lecture groups. This evidence is supported by the statistics (HESA, 2002) that show a decline in staff to student ratios. These have fallen from just over 1:10 in 1983, to 1:18 in 2000, which means that students write fewer assignments, as staff are not capable of marking large loads, and that they have less quality contact with staff.

The HESA (2006) has also recorded the changes in requirements for entry into HE. With the drive to increase numbers into degree programmes, the academic standards have naturally altered with it, and it is now possible for students with lower grades, or mature students with no formal qualifications, to enrol into a university.

In consideration of the fact that class sizes have increased in the HE setting in recent years, and that there is a greater range of student background and ability within these classes, it is important to review teaching and learning practice in UK universities. This next section revisits the foundations of learning, before examining the contemporary frameworks for best teaching practices in HE.

1.4 Learning Theories

To understand the concept of learning in HE, it is important to review the foundations of learning, to see how they relate to the current pedagogies. There are vast arrays of behaviours that can be deemed "learning," and it is evident that there are types of learning that take place on different levels and in a variety of ways. With all of these dimensions, defining learning is not an easy task.

Bloom (1956) developed a classification of levels of intellectual behaviour important in learning. This became a taxonomy and included three overlapping domains: the cognitive, psychomotor, and affective (see Anderson & Krathwohl, 2001; Bloom & Krathwhol, 1956; Gronlund, 1970). Cognitive learning consisted of six levels: knowledge, comprehension, application, analysis, synthesis, and evaluation. The affective domain (e.g., Krathwhol, Bloom & Masia, 1964) consisted of behaviours corresponding to: attitudes of awareness, interest, attention, concern, and responsibility, the ability to listen and respond in interactions with others, and the ability to demonstrate those attitudinal characteristics or values which are appropriate to the test situation and the field of study. This domain relates to emotions, attitudes, appreciations, and values, such as enjoying, conserving, respecting, and supporting. It is these two domains that relate to this thesis, as the focus is on developing understanding and psychological components that affect behaviour during this learning process.

The work of Bloom and others on taxonomies was significant because it was the first attempt to classify learning behaviours and provide concrete measures for identifying different levels of learning. There are other classic theories that use different elements of this taxonomy to develop their understanding of how learning actually occurs.

Psychologists have explained learning as a relatively permanent change in behaviour as the result of experience (Hardy, 1982). Biologists explain that for someone to adopt a relatively permanent change in behaviour, there must be a relatively permanent change inside of a person. The nervous system and the brain are the physical foundation

of the human learning process. Hebb (1949) proposed a theory of cell assembly to explain learning and how it affects the pathology of the brain. The key idea is that learning takes place by reinforcing patterns of neural activity elicited during mental activity. This growth is a permanent change in the brain that allows the neurons to fire easily. It is known as a phase sequence, and is shown when a person displays learning. Phase sequences develop as a result of learning and memory development, and in this way the brain could be described as a self-organising system. As long as there are no barriers to prohibit normal processes, learning will occur. Due to recent advances in technology, brain mapping is a growing area of interest for neuroscientists. Research has found that the different areas of the brain have different functions. Due to the plasticity of the brain, when opportunities arise, learning can take place at any age, developing previously latent parts of the brain (Blakemore & Frith, 2000).

Although this theory is recognised as physiologically sound, it does not explain the variability that occurs in learning, and so educators have also sought explanations from psychological perspectives. These classic learning theories can be classified into four orientations: behaviourist, cognitive, social/situational, and humanistic (see Table 2).

Table 2: Four orientations to learning (Merriam and Caffarella 1991, p.138)

Aspect	**Behaviourist**	**Cognitivist**	**Social / situational**	**Humanist**
Learning theorists	*Thorndike, Pavlov, Watson, Guthrie, Hull, Tolman, Skinner*	*Koffka, Kohler, Lewin, Piaget, Ausubel, Bruner, Gagne*	*Bandura, Lave and Wenger, Salomon*	*Maslow, Rogers*
View of the learning process	*Change in behaviour*	*Internal mental process (including insight, information processing, memory, perception*	*Interaction /observation in social contexts. Movement from the periphery to the centre of a community of practice*	*A personal act to fulfil potential.*
Locus of learning	*Stimuli in external environment*	*Internal cognitive structuring*	*Learning is in relationship between people and environment.*	*Affective and cognitive needs*
Purpose in education	*Produce behavioural change in desired direction*	*Develop capacity and skills to learn better*	*Full participation in communities of practice and utilization of resources*	*Become self-actualized, autonomous*
Educator's role	*Arranges environment to elicit desired response*	*Structures content of learning activity*	*Works to establish communities of practice in which conversation and participation can occur.*	*Facilitates development of the whole person*
Manifestations in adult learning	*Behavioural objectives* *Competency - based education* *Skill development and training*	*Cognitive development* *Intelligence, learning and memory as function of age* *Learning how to learn*	*Socialization* *Social participation* *Associationalism* *Conversation*	*Andragogy* *Self-directed learning*

However, as with any categorization of this sort, the divisions are a bit arbitrary. There are opportunities for further additions and subdivisions to the scheme, as well as various ways in which the orientations overlap and draw from each other.

Early behaviourists developed the concept of conditioning. Twitmeyer (1902) was the first to publish work on classical conditioning, but the name familiar to most people is that of Ivan Pavlov (1911). He associated a stimulus to an object/reward that facilitated a reflex response, so that the response occurred when the original object was removed. This was termed a conditional stimulus. Pavlov went on to test the characteristics of this type of learning. He found that animals could be taught to react to a range of stimuli. The dogs he used also could be taught to discriminate between stimuli, if the reward was only given for certain conditional stimuli. Recent studies have gone on to investigate the effect of multiple reinforcement, which allows for a higher possibility of the required behaviour to be exhibited (Shelton, 2001).

This kind of conditioning – classical, is usually used with people who are thought to exhibit abnormal behaviour, stemming from a learning problem. Classical conditioning deals only with reflexes, the simplest form of behaviour, and can therefore be classified as the simplest kind of learning. Even though it is a simple form of learning, it acts as the model for learning.

Operant conditioning differs from classical, in that reinforcement or stimuli is presented after the required behaviour has been exhibited, rather than before, in order to stimulate the reaction. Thorndike (1913) and Skinner (1938) were two pioneers of this work. Thorndike measured the time it took for an animal to find a solution to a problem;

it was found that the creature took less time with each trial to find the answer, until eventually it was done instantly. Thorndike hypothesised that if the response has a positive outcome, then the behaviour is more likely to be repeated given the same circumstances. This is known as the law of effect.

Skinner introduced reinforcement into his experiments. Behaviour that is reinforced tends to be repeated, whereas behaviour that is not reinforced tends to die out. Learning can also occur through negative reinforcement, or escape learning. This involves the removal of unpleasant stimulation when the correct response is made. If a warning is given before the unpleasant stimulus is introduced, then this can cause the desired behaviour through avoidance learning. However, if the learner receives negative reinforcement for a length of time, and is unable to find a solution to stop the unpleasant stimulus, then even when the answer becomes apparent the learner will make no attempt to avoid the punishment, which is learned helplessness (Seligman, 1975).

A major criticism of classical and operant conditioning is the amount of time it takes for learning to take place. Operant is more flexible and can help explain how humans generate the numerous possible responses that could be exhibited in a situation, but it does not explain how the appropriate selection of efficient responses takes place. Thorndike's (1911) work showed that through trial and error, the learner gradually came to the correct response, but again, this was time consuming. Harlow (1949) conducted research, finding that although when initially faced with a problem, trial and error methods are used, over time a set of rules are devised and learnt in order to aid in the problem solving. These rules are known as a learning set. They are important as they

explain how, by trial and error, structures can be developed that enable learning to be quick and efficient.

Harlow's (1949) work shows how learning is enabled through trial and error, not only how to do a particular task, but how to do a particular type of task. This relates to Hebb's (1949) theory of developing phase sequences for particular sets of behaviours. The cognitivist psychologists have built on these findings to describe hypothetical constructs that re-organise and develop to explain learning.

Piaget (1972) looked at the development of intellect in children, constructing a highly influential model of child development and learning. He believes that intelligent behaviour stems from an external display of internal, biological tendencies towards adaptation and organisation. If a learner can adapt to his environment, this supposes that there is some internal organisation or structure present, and that the adaptation is a manifestation of this. As an individual develops, they continually reorganise, allowing for more advanced adaptation. Piaget sees intelligence as an ability to adapt. This organisation is comprised of schemata. Earliest examples of schemata are reflexes, which develop into complex hypothetical constructs that allow for analyses of the environment and of experiences.

There are two processes that explain the formation of schemata and the development of existing ones – assimilation and accommodation. Assimilation is when the learner reacts to the environment by applying his already existing schemata, thereby re-organising the internal structure. Accommodation is the process whereby existing schemata is modified to take into account the properties of the input stimuli. Piaget

proposes a process of equilibrium between these two functions, which maintains a balance between them (Piaget, 1926). Assimilation alone would produce rigid, fixed behaviours using existing schemata, while accommodation alone would not allow for sense to be made of the environment, due to the constant modification. Equilibrium ensures that accommodation is consolidated via assimilation; once it has been consolidated, then the individual is ready for new learning by entering into a stage of disequilibrium (Piaget, 1926).

Bruner's (1956) views parallel those of Piaget, but he asks how and why intellectual development occurs, rather than attempting a description of the mechanisms. Bruner places more emphasis on culture and education, rather than the developmental slant that Piaget has. They both believe that the individual has a major role and an active part in their development. Bruner's theory says that in order for people to control their environment, they must learn to predict it (Bruner, 1961; 1977). In order to predict it is important to be able to recognise reliable patterns in behaviour, and to make sense and organise personal experiences.

Language and thought are seen as separate, according to Bruner's perspective, with non-linguistic thought developing first, and once the language has developed it is then used to accelerate thought into abstract levels. This is closely related to Vygotsky's (1962) concept of learning that he explains within a social concept.

Vygotsky (1962) sees language and thought as having separate roots, but amalgamating as the child develops. He was particularly interested in egocentric speech, which is evidenced in children until the age of about seven or eight. Where Piaget saw

this type of speech as futile, becoming extinct as the child overcomes their egocentrism, Vygotsky sees it as developing into inner thought processes that are used in problem solving (Vygotsky, 1962).

Social interaction is seen to play a fundamental role in the development of cognition. There is a fusion between the child, the social context, and others, each affecting the other in various ways. Looking at an individual's development out of his context leads to an incomplete picture. Vygotsky (1978) defined the zone of proximal development (ZPD), and in his theory about ZPD suggests that the child has a level at which they can operate independent of others, but that there is a higher level of potential development that can be accessed through interaction with more capable peers and adults. Through prompts, clues, modelling, explanation, questioning, discussion, and participation, the child's learning is awakened so that they operate on this higher level. His theory saw a child experiencing each behaviour twice, once on a social level and then on an individual level. The child's development and potential to develop was therefore limited by their social interactions (Vygotsky, 1978).

Social learning theory emphasises the importance of observing and modelling the behaviours of others. It sees individuals developing by conforming to social norms, and assumes that behaviour is shaped by external reinforcements. It therefore builds on theories of conditioning. Bandura (1977) is the main researcher in this area; he has found that observational learning is efficient and adaptive, and therefore well-suited to learning complex, interactive behaviours. The basic premise is that the individual observes a model acting in a certain manner, and then depending upon factors, such as outcome (success or failure, reward or punishment) and prestige of the model, the observer will

imitate their behaviour. This theory encompasses elements of both cognitive and behavioural frameworks as it includes attention, memory, and motivation.

In order to show how these theories relate, Sternberg (1983) talks of a triarchic structure of intelligence. The first category outlines the structures and mechanisms that underlie intelligent behaviour as being metacognitive, based on knowledge acquisition, and such theories as biological, and constructivist. The next element is the experiential element, which stipulates the need for interaction. This incorporates experiential learning, conditioning, and social learning. Last is the contextual element that is defined by the environmental and cultural context. In order for learning to be explained fully, all three components must be considered in interaction with each other.

The foundations of learning described in the first section give the basic theoretical underpinnings of learning, but these concepts on their own are unable to explain the complexities and robustness of more meaningful learning situations (McKeachie, 1974). For example: behaviourist theories such as Thorndike's Law of Effect (1932) (reward correct responses) and Skinner's Law of Exercise (1965) (practice correct responses) are adequate to explain simple actions, but fall short when it comes to more complicated learning. Social theorists (Bandura, 1977, Vygotsky, 1962) can explain learning through modelling and interaction with others, but fail to explain individual self-learning. Biologists (Hebb, 1949) can describe the functions of the brain when learning is taking place, but do not explain how those functions manifest; for example, the reasons why when two individuals have the same experience, one will learn and the other does not. Cognitivists (Piaget, 1972) talk of hypothetical constructs called schemas that are applied

or adapted to different situations, in order to develop behaviour; again these schemas alone do not seem to be able to explain more complex learning situations.

Therefore, the question of what affects more complex, effective learning is still to be addressed. It is of vital importance to understand learning so that educationalists can provide the most effective climates for students to learn.

Drawing on the work of the humanists (for example, Krashen, 1982), Rogers (2003) sets out two contrasting approaches: task-conscious, or acquisition learning, and learning-conscious, or formalized learning. Task-conscious or acquisition learning is seen as ongoing. This kind of learning has been referred to as unconscious or implicit. However, Rogers suggests that it might be better to speak of it as having a consciousness of the task. In other words, whilst the learner may not be conscious of learning, they are usually aware of the specific task at hand (Rogers, 2003).

Learning-conscious, or formalised learning, arises from the process of facilitating learning. It is "educative learning," rather than the accumulation of experience, to the extent there is a consciousness of learning - people are aware that the task they are engaged in entails learning. The traditional theories can be seen to apply to the different sectors on the acquisition-formalized learning continuum (Rogers, 2003).

At one end of the continuum are the unintentional and usually accidental learning events which occur continuously while walking through life. This is followed by incidental learning, which is unconscious learning through acquisition methods that occur in the course of some other activity. Then, there are various activities in which people are somewhat more conscious of learning, such as experiential activities arising from

immediate life-related concerns, though even here, the focus is still on the task. Next are the more purposeful activities, occasions in which the goal is to learn something in a more systematic way, using whatever comes to hand for that purpose, but often deliberately disregarding engagement with teachers and formal institutions of learning. Further along the continuum, lie the more formalized (and consequently less contextualised) forms of learning, in which some elements of acquisition learning are often built into the designed learning programme. This leads to the other end of the continuum, the more formalised learning programmes of highly decontextualised learning, which use material common to all the learners without paying any regard to their individual preferences, agendas, or needs. There are no clear boundaries between each of these categories (Rogers 2003).

Lave (1988) argues that learning as it normally occurs is a function of the activity, context, and culture in which it occurs (i.e., it is situated). This contrasts with most classroom learning activities that involve knowledge that is abstract and out of context. Social interaction is a critical component of situated learning, in which learners become involved in a "community of practice," which embodies certain beliefs and behaviours to be acquired (Lave, 1988). Furthermore, situated learning is usually unintentional, rather than deliberate.

Other researchers have further developed the theory of situated learning. Brown, Collins & Duguid (1989) emphasize the idea of cognitive apprenticeship:

> Cognitive apprenticeship supports learning in a domain by enabling students to acquire, develop and use cognitive tools in authentic domain activity. Learning, both outside and inside school, advances through collaborative social interaction and the social construction of knowledge. (p.3)

The idea of cognitive apprenticeship is to make learning a part of a rich context that allows for a variety of experiences, making it meaningful and authentic for students. In many learning situations, the experts often fail to take into account the implicit processes involved in carrying out complex skills when they are teaching novices; cognitive apprenticeships, "...are designed, among other things, to bring these tacit processes into the open, where students can observe, enact, and practice them with help from the teacher..." (Collins, Brown, & Newman, 1987, p. 4). This model is supported by Albert Bandura's (1997) modelling aspect of social learning, which states that in order for modelling to be effective, , in addition to other facets, the learner must have access to and retain the information presented, and must be able to accurately reproduce the desired skill.

As students who are taught in cognitive apprenticeships learn, they undergo three stages of skill acquisition: the cognitive stage, the associative stage, and the autonomous stage (Anderson, 1983; Fitts & Posner, 1967). During the cognitive stage, learners develop a declarative understanding of the skill. The next stage, the associative stage, is an opportunity for learners to identify and correct mistakes and misinterpretations from the cognitive stage, whilst further developing associations between the critical elements involved in the skill. Finally, in the autonomous stage, the learner's skill is perfected until it can be executed at an expert level without the support of expert guidance (Anderson, 2000).

The most important emphases of the learning environment in cognitive apprenticeship are situated learning and the culture of expert practice (Collins, Brown, & Newman, 1989), where learners are engaged in activities that relate to practices in the

real world. These authentic tasks encourage students to think like and to be treated as experts (Collins, 1991), which means the students are motivated, and experience a sense of ownership of their knowledge and tasks, which also encourages a greater level of retention and transfer. Also, in cognitive apprenticeship practices, because students are working with experts who are using higher-level thinking processes, they are exposed to these processes through cognitive modelling (Hogan & Tudge, 1999). As the learners become more autonomous, they explore new ideas and make discoveries using advanced reasoning processes.

However, there are other considerations that must be acknowledged when using a cognitive apprenticeship process. The students' autonomy levels depend on the success of the coaching and scaffolding provided largely by the teacher. This requires patience and advanced facilitative teaching skills. Also, if expert modelling overwhelms the students, there may be difficulty in understanding the processes and construction of a mental model of the task, and then students may become anxious, frustrated, and afraid to explore tasks on their own.

This autonomous skill development is also evident in experiential learning, which is another humanistic view that fits into the situated learning arena. Experiential learning involves identifying learning objectives, and then allowing participants to be actively involved at one or more points of time during this learning experience (Walter & Marks, 1981). It follows the theory that one learns best by doing. In experiential learning, the participants show an interest in the subject, help to develop the curriculum, are free to learn in their own way, and are allowed to change, as opposed to an orthodox situation in

which the learner is told what to learn and how to learn it. To Rogers (2003), experiential learning is equivalent to personal change and growth. He feels that all human beings have a natural propensity to learn, and so the role of the teacher is to facilitate this learning. This includes: setting a positive climate for learning; clarifying the purposes of the learner(s); organizing and making available learning resources; balancing intellectual and emotional components of learning; and sharing feelings and thoughts with learners without dominating.

In order for experiential learning to be effective, the participant must be fully involved, subjects that are relevant to the individual must be selected, the learner must take responsibility for their own learning, and training has to be flexible and responsive to the learners' needs. When the learner is engaged in an activity, then they are more susceptible to a change in attitude, and are more likely to develop their skill level. Individuals feel a need for mastery (Competence Motivation Theory, Harter, 1981), and will gain more satisfaction when they are directly involved in the activity (Erikson, 1950). This learning leads to increased motivation through reinforcement. Individuals have to feel that the learning matter is of personal significance in order for it to be appreciated, which in turn leads to higher intrinsic motivation. When responsibility is taken for one's learning then the individual is more inclined to invest higher levels of energy to the task.

The processes discussed at this end of the acquisition-formalized learning continuum all relate to elements of Knowles' (1990) theory of andragogy (adult learning), which introduces us to learners in HE. This theory emphasizes that adults are self-

directed and are expected to take responsibility for decisions, so adult learning programs must accommodate this fundamental aspect.

Andragogy makes the following assumptions about the design of learning: adults need to know why they need to learn something; instruction should be task-oriented, instead of based in memorization; adults need to learn experientially, allowing them to discover things for themselves; instruction should take into account the wide range of different backgrounds of learners; adults learn best when the topic is of immediate value; adults are self-directed, involved in the planning and evaluation of their instruction; and instruction should provide guidance and help when mistakes are made (Knowles, 1984). In practical terms, andragogy means that instruction for adults needs to focus more on the process, and less on the content that is taught.

The main focus of this thesis is teaching and learning in HE, which of course utilises adult teaching and learning. During the first stages of the university, students who are entering from school or returning to education after time away, are expected to transition from the school-based learning style to an andragogy style of learning. This transition develops students' autonomous learning skills, and requires them to engage in material in a critical manner, adopting a higher order, deeper approach to learning than what was expected of them for previous education experiences. The widening participation scheme also means that there is a broader range of students entering HE; therefore, providing a framework as students enter a university to foster learning skills is a key consideration.

1.5. Learning in Higher Education

Learning in HE aims to work with students to acquire and develop their knowledge, through critical thinking. According to Ramsden (2003), the graduate should be able to, "tackle issues logically and effectively, critically analyse content; examine evidence to support theories and consider their alternatives; develop complex, abstract concepts that link to the subject matter; write in an academic fashion; and solve problems by applying the concepts that they have acquired" (p. 20). These skills are said to be transferable, and allow lifelong learning within employment and everyday life (Prosser & Trigwell, 1999).

With the changes in HE and widening participation, a major challenge for educators is to adapt their teaching to students who are perhaps less prepared for HE than was previously the case, and to do so with increasing class numbers. Research into the process of learning has provided a number of different perspectives that might help to understand how to develop more effective teachers in HE.

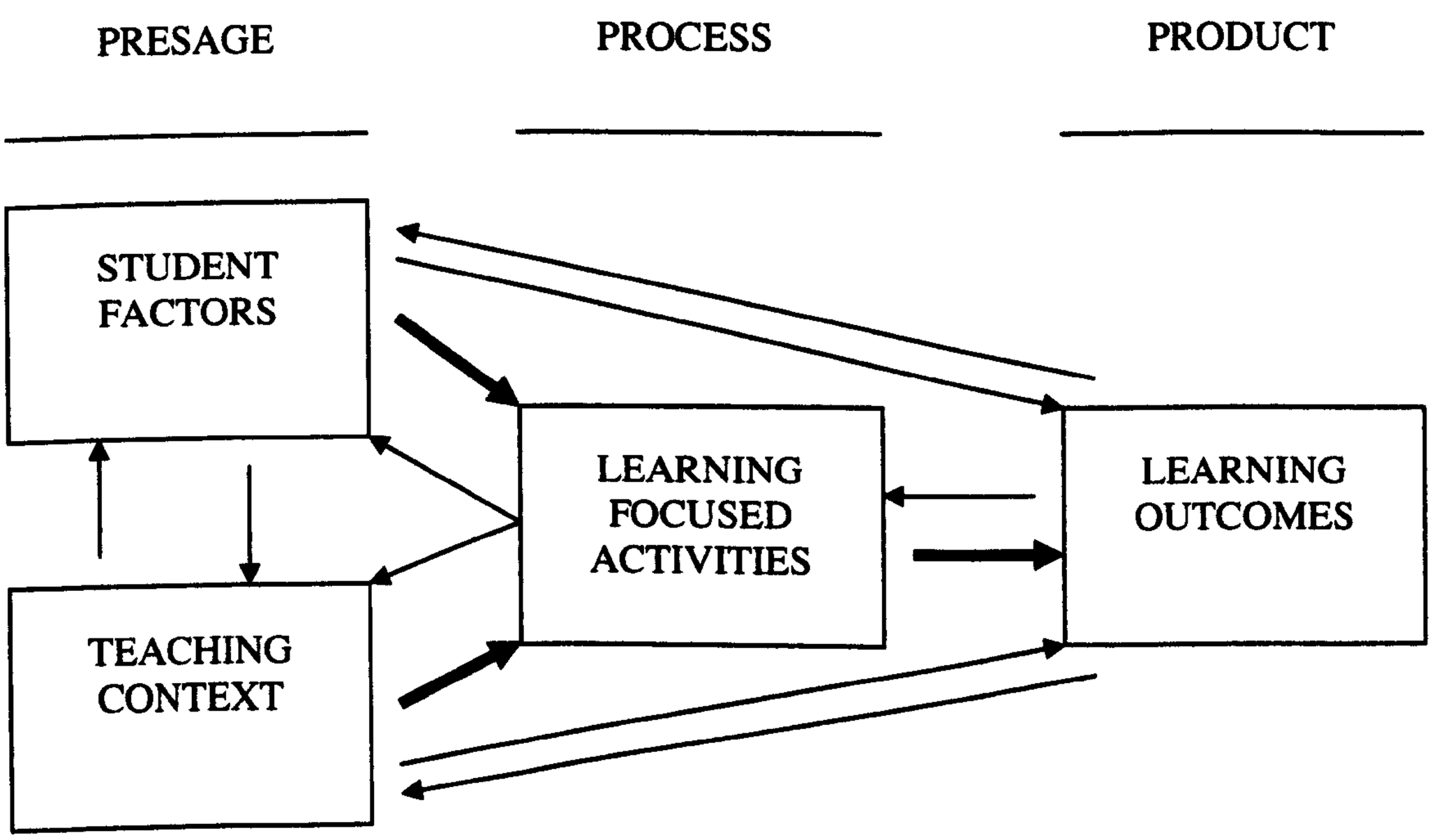
Bain (1993) considered two models of teaching and learning in HE. The first model is essentially a lecturer- and discipline-dominated view of undergraduate teaching and learning. Lecturers teach (or more likely lecture); students do the learning. This conception of learning is foundationalist. One must first learn the basics before an attempt is made to use one's knowledge. It emphasises the idea that learning is an individual phenomenon. Assessment is largely about marking, classifying, and competition, and teaching is improved through practice alone.

The second model is focused on learning and students, rather than on teaching. The problem is how to engage students with the things they are learning. The implications are consonant with the findings from research into student learning research, for example, Knowles (1990) work on androgagy that emphasises the need for learners to have an active involvement in their learning. More significantly, it reflects the changed environment in which the universities in the UK now find themselves. It recognises the importance of the social context of learning and the need, in undergraduate education, to integrate knowledge with its practical use. It also focuses on assessment as part of learning. These two models cannot be viewed in simple dualist terms, as it is a matter of emphasis and not of simply dualities. The two perspectives will, in most circumstances, be used in an integrated way to provide balance within the education system (Bain, 1993).

Bransford (2000) discusses the theoretical underpinnings of learning and how they have changed to be viewed as learning for understanding. He believes that many learning opportunities have provided limited chances for students to make sense of information, by heavily emphasising remembering as the intended outcome. New ways of thinking about learning do not deny that facts and information are important in order to solve a problem, but emphasis that learning is more than knowing facts. This type of knowledge is classified as "usable knowledge," rather than as simply a list of disconnected facts (Bransford & Stein, 1993). The ability to merely regurgitate given facts does not provide evidence that the learner has gained a deep understanding, able to can apply knowledge constructively, as well build on known facts to develop further insight.

Much of the recent research on student learning in HE has been summarised in terms of the 3P model of student learning (Biggs, 1979; Ramsden, 1992; Prosser, Trigwell, Hazel & Gallagher, 1994). One version of this model is shown in Figure 1. Students' perceptions of the teaching and learning context are seen to be an interaction between their prior experiences of teaching and learning, and the teaching and learning context itself. Students approach their studies in relation to their perceptions of the context, and that approach affects their learning outcome. Similar models have been proposed for teaching (Biggs, 1989).

Figure 1: 3P Model of Teaching and Learning (Biggs, 1999)



From the cognitivist perspective, data is thought to come to the student from the outside, be stored for a short time, be processed internally, and then it either is put in longer-term storage, or an output is generated to the outside world (Costall and Still, 1987). In terms of the 3P model, the various parts of the model would be considered to be

independently constituted, and to describe a causal chain from presage through process to product.

From the constructivist view, knowledge is constructed internally and tested through interaction with the outside world. From this perspective, Biggs (1993) has argued for a systems theory interpretation of the 3P model, in which the various parts of the model are independently constituted, but are in continuous interaction with one another. The model does not describe a causal process, but a continuously interacting system. The process of knowledge construction is driven internally through processes of assimilation and accommodation.

From a Vygotskian social constructivist perspective, knowledge is thought to develop internally, but in a process that is driven by social interaction with the outside world. From this perspective, the context, particularly the social context, is of prime importance. It is the context that brings about knowledge development within individual students (Trigwell & Prosser, 1996).

For each of these perspectives, there is a separation between the individual and the world. Knowledge is brought in from the outside, or constructed on the inside. The alternative view is non-dualistic, in which there exists an internal relationship between the individual and the world. The mind does not exist independently of the world around it (Hart, 1996). Thus, perceptions, approaches, and outcomes are not independently constituted, but are considered to be present simultaneously in the students' awareness.

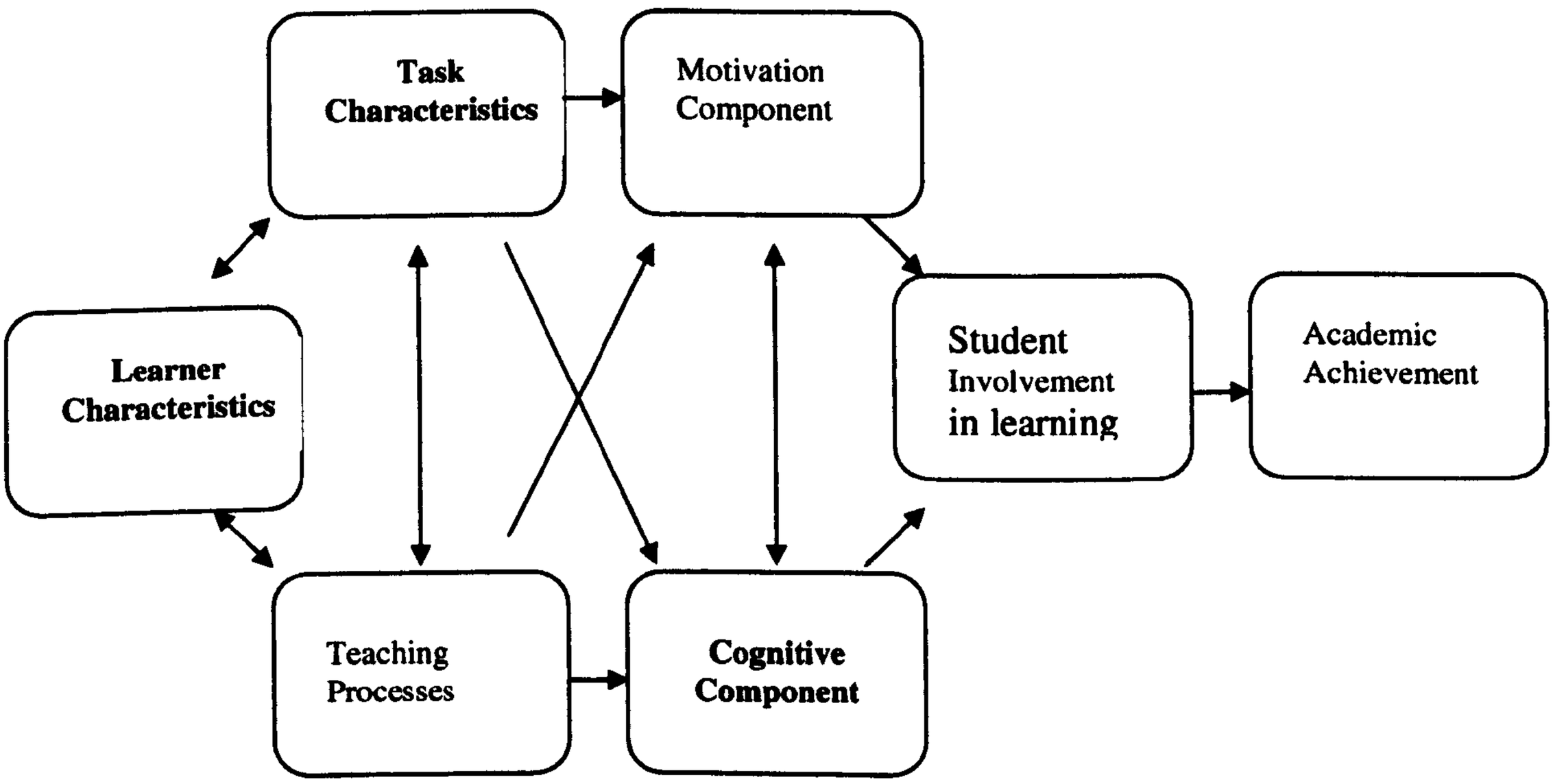
Thus, in any act of teaching and learning, prior experiences, perceptions, approaches, and outcomes are present simultaneously. In some situations, one or more of these aspects may be more in the foreground of our awareness, while other aspects may be more in the background. From this perspective, a 3P model does not describe a chain of causal processes extended over time, but an analysis of individuals' awareness of the teaching and learning acts in which they are engaged (Biggs, 1999).

Pintrich's model (1992; see Figure 2) shows how the learners' and teachers' characteristics interact to influence the learning situation. It postulates that, in order to reach academic achievement, there is a range of factors that must interrelate in a positive fashion to promote learning. Like Biggs (1999), Pintrich acknowledges that the learner arrives at a learning situation with certain characteristics. These characteristics may derive from previous experiences, which lead to levels of motivation, and concepts of ability and self-efficacy, as well as the characteristics that are seen as individuals' natural traits. These initial characteristics will influence how the learner reacts to the teaching process and learning activities, and it is this reaction that influences psychological factors like motivation and cognitive elements, such as thinking dispositions. It is the combination of these elements that then determines the level of achievement in the learning situation. There are three main factors that have an impact on a student's learning: the student's level of engagement; the learning-related activity that the teaching method stimulates; and the academic orientation of the student (Pintrich, 1992).

Garcia and Pintrich (1994) state that learners utilise both content knowledge and self-knowledge in their learning. Self-regulated learning is enhanced or constrained by individuals' perceptions of their self-efficacy, motivational orientation, learning

intentions, and concept of ability. Whilst some of these psychological elements alter for each different learning situation with which learners are presented, affecting the individual's behaviour, individuals also have trait behaviours that are dispositional (Vallerand, 1997).

Figure 2: Conceptual Framework for Motivation and Cognitive Components in the Learning Process (Pintrich 1992)



It has been recognised that learners are an active part of the process of learning. People come to a learning experience with prior knowledge, skills, beliefs, and concepts, all of which influence their behaviour in that organisation and their interpretation of the environment. This has already been discussed in the previous sections, for example, in the presage stage of the 3P model (Biggs, 1999), and the impact of learner characteristics in Pintrich's model (1992). Previous experience affects abilities to reason, remember, solve problems and acquire knowledge. There is evidence (see White & Frederickson, 1998; Lehrere & Chazan, 1998) that learning is enhanced when the teacher acknowledges

and incorporates the knowledge, beliefs, and dispositional attributes that the learner brings to the given situation, and then uses this knowledge as a starting point, monitoring changes in these elements of learning .

Learning is personal; it is the individual's way of interacting with the world. A person's view of the world changes not only from merely gaining information, but from how this information is structured and thought about. It is a conceptual change. In order for a learning experience to be productive, it must have clear objectives, be motivated, use collaboration, and be non-pressured. It must also, to some extent, be under the control of the learner.

In order to investigate the elements that make up a self-regulatory learning system that allows effective learning, we must understand students' intentions in their learning. Marton, Dall'Alba and Beaty (1993) asked students to describe the type of learning they were undertaking. Using that data, they compiled categories of learning (see Table 2). Levels 1 and 2 are concerned with learning that is purely for the purposes of reproduction. In Levels 3 and 4, students' intentions are to apply their learning to gain a deeper understanding of the material. Level 5 is the stage in which learners become so familiar with the subject matter that they can consider it a variety of perspectives, for examples arguments and counter arguments, understanding the advantages and disadvantages of each perspective. Finally, Level 6 is when the learner fully understands and believes in what they have learnt. It is at this level that they will develop as individuals, leading to changes in their behaviour (Marton & Säljö, 1997). These levels of learning mirror the processes of internalisation that have been described in a number of

psychological theories (e.g. Self Determination Theory, Expectancy Value Theory, Motivational Self-Esteem Theory).

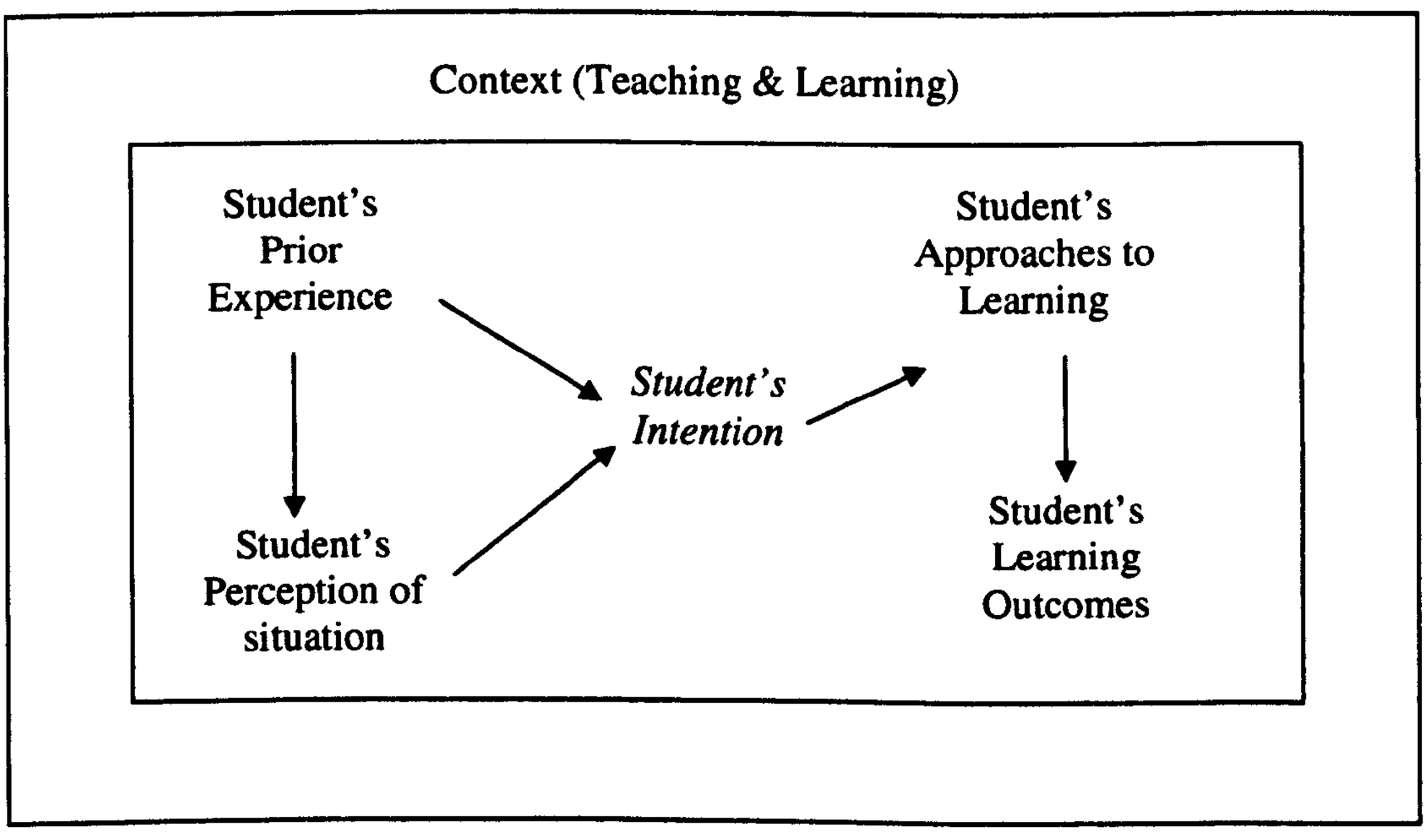
Table 3: Levels of Learning (Marton, Dall'Alba and Beaty, 1993; Marton and Säljö, 1997)

	Global	**Contextual**	**Situational**
Level		**Description**	
1	knowing facts	increasing own knowledge	gathering information on subject
2	provide information in response to questions	memorising and reproducing	rote learn for a test
3	making use of information	applying	putting theory into practice
4	grasping the subject	understanding	seeing the why behind the concept
5	seeing the whole picture	getting perspectives on things	questioning and investigating
6	to develop as a result of learning	changing as a person	having a holistic experience

It is important to recognise that learning can take place on different levels, and that learning intentions can alter for each individual in every situation, leading to different student approaches to learning in response to both the content and context.

Approaches to learning concepts were devised in connection with motivation, but can be easily applied to other factors, for example, perceived competence. Although individuals have a global (dispositional) preference for ways of learning, learners will adapt to different contexts. For example, an individual may be predominantly motivated for intrinsic reasons, such as the challenge of an activity, but when in a situation that fosters extrinsic motivation, he may focus on the reward, rather than on the learning itself.

Figure 3: Factors affecting Student Learning (Biggs, 1999)



The above figure expands on the complexity of the factors that affect learners. It incorporates the elements that students bring to a learning situation, which are their prior experiences and their perception of the learning. According to Biggs (1999), these are important elements, as prior experience will impact on students' self-efficacy and motivational levels. Whereas perceptions of the learning will impact on the intentions the

students' have towards their learning, in fact it is this perception, rather than the reality of the situation, that influences the learner most (Fox, 1987). The intentions then impact on the approach students adopt for their learning, and thus, the learning outcomes that the student achieves.

An alternative way of considering learning derives from work by Entwistle (1983) based on students' approaches to learning. This work has used a phenomenographic approach to look at the relationship between learners' approaches to studying and their level of understanding. The underlying concepts behind this framework are that in order to understand learning, it is necessary to examine the learners' experiences, including the context and setting in which the learning takes place, and to examine what students intend to achieve in learning and the processes by which they acquire information (Marton and Entwistle, 2001).

These studies have provided descriptions of the different approaches that students adopt, and classified these approaches as deep, strategic/achievement, or surface. Ramsden (1988) summarised the aspects of deep approach evident in the learner as correlating with an intention to understand. The surface approach is driven by an intention to complete the task (or learning) requirements. Specifically, there is a focus on the actual given material, such as the text itself, which is accompanied by an approach that aims to memorise information in order to meet the requirements for assessment. These students are unreflective in the relationships between concepts and facts; they fail to identify principles from evidence or new from old, and they treat the task as an external procedure, with demands of the assessment and knowledge remaining separate to reality (Ramsden, 1988). These surface approach aspects indicate a learning that is task-

focused and with more extrinsic values, for example, the emphasis is on the grade rather than the learning. These approaches are developed from research, and as such, are analytic categories and only describe the stronger inclination of each approach to studying in a student (Entwistle, 2000).

This suggests that there may be difficulty in categorising some students, in that neither approach is strictly prominent. It is also important to note that these are not fixed traits, but will fluctuate with time, dependent upon the situation and individual. When research was conducted into approaches to learning, Entwistle found that when some students were asked to read text and then answer questions relating to it, "The students who did not get 'the point,' failed to do so, simply because they were not looking for it' (Entwistle, 1988: p.8).

According to Entwistle (1998), approaches to learning are a critical element of levels of understanding. This is also apparent in Marton and Säljö (1976, cited by Gibbs, 1981) work, which was discussed earlier (see Learning Theories, 1.4.), in which the researchers discovered a relationship between the approach and four hierarchical categories of understanding. That is, those who were categorised as surface approach learners showed a correlation to the lowest level of understanding, and those who showed a deep approach, showed a correlation relationship to the highest level. This research suggests that a deeper approach to learning is linked to a higher level of understanding in learning.

Table 4: Compares the characteristics and factors that encourage Deep and Surface Approaches to learning. (Compiled from Biggs (1999), Entwistle (1988), and Ramsden (1992))

	Deep Learning	**Surface Learning**
Definition:	Examining new facts and ideas critically, and tying them into existing cognitive structures and making numerous links between ideas.	Accepting new facts and ideas uncritically and attempting to store them as isolated, unconnected, items.
Characteristics	• Looking for meaning. • Focussing on the central argument or **concepts** needed to solve a problem. • Interacting actively. • Distinguishing between argument and evidence. • Making connections between different modules. • Relating new and previous knowledge. • Linking course content to real life.	• Relying on rote learning. • Focussing on outwards signs and the **formulae** needed to solve a problem. • Receiving information passively. • Failing to distinguish principles from examples. • Treating parts of modules and programmes as separate. • Not recognising new material as building on previous work. • Seeing course content simply as material to be learnt for the exam.
Encouraged by Students'	• Having an intrinsic curiosity in the subject. • Being determined to do well and mentally engaging when doing academic work. • Having the appropriate background knowledge for a sound foundation. • Having time to pursue interests, through good time management. • Positive experience of education leading to confidence in ability to understand and succeed.	• Studying a degree for the qualification and not being interested in the subject. • Not focussing on academic areas, but emphasising others (e.g. social, sport). • Lacking background knowledge and understanding necessary to understand material. • Not enough time / too high a workload. • Cynical view of education, believing that factual recall is what is required. • High anxiety.
Encouraged by Teachers'	• Showing personal interest in the subject. • Bringing out the structure of the subject. • Concentrating on and ensuring plenty of time for key concepts. • Confronting students' misconceptions. • Engaging students in active learning. • Using assessments that require thought, and requires ideas to be used together. • Relating new material to what students already know and understand. • Allowing students to make mistakes without penalty and rewarding effort. • Being consistent and fair in assessing declared intended learning outcomes, and hence establishing trust	• Conveying disinterest or even a negative attitude to the material. • Presenting material so that it can be perceived as a series of unrelated facts and ideas. • Allowing students to be passive. • Assessing for independent facts (short answer questions). • Rushing to cover too much material. • Emphasizing coverage at the expense of depth. • Creating undue anxiety or low expectations of success by discouraging statements or excessive workload. • Having a short assessment cycle.

Entwistle (1998) proposes two factors that determine the approach adopted by learners. He based his argument on early research, which showed the development of thinking over the course of HE (Perry, 1970). During this time, students shift from a belief that information that is presented by lecturers should be reproduced in assessments in order to achieve (dualism), to the realisation that merit is awarded based on the learners' interpretation of evidence (relativism) (Perry, 1970).

The second factor that influences approach was identified by Säljö (1979), when he described a development in the students' conception of learning. He found a contrast between students who perceived that learning involved storing and reproducing information, and others who attempted to grasp the meaning for themselves with the aim of transforming the material provided. This development has three proposed stages: first, the student becomes aware of by their context, understanding what should be learnt and how you go about learning it, but the students do not necessarily apply these principles to their own behaviour (Säljö 1978, 1979); next, students begin to differentiate between "...learning 'for life' versus learning in school" (Säljö 1978, 1979), which indicates the realisation that some learning contexts are artificial, and not always related to the real world; finally, a distinction is made by some participants between "...learning and real learning, or even more commonly, as that between learning and understanding" (Säljö 1978, 1979b cited by Gibbs 1981: 81). The stages in the conceptualisation of learning that Säljö proposes suggest that these concepts are neither static nor consistent over time. Entwistle (1998), believes that the development of concepts of learning (from reproducing to transforming) and intellectual development (from dualism to relativism)

are factors that influence which approach is adopted, therefore supporting the argument that the same approach is not consistently adopted by the learner.

The context of the learning also is seen as a third influential factor in many studies. For example, Svensson (1977) discovered that a large proportion of students took the same approach in their experiments as in their usual studies. This suggested that they were consistent in their approaches to learning. This work led to the development of Gibb's (1981) instrument to measure deep processors and surface processors, a concept that opposes Entwistle's argument that approaches to learning are not fixed, but change depending on the situation, and suggests the processing is fixed or alterable through course design and teaching methods.

This led Säljö and other researchers (for example, Entwistle and Ramsden, 1983) to develop a third approach category, strategic or achievement approach. This approach is used for students who achieve through effective time management, organised study methods, and an understanding of assessment processes, which allows them to adapt to the requirements of the learning (Entwistle and Ramsden, 1983). These students have two distinct focuses - the academic content and the demands of the assessment system (Entwistle, 2000).

Most important is the crucial question of whether the desired approach can be encouraged through course design and challenging teaching methods. Bowden (1990) found that by altering students' learning environments, they would adopt their approach to the one fostered by that environment. Bowden went on to identify several common characteristics in HE courses that tend to encourage the surface approach, examples of

which include: immediate assessment, assessment for recall, grades as the only feedback, students never assessed again on topics, and few links to other units. This suggests that it is important to design courses that encourage deep approaches to learning, by supporting the importance of students constructing meaning.

To summarise all of the above, phenomenographic research suggests identifiable learning approaches that can be termed as either "deep," or "surface," as well as an approach to study that can be termed as "strategic." The approach adopted by the learner is significantly related to a student's intellectual development and conception of learning, along with the learning context. Furthermore, the approaches correlate with the outcome of the learning. Entwistle (2000) concluded that the overall picture is still emerging from research findings, for example, the exact nature of the relationship between the concepts, and that:

> The process of transforming research findings into workable and effective practice is both extremely difficult and enormously important: without progress towards this end, research will still have little impact on practice.(p. 9)

Therefore, students may be encouraged to adopt the deep approach to facilitate a higher level of understanding. Although all approaches to learning have their place, there are perceived advantages of a deep approach to study, as students are actively involved in constructing knowledge, rather than simply storing it for recall. This is supported by Barab and Plucker (2002; 2004), who discuss how, in order to learn, there is a need to actively reconstruct understanding. With surface approaches, repetition and reproduction are the focus, rather than understanding, and so this approach has perceived disadvantages for higher levels of learning (Spencer & Jordan, 1999; Brown, Bull, & Pendelbury, 1997). By fostering a deep approach to learning, students are consistently

challenged to think, read a wide variety of materials, express opinions, criticise, question, analyse, and apply understanding, and this impacts on the achievement of graduate competencies (Biggs, 1999). This approach is maintained through appropriate motivational orientation, which drives the student to strive towards accomplishment, meet challenges, and develop understanding (Entwistle, 1998).

Students who are pre-disposed to adopt a particular approach are nevertheless affected by the context in which studying takes place. This encourages the use of a particular approach (Kember & Gow, 1994; Solomonides & Swannell, 1995). Many university students, who have made an active choice to study, report an intention to adopt a deep approach to their learning (Fazey, 1999). This intention may not be realistic, given the time constraints and frequent deadlines of a degree programme. A strategic approach may be adopted, where a pragmatic compromise between desire and study demands will enable the identification of crucial elements of the work and help students to apply learning skills to their advantage. Willis (1993) investigated the interaction between perceptions of the context of study, study intentions (e.g. approach), and involvement in a degree-relevant module. Not all those students who expressed an intention to study using a deep approach succeeded in fulfilling their intentions. However, some students who were reluctant learners at the start of the module were encouraged to adopt a more positive approach by the learning climate that was offered to them.

It has been difficult to provide evidence that adoption of a deep approach to learning will correlate with higher academic achievement. Fazey (1999) found that higher scores on surface approach were predictive of a lower degree result, but that other

variables, including surface and strategic approaches, did not provide any predictive power. Given the multidimensional complexity of the student experience in HE, this is not surprising. Fazey's results supported those of Busato et al. (1998) and those of Sadler-Smith (1996). However, Trigwell and Prosser (1991), using a qualitative method of assessing learning outcomes at the course level, established that whilst there was a small but significant correlation between prior ability and quantitative outcome (but no significant relationship with approach), there was a more highly significant correlation between a deep approach and qualitative outcomes.

Richardson (1995) reviewed some of the findings from research into the relationships between study approach and outcome, and concluded that there is little convincing evidence that a deep approach predicts academic achievement. This work has been criticised as it uses grade marks to measure outcome. The problem with this approach is that grades can be assigned for more surface approaches rather than understanding. Therefore care has to be taken to assess for deeper learning when comparing the effect of approaches to learning on outcomes. Whilst a surface approach might be more predictive of poor academic performance than a deep approach is of better performance, there is evidence that the lack of an integrated study approach is indicative of "at risk" students (Entwistle, Meyer & Tait, 1991; Meyer & Scrivener, 1995).

These developments in our understanding of learning provide a foundation for adapting teaching, so that learners are encouraged to be active and autonomous, seek understanding, and are able to transfer their learning to new problems and settings. The application of this is seen as a major challenge to teachers, underscoring the importance

of what is taught, the teaching methodology, and the assessment procedures (Elmore et al., 1996).

Approach to learning is just one of the aspects of learning that HE pedagogy discusses as impacting students' behaviour. Motivation is a pivotal concept in most theories of learning. Weiner (1990) points out that behavioural theories tend to focus on extrinsic motivation (i.e., rewards) while cognitive theories deal with intrinsic motivation (i.e., goals).

In most forms of behavioural theory, motivation was strictly a function of primary drives, such as hunger, sex, sleep, or comfort. According to Hull's (1943; 1952) drive reduction theory, learning reduces drives, and therefore motivation is essential to learning. The degree of the learning achieved can be manipulated by the strength of the drive and its underlying motivation. In Tolman's (1942) theory of purposive behaviourism, primary drives create internal states (i.e., wants or needs) that serve as secondary drives and represent intrinsic motivation.

In cognitive theory, motivation serves to create intentions and goal-seeking acts (Ames & Ames, 1989). One well-developed area of research highly relevant to learning is achievement motivation (for example, Atkinson & Raynor, 1974). Motivation to achieve is a function of the individual's desire for success, the expectancy of success, and the incentives provided. Studies show that in general, people prefer tasks of intermediate difficulty. In addition, students with a high need to achieve obtain better grades in courses that they perceive as highly relevant to their career goals. On the other hand, according to Rogers (2003), all individuals have a drive to self-actualize, and this motivates learning.

Malone (1981) presented a theoretical framework for intrinsic motivation in the context of designing computer games for instruction. Malone argues that intrinsic motivation is created by three qualities: challenge, fantasy, and curiosity. Challenge depends upon activities that involve uncertain outcomes, due to variable levels, hidden information, or randomness. Fantasy should depend upon skills required for the instruction. Curiosity can be aroused when learners believe their knowledge structures are incomplete, inconsistent, or unparsimonious. According to Malone, intrinsically motivating activities provide learners with a broad range of challenge, concrete feedback, and clear-cut criteria for performance.

Keller (1983) presents an instructional design model for motivation that is based upon a number of other theories. His model suggests a design strategy that encompasses four components of motivation: arousing interest, creating relevance, developing an expectancy of success, and producing satisfaction through intrinsic/extrinsic rewards.

1.6 Teaching in Higher Education

Educational policymakers' and practitioners' focus is learning; however, there is a surprising lack of attention to what learning entails within the formal educational context (Smith, 1999). In Britain and Northern Ireland, for example, theories of learning do not figure strongly into professional education programmes for schoolteachers. This lack of attention to the nature of learning inevitably leads to an impoverishment of education; therefore, it is important to ground this current work in the fundamental principles of teaching and learning.

Effective teaching has taken second place to research for too long in HE, with promotion for academics based largely on research excellence, rather than teaching ability. It was suspected that less than 12 percent of academic staff in HE had any formal teaching qualification in 2003 (White Paper). The Higher Education Bill (2004) recognised that effective teaching and learning is essential to promoting excellence and opportunity in HE. The reforms to achieve this included new national professional standards for teaching, and a new national body to develop and promote good teaching (the Teaching Quality Academy). It is important to address the elements that need to be promoted to develop effective teaching in universities. According to Biggs (1999), "Good teaching is getting most students to use the higher cognitive level processes that the more academic students use spontaneously" (p.4). The teacher is said to have responsibility for setting the learning climate that will affect the students' understanding of learning and their approach to learning. The table below shows the relationship between the teacher and the student, using the levels described by Marton, D'Alba, and Beaty (1987).

Table 5: Table of teaching styles (adapted from Entwistle and Tait, 1990)

Conception of Learning	Conception of Teaching
Reproducing (Levels 1, 2 and 3)	Information Transmission/Teacher Focused (Closed/Convergent) Teacher selects content, presents it and tests whether it has "stuck"
Making Sense (Levels 4 and 5)	Conceptual Change/Student Focused (Open/Divergent) Learner functions independently with the facilitation of the teacher

If one is to accept Ramsden (1993) and Biggs' (1999) notions about critical elements of learning in HE, then teaching intentions must be to construct appropriate learning environments. Trigwell and Prosser (1999) also discussed lecturers' intentions towards teaching in HE. They devised an inventory that had two factors, "information transmission," which is classified as teacher-focused, and "conceptual change," which is viewed as student-focused. Both the intentions and teaching strategies vary for these two elements, with the former being driven by providing content to the students that is dictated by the teacher, and the latter providing a structure to allow students to build on their knowledge and understanding in a manner that gives them, the learner, control of their learning.

It is recognised (Ramsden, 1993; Biggs, 1999; Trigwell & Prosser, 1999) that in order to teach effectively, an environment needs to be established that will foster a deeper approach to learning and allow students to take control of their learning. This "open" teaching (Entwistle & Tait, 1990) promotes students to achieve a higher level of learning (see Table 3) in comparison to the "closed" approach.

In recent years, the importance of allowing learners to take control of their learning has been brought to the forefront of discussion (Bransford, 2000). It is vital, for instance, that learners can recognise when they have understood and when they need to gather more knowledge (Brown, 1975). Therefore, teachers have to focus their methods on allowing students opportunities to adopt a metacognitive approach, by allowing time for understanding, self-assessment, and reflection. This type of teaching has been shown to increase students' transfer of their learning to new settings (Palinscar & Brown, 1984; Schoenfeld, 1991).

In order to foster this student-centred approach Biggs (1989) described four elements of good teaching:

- The motivation context – making sure there is importance to the individual by allowing selection and planning, thus giving the learner ownership
- Learner activity – making sure the learner is involved in their learning. By doing a task and then reflecting, connections can be made between the past and the present
- Interaction – through discussion and peer tutoring

- Structured knowledge base – using existing knowledge bases and providing structure so information can be easily integrated.

When considering these four elements, it is evident that the first three are heavily related to student-focused learning, with the teacher, when necessary, providing the structure for these to be effective. However, the fourth item relies more on the teacher. It requires the lecturer to either provide enough content, or to guide students through research to necessary knowledge for them to be able have a foundation for their learning.

Therefore, teaching and learning is a dynamic interaction between the learner and the teacher, and even when teaching intentions are focussed on the elements that are considered best practice, there still may be problems. These may include when the expectations for learning are not getting across to the students, or when they are only reproducing the information that has been given to them in lectures, rather than relating it at a higher level. The next section looks at some conditions that consider both the teaching and learning climate, in order to produce higher level learning in HE.

Bransford (2000) also looked at conditions that teachers could influence in order to enhance learning. He developed four conditions of learning, which he based on some key concepts:

- Students come to the classroom with preconceptions. If their initial level of understanding is not considered, they may fail to grasp new concepts.

- In order to develop competence, students must have a foundation of factual knowledge, understand these facts in the context of the conceptual framework, and be able to organize these facts to allow for easy retrieval and application.

- A metacognitive approach is required to aid students in taking control of their learning, helping in goal definition and monitoring of progress.

Therefore, teachers must create learning opportunities that draw out existing understanding, and then work from this baseline with the students. This means that the use of assessment must be expanded from the traditional notion of testing to use as a tool that aids learning through formative methods, providing feedback to the teacher, student, and their peers. Teachers must teach their subject matter in depth, giving numerous examples of concepts, so that a firm foundation of knowledge is established. Assessment must be aligned with this way of teaching, so that students examine for deep understanding rather than surface knowledge. Finally, the teaching of metacognitive skills should be integrated into the curriculum. By encouraging students to reflect on how they address their learning, answer questions, tackle problems, learners are able to recognise effective strategies that they can optimise in the future. This will develop the students' ability to learn independently. Evidence has shown that when these factors are incorporated into a teaching methodology, students' abilities to apply knowledge to problem solve in new areas greatly increases (White & Frederickson, 1997).

Drawing heavily on these principles, Bransford (2000) has suggested four interrelated conditions that are required to create an effective learning environment:

Learner Centred – Attention must be paid to the knowledge and conceptions that students bring to the learning environment. This also includes cultural differences (Moll et al., 1993) as well as psychological factors, such as motivation, concepts of ability (Dweck, 1989), perceptions of competence, and so on. Learner-centred teachers challenge their

students enough to maintain engagement but not so much that students are discouraged; therefore they must understand their students' knowledge, skills, and interests (Duckworth, 1987).

Knowledge Rich – In order to make a learning situation knowledge-rich, the teacher must consider what they are teaching (subject matter), why this information is being taught (value/understanding), and how to recognise achievement in this area (learning outcomes). It is vital that knowledge is well-organised, so that it supports understanding and transfer (Bransford, 2000). Learning with understanding is not always achieved, because too many unrelated facts are presented to the learner, assessment methods allow students to surface learn, and little time is given for the student to engage in the material. Knowledge-rich environments allow for depth of study, assessment for understanding, and incorporating meta-cognitive strategies to facilitate learning.

Assessment Driven – It is essential that assessments be designed as both a tool for additional learning, as well as a method for establishing achievement levels for students and teachers. Assessments are a strong influence on what drives students' intentions and approaches to learning, and they must be constructed in a way that will encourage learners to approach their learning in a deep manner, aiming to gain understanding. Biggs (2000) developed this condition when he described how the students' perception of the assessment will influence their intention towards their work. This, in turn, impacts on their approaches to learning. It is the approach to learning that affects the learners' behaviour during the learning, and therefore, will impact on the learning outcome for the experience.

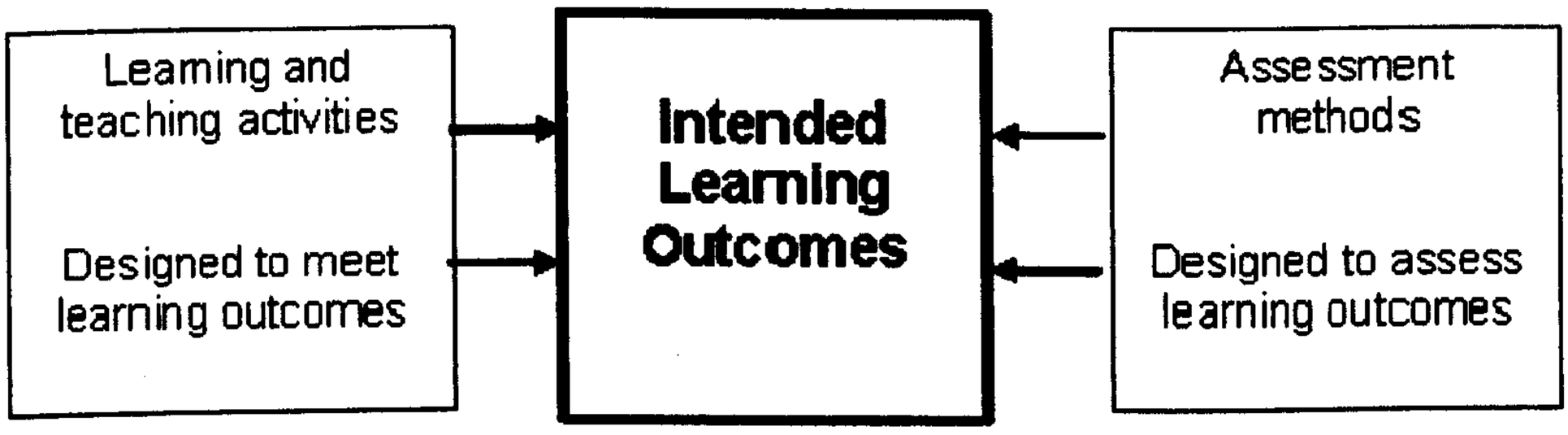
Community Valued – Making the learning environment valued by the community has a strong effect on students. If a climate is established whereby learning with understanding is perceived as the norm, then students are encouraged to engage. It also allows for a greater zone of proximal development (Vygotsky, 1978) through collaborative learning where students are encouraged to work together to solve problems and develop their understanding (Brown & Campione, 1994). Communities are also used to make links between the classroom-based learning to "real" life by including a wider community, for example, professionals and parents. These connections to the outside world are of utmost importance to the learning process (Moll, 1996).

The design of learning opportunities is also crucial to effective teaching practice. Constructive alignment (Biggs, 1999) is one of the most influential ideas in Higher Education. There are two parts to constructive alignment:

- Students construct meaning from what they do to learn.
- The teacher aligns the planned learning activities with the learning outcomes.

The basic premise of constructive alignment is that the curriculum is designed so that the learning activities and assessment tasks are aligned with the learning outcomes that are intended in the course.

Figure 4.:Aligning learning outcomes, learning and teaching activities and the assessment. Adapted from Biggs (1999, p. 27)



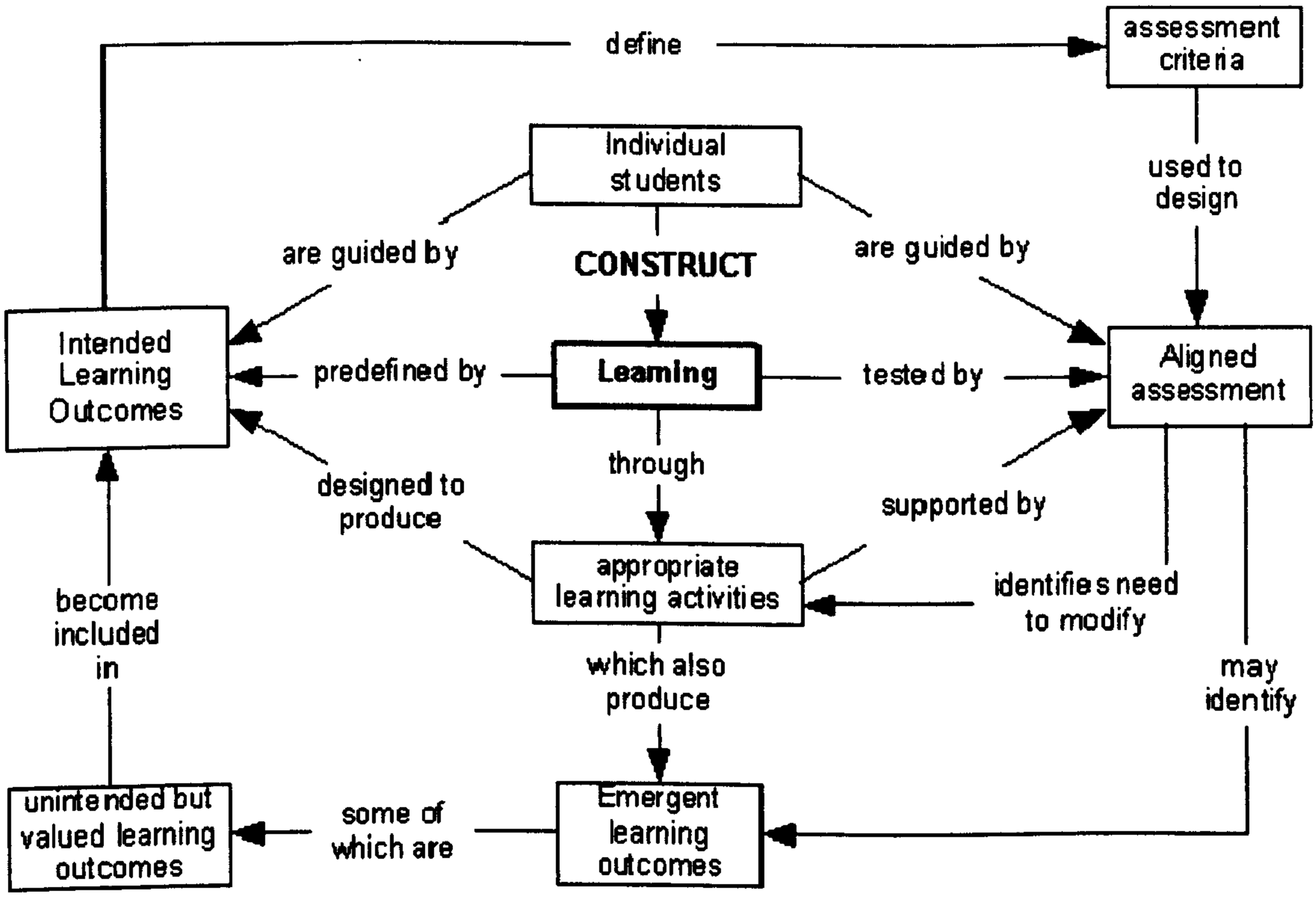
Within the concept constructive alignment, the constructive element refers to the concept that the teacher is a catalyst for learning, rather than a transmitter. Learning takes place when the students construct meaning from the learning experience, rather than absorbing material as it is presented (Biggs, 1996). Shuell (1986) describes this concept well when he says, "What the student does is actually more important in determining what is learned than what the teacher does" (p. 429). The alignment refers to how the teacher sets up the learning environment in order to support the intended learning process. It stresses how the learning outcomes, teaching methodology, and assessment must be aligned so that they all lead to the same teacher-desired learning outcomes and all the elements support each other. Therefore, an effectively-designed teaching session should be aligned so that the learning objectives are clear (see Figure 5), the teaching methodology gives the student an opportunity to construct meaning that will lead them to the intended outcomes, and the student is assessed in a way that promotes this understanding.

Alignment is about getting students to take responsibility for their own learning, and establishing trust between the student and teacher. If students construct their own

learning, and this takes place inside the students' brains where teachers cannot reach, then the real learning can only be managed by the students. All teachers can do is to create an environment that is encouraging and supportive of students engaging in the appropriate and necessary mental activity. This can be done by providing the pieces and specifications of what the students must become able to do as a result of modifying their cognitive structures, and by setting up or suggesting activities that students can use to achieve these changes or intended learning outcomes.

There must be a clear idea of what the teacher wants the students to be able to do at the end of a unit of study, and these intended learning outcomes must be communicated to students so they can at least share in the responsibility of achieving them. However, students will inevitably tend to look at the assessment and structure their learning activities, as far as they are able, to optimise their assessment performance. Therefore, teachers must make sure that the assessment very obviously does test the desired learning outcomes for students to achieve; this way, as strategic optimisers of their assessment performance, students will actually be working to achieve the intended learning outcomes. Alignment is simply a matter of honesty and fairness that establishes the trust required for students to be confident that they can manage their own learning.

Figure 5: Concept map illustrating the main ideas put forward by Biggs and the relationships between them in the Curriculum Design Process



These concepts of learning are the foundation for the following studies, and the thesis explores the impact of teaching design on students' approaches to learning and motivational orientation; and the power of constructive alignment that fosters a deep approach to learning on students' behaviour. The last element of this research examines the effectiveness of academic development courses on lecturers' personal epistemologies and approaches to teaching.

The impact of academic development courses have been considered over the last fifteen years when they began to be introduced for new teachers in Higher Education. Coffey and Gibbs (2004) recognised the importance in providing opportunities for academics to develop their teaching when they found that "trained" teachers were

classified as more effective than their "non-trained" colleagues. Pill (2005) conducted extensive research into professional development in higher education. She found that depending upon the model of development adopted to train staff, staff were either intrinsically driven to change their teaching behaviour or merely comply to external pressures. Her work indicated that the courses that were based on reflective practice, and applying theories to actual practice resulted in participants experiencing a more internal change, which was viewed as being more permanent, than those who were part of an instructional model. Kandlbinder and Peseta (2009) also examined this area, building on previous works to explore which theoretical concepts were important for teachers to understand in order to apply to their practice. Again they outlined the value of reflective practice, ands also recognised the need to include: constructive alignment, approaches to learning, scholarship of teaching, assessment-driven learning. This work provides a sound foundation for examining the effect of the teaching in Higher Education Scheme that was used to train new lecturers at the University of Wales, Bangor.

This review provides the basis for the research questions investigated in the following chapters, where studies have been undertaken to both test earlier work and then to build on these concepts to contribute to current understanding of teaching and learning in HE.

Chapter 2

Rationale and Instruments of Measurement

2.1 Rationale for the Research Methodology

Social science research methodology can be difficult to design and even more difficult to justify to an audience. The first section of this chapter provides the rationale for the research methodology used in this thesis, using the framework approach proposed by Crotty (2003). He proposes four elements that should be addressed when designing a research method:

- The proposed methods
- The methodology underlying the choice of methods
- The theoretical perspective behind the methodology
- The epistemology informing the theoretical perspective.

In order to provide this rationale for this research the author shall consider each of these elements in turn.

The first area that must be explained is the epistemology used to inform this body of work. This research takes a constructionist stance, which advocates that humans generate knowledge and meaning from their experiences. Constructionism holds that learning happens most effectively when people are active in making changes in the real world. In this sense, constructionism is connected with experiential learning and builds on some of the ideas of Jean Piaget. Papert (1998) talks of constructionism as having two

elements, which are, "A view of learning as a reconstruction rather than as a transmission of knowledge . . . learning is most effective when part of an activity the learner experiences as constructing a meaningful product" (p.1056). Larkin (2004) states it is an approach to psychology (and other bodies of knowledge) that focuses on meaning and power. It is called "social constructionism" because it aims to account for the ways in which phenomena are socially constructed.

This epistemology fits into the research philosophy for this thesis, as it examines the effects of learning experiences on students. It is based on participants in the studies being actively involved in teaching and learning situations, and it is the impact of these experiences that are measured in order to construct meaning. As a philosophy, it also fits with the author's belief about learning, which is that learning is a dynamic process that involves an interaction between the teacher and student, and that it is about developing autonomous learners who can justify knowledge and build concepts in order to achieve high levels of understanding.

The theoretical perspective approaches adopted for the research revolves around intrepretivism, where appropriate, and critical inquiry. Interpretivism and constructivism are related approaches to research that are characteristic of specific philosophical world views. Schwandt (1994) says that the two approaches, "...share the goal of understanding the complex world of lived experience from the point of view of those who live it" (p. 118). Interpretivism is the view that all knowledge is a matter of interpretation, and refers to approaches emphasizing the meanings that people confer upon their own and others' actions. In this perspective, the researcher enters the social world that is being

investigated in order to grasp the socially-constructed meanings, and then reconstructs these meanings in a social scientific language.

In this work, the researcher was part of the teaching and learning world that was investigated, when appropriate for the methodology, and when her presence did not impact on behaviour. The author was involved in teaching activities in some of the studies, and observation and interviewing in others. The study participants were asked to provide a comment on their experiences by providing answers to open questions within the surveys that were administered, and through responses in interviews. This is important, as the participants' responses are not made directly to the actions of one another, but instead are based on the meaning that they attach to such actions. A second researcher was also used at times to provide another perspective on the context being studied.The data collected were not solely reliant on interpretivism, and when this perspective was not appropriate for the research, critical analysis was used, whereby the researcher applied valid and reliable methodologies to collect quantitative data in order to analyse the impact of interventions, for example assessment, on students' learning behaviour.

The methodology was in the main experimental research, with pre and post measurements taken in conjunction with an intervention. This provided a series of quantitative data derived from valid and reliable questionnaires, which meant it was possible to analyse the data to explore for significantly relevant differences and relationships. This experimental methodology also incorporated qualitative methods to

provide added value to the numerical data. This qualitative data was used to validate and embellish the statistical findings, and as a mechanism for categorizing data.

The methods used to meet this methodology varied depending on the research question. Questionnaires, observations, interviews, statistical analysis, and document analysis were all used as part of the research conducted in this thesis, each chosen to provide the best data for the hypotheses being addressed. The second part of this chapter elaborates on the instruments used in the series of studies.

2.2 Instruments of Measurement

A series of inventories was selected to measure relevant variables in this research. Wherever possible, selection utilised well-established, valid, and reliable instruments. In some cases, when appropriate, only parts of inventories were presented to respondents to reduce the burden on them. In other cases, adaptations to instruments were also made to increase their relevance without compromising their validity.

2.2.1 The Academic Motivation Scale – AMS (Vallerand, Pelletier, Blaise, Brière, Senêcal, & Vallières, 1992) – See Appendix I.

This was devised as an English-language version of the Echelle de Motivation en Education (EME; Vallerand, Blais, Brière, & Pelletier, 1989). It was designed to assess the motivational orientations of university students towards their studies.

2.2.1.1 Theoretical underpinnings.

This instrument is derived from Deci and Ryan's (1985; Deci, Vallerand, Pelletier & Ryan, 1991) Self-Determination Theory (SDT). The SDT incorporates three sub-

theories: Cognitive Evaluation Theory, Organismic Integration Theory, and Causality Orientations Theory. The SDT arises from the belief that humans have an innate need to gain control of their actions, and that motivation for behaving varies in the extent to which the motivation is internalised. At the highly internalised end of the continuum is intrinsic motivation, divided into three components: "to know," "to achieve," and "to experience stimulation." The motivations associated with these three factors are all equally internalised. Extrinsic motivation is divided into three regulatory factors that are ranked in relation to their internalised reasons for acting. The most internalised is identified regulation, followed by introjected regulation, and finally the least internalised, external regulation. These are all extrinsic motivators in that they all contain some instrumental reasons for behaviour. Another component is amotivation, but this does not have a position on the continuum (see Chapter 1 for more details).

Vallerand et al. (1992) note that another extrinsic component that of integrated regulation, was not included on the EME. Initial investigations found, that for measurement purposes, it was not differentiated from identified regulation, and was not given as a reason for studying; therefore, it was not included in the AMS.

2.2.1.2 Development of the instrument.

Over 300 students were used to test the validity of the original version of the instrument in French - EME (Daoust, Vallerand & Blais, 1988; Vallerand & Bissonette, 1992). This instrument was found to have satisfactory levels of internal consistency (a mean α score of 0.80) and temporal stability over a one-month period (mean test-retest correlation of 0.75). Evidence for construct validity was provided from several correlation analyses between the EME and other scales.

When the EME was translated into English for the AMS, it was also back-translated by four individuals for moderation purposes. This produced two English versions, which were discussed by a group in order to agree on a single version that was as close as possible to the original French instrument. This single version was then given to a group of students, who commented on its clarity.

University students (N=745; mean age 21.0 years) then completed the AMS, and the data were analysed using confirmatory factor analysis (LISREL), analysis of variance, Cronbach's alphas, and test-retest correlations on the subscales. The seven factors were confirmed using LISREL, with no cross loadings between factors. Cronbach's alpha values varied from 0.83 to 0.86, except for identified regulation which was $\alpha = 0.62$. These results were similar to those for the EME. The results for the test-retest to check for temporal stability over a four-week period were also acceptable (Vallerand et al., 1992), with correlation coefficients ranging from 0.71 to 0.83 (mean r = 0.79).

Gender differences were investigated using ANOVA. The results found that females (n=484) scored significantly higher than males on all the intrinsic sub-scales and on identified and introjected regulation, but not on external regulation.

2.2.1.3 Structure of the inventory.

The inventory consists of 28 statements that participants were asked to rate on a seven point Likert-type scale. Students indicate the extent to which each statement matches their reasons for studying, from "does not correspond at all," scoring 1, to "corresponds exactly," which scores 7. The seven factors within the motivational continuum are each assessed with four statements.

The seven factors are:

Intrinsic Motivation

- To Know – Self-initiated motivation in order to learn for the sake of learning or for pleasure.
- To Accomplish – Motivation to master a task with the focus on the process, not the outcome.
- To Experience Stimulation – Motivation to take part in order to experience enjoyment or excitement.

Extrinsic Motivation

- Identified Regulation – Described as self-determined motivation, as it is highly internalised. Valuing the task drives behaviour, but either the individual does not initiate the action, or there is an instrumental reason for the behaviour.
- Introjected Regulation – This is not classed as self-determined regulation, as the reasons that drive behaviour include fear of failure, guilt, or the need to demonstrate achievement to oneself or others.
- External Regulation – Behaviours are motivated by the outcomes of the action not the process, for example, for grades or the career at the end of studying. The activity itself is not intrinsically valued.

Amotivation

- Amotivation - Students are not motivated to study; they do not see the relationship between study and outcome, and are usually confused about why they are studying.

2.2.1.4 Scoring the data.

The scoring for this inventory is from 1 to 7, with 1 indicating a low score, and 7 a high level of motivation. The seven sub-scales (as above) are calculated separately, and a mean score is derived for each. Overall mean scores are also derived for intrinsic and extrinsic motivation.

2.2.2 Revised Approaches to Study Inventory – (RASI) (Entwistle & Tait, 1994) – See Appendix II.

The ASI (Entwistle & Ramsden, 1983) measures students' intentions and goals towards their studies. It has been revised numerous times, and the version used in this study was the 1994 Revised Approaches to Study Inventory (Entwistle & Tait, 1994).

2.2.2.1 Theoretical underpinnings.

The basis for this inventory stems from qualitative and quantitative work on teaching and learning in HE by Entwistle and Ramsden (1983). They conducted studies in Lancaster, identifying lecturers' perceptions of what they were trying to achieve for their students' development. This built on the work of Perry (1970), who had previously identified stages of intellectual development, and the Lancaster model was developed based on his findings. One finding that was common to both research studies was that students showed clear differences in their approaches to study, with some students adopting a deep approach to learning, whilst others were more surface in their approach. A strategic approach was also evident from these studies, although this was less clearly defined.

2.2.2.2 Development of the Approaches to Study Inventory (ASI).

After a series of interviews, Ramsden (1991) identified three categories within a deep approach to learning (personal experience, relationships, meaning), three within a surface approach (unrelatedness, memorisation, unreflectiveness), and a strategic approach to learning. Although greater complexity has been discussed since these categorisations were initially developed, the three categories have remained, although the strategic title is often referred to as an achievement approach (Entwistle, 1988).

Using factor analysis, related items were identified to finalise the ASI. The final version contained three sub-scales (deep, surface, strategic), with another category labelled as "styles and pathologies of learning." Cronbach's alpha scores ranged from 0.32 (strategic approach) to 0.78 (deep approach). Some changes have taken place since this structure was defined, with deep and surface being verified consistently, but the strategic approach producing less stable results (Richardson, 1994). The ASI was then shortened to the Revised Approaches to Study Inventory (RASI, Entwistle & Tait, 1994), and was found to be valid and reliable.

2.2.2.3 Structure of the Revised Approaches to Study Inventory.

The RASI has 44 items with six factors. Four of these factors were used in this study (deep, surface, strategic, and lack of direction), as they were viewed as the most relevant to the research questions.

The factors are:

- Deep Approach – an intention to look for meaning, to relate and organise ideas and to critically analyse.

- Surface Approach - an intention to memorise material without trying to make sense of it.
- Strategic/Achievement Approach – effort is applied at appropriate times to achieve the best results through recognising what is required, and organising both the material and study methods more effectively.
- Lack of Direction – students do not understand why they are studying.

2.2.2.4 Scoring of the data.

Students answered the questionnaire using a five point Likert scale in order to ascertain the students' approaches to learning for each of the inventory statements. The factor was scored on a scale of 1 (low) to 5 (high), with 3 as neutral. A mean was calculated for each factor from the corresponding items.

2.2.2.5 Approaches to Study Skills Inventory for Students - ASSIST (Entwistle, 2001) - See Appendix III.

Entwistle (2001) has revised again the instrumentation for measuring approaches to study. Based on the conceptions of learning described by Marton and Saljo (1996), and extended by Hattie, Biggs and Purdie (1996), he devised the Approaches to Study Skills Inventory for Students (ASSIST). In order to use a shorter tool than the RASI, to attempt to increase student returns, some of the later studies in this thesis used the ASSIST. A minimised version of the ASSIST uses six questions to establish extents to which transformational (deep), reproductive (surface), or application (achievement/strategic) approaches are adopted. An additional eight questions categorise preference for teaching that promotes understanding (deep) or information transmission (surface).

2.2.3 Implicit Theory Measures – Theories of Intelligence Scale (TIS)(Dweck, Chiu & Hong, 1995) – See Appendix IV.

This questionnaire was developed to investigate ideas about intelligence. It examines the level to which an individual believes that ability/intelligence is fixed or can be changed incrementally. The theory or concept of fixed intelligence postulates that some people believe that intelligence/ability is a fixed trait, inasmuch as individuals have a fixed amount of ability and this cannot be altered. This is also known as the entity theory (Bandura & Dweck, 1985). A different concept is the incremental, or malleable theory. People who have this belief system perceive that intelligence is not a fixed trait, but something that can be cultivated through learning. These concepts of ability are proposed to affect the ways in which people organise their world and assign meaning to experience. They have an impact on behaviour (Dweck & Leggett, 1988) by affecting perceptions of competence (Stone, 1998; Henderson & Dweck, 1990), motivational orientation (Dweck, 1995; 1998), and approaches to learning (Sorich & Dweck, 1999).

2.2.3.1 Theoretical underpinnings.

An emphasis on personal belief or meaning systems has a long history in philosophy and psychology. It is evident in social personality psychology (Epstein, 1990), clinical psychology (Beck, 1996), cross-cultural psychology and anthropology (Hirschfeld & Gelman, 1994), cognitive psychology (Murphy & Medin, 1985), and developmental psychology (Goodnow & Collins, 1990). Piaget realised, towards the end of his work, that simply focusing on logical thinking and its development was not complete without considering the meaning systems that shape thinking (Piaget, Garcia &

Feider, 1989). Dweck and her colleagues are considered the primary researchers in this area, investigating concepts of ability for the last 30 years.

2.2.3.2 Development of the instrument.

The instrument was originally developed to include only entity theory items, as it was expected that the incremental theory items would appear too appealing and gain high levels of agreement. The inventory was developed over time to construct incremental items that did not have this strong bias. The initial version been adapted for use with children (10 years of age and older) and domain-specific items (personality, morality, theory of the world, personality), as well as for "self" and "others" (Erdley & Dweck, 1993).

The reliability and validity of the various scales has been thoroughly tested (Dweck, Chiu & Hong, 1995; Levy, Stroessner & Dweck, 1998; Erdley & Dweck, 1993; Erdley et al., 1997). In general, the scales for the implicit theory do not correlate with other measurement scales, for example self-esteem, self-presentation concerns, or motivational orientation (Levy, Stroessner & Dweck, 1998). As beliefs about ability are not correlated with actual cognitive abilities, these beliefs represent assumptions about the self that have consequences for behaviour, but are distinct from other cognitive and motivational constructs (Dweck, 1999).

2.2.3.3. Structure of the inventory.

There are two types of implicit theory measurement instruments that need to be distinguished. These are the "self" form and the "other" form. The "self" form asks individuals to report their theories about their own intelligence, and can be used to predict

self-goals and self-judgements. The "other" form is used to ask about people in general, and to predict general reactions to the behaviour and outcomes of others.

Some of the implicit theory measures are domain specific, in that they refer to one specific attribute (for example, intelligence, morals, personality). There is also a domain general measure, which refers to the person as a whole.

2.2.3.4 Scoring the data.

The scale is scored on a 6-point Likert scale, with 1 indicating strong agreement with the statement, and 6 showing strong disagreement. The scale is comprised of a total of six statements, with three items of incremental theory and three of entity theory. The total score for each sub category is found, and then a mean score is calculated for both entity and incremental theory beliefs.

2.2.4 Approaches to Teaching Inventory – (ATI) (Prosser & Trigwell, 1999) – See Appendix V.

The approach to teaching inventory (ATI) has been developed to measure the ways that teachers approach their teaching in a particular situation. It has been used in a variety of contexts, different disciplines, and university types and levels, and has consistently shown how qualitatively different ways of teaching are related to a range of teaching-related variables. Another use is as a tool to prompt discussion amongst groups of teachers in order to raise awareness of different approaches to teaching.

2.2.4.1 Theoretical underpinnings.

This instrument was constructed on the assumption that changes in teaching will lead to changes in the quality of student learning. Research in the 1990s (Trigwell,

Prosser & Taylor, 1994; Prosser & Trigwell, 1999) showed that there is some validity in this premise, as different approaches to teaching have been found to relate to different approaches to learning.

Different approaches to learning have been discussed since the 1970s, with deep and surface student intentions now used as common concepts in educational research (Marton, Hounsell & Entwistle, 1997). From studies that have been conducted with university teachers, five different approaches to teaching have been described (Trigwell, Prosser & Taylor, 1994). These five approaches range from concept change/student-focused (CCSF) to information transmission/teacher-focused (ITTF).

2.2.4.2 Development of the instrument.

This instrument for measuring approaches to teaching was developed in conjunction with the ASI. It was originally developed specifically to study the relations between variations in science teaching and variations in science learning. It is based on the assumption that changes in teaching will lead to changes in learning. Using the qualitative data from studies about approaches to learning, Marton, Hounsell and Entwistle (1997) and Prosser and Trigwell (1999) have conducted further research. They found that like students' approaches to learning, the teachers' approaches to teaching were constituted in terms of the strategies they adopted for their teaching, and the intentions underlying those strategies. The intentions were found to range from those involving transmission of the content of the subject to the student, to those where the teacher aims to help the student change their conceptions of the content.

Prosser and Trigwell (1999) conducted a confirmatory factor analysis of the ATI. This analysis confirmed a two-scale inventory containing a CCSF scale and an ITTF

approach scale. It was therefore concluded that the instrument was a valid and reliable indicator of variation in approaches to teaching.

2.2.4.3 Structure of the inventory.

The scale is composed of 16 items. Eight of these are a sub-scale describing CCSF. Four of the eight items in the CCSF approach refer to the motive of the approach, and the other four refer to the strategy. The other eight items form a sub-scale that is labelled the ITTF approach. Again four of the items refer to the intentions, and the other four to the strategy used by the teacher.

2.2.4.4 Scoring the data.

The 16-item scale is divided into two subcomponents, CCSF and ITTF. Each item is scored on a 5-point Likert scale, with 1 indicating strong disagreement with the statement, and 5 indicating strong agreement. The scores are then totalled for each subcategory and a mean score is derived for both CCSF and ITTF.

2.2.5 Assessment Experience Questionnaire (AEQ) (Brown, Gibbs & Glover, 2003) – See Appendix VI.

The Assessment Experience Questionnaire (AEQ) was also used to gauge teachers' approaches to teaching. It was developed to provide quick and easy data from students about the extent to which students experience the "eleven conditions" of effective assessment and feedback (Gibbs & Simpson, 2004). The eleven conditions are:

- Assessed tasks capture sufficient student time and effort
- These tasks distribute student effort evenly across topics & weeks
- These tasks engage students in productive learning activity
- Assessment communicates clear and high expectations to students

- Sufficient feedback is provided, often enough & in enough detail
- The feedback is provided quickly enough to be useful to students
- Feedback focuses on learning rather than on marks or students
- Feedback is linked to the purpose of the assignment and to criteria
- Feedback is understandable to students, given their sophistication
- Feedback is received by students and attended to
- Feedback is acted upon by students to improve their work or their learning

Questionnaire items were derived from unstructured interviews carried out at Open University science summer schools in 2002. The AEQ contains six scales (each covering more than one "condition"), and each scale contains six statements.

Scale 1 - Time demands and distribution of student effort
Scale 2 - Assignments and learning
Scale 3 - Quantity and timing of feedback
Scale 4 - Quality of feedback
Scale 5 - Use of feedback
Scale 6 - The examination

Students are asked to indicate the extent to which they agree or disagree with each statement on a Likert-type scale scored from 1 to 5, with 1 indicating strong agreement and 5 representing strong disagreement. This questionnaire has been used with 1,050 students on seven science courses at the Open University and also on six science courses at Sheffield Hallam University. According to Gibbs and Simpson (2003) the scales are reasonably coherent, though they would benefit from some further development.

Two of the scales were used for the studies in Chapters 5 and 6 – assignments and learning, and examination and learning.

2.2.6 Disciplinary Epistemological Beliefs Questionnaire – (DEBQ) (Hofer, 2000) – See Appendix VII.

2.2.6.1 Theoretical underpinnings.

Hofer (2000) described how four dimensions of personal epistemology have been the focus of research and accompanying literature. These four dimensions are certainty of knowledge, simplicity of knowledge, source of knowledge, and justification for knowing. Hofer has argued these four dimensions "...should be considered the core of an individual's epistemological theory" (Hofer 2000, p.381).

"Certainty of knowledge" describes the degree to which one sees knowledge as fixed, or more fluid. From a developmental view, an individual at a lower level of this dimension believes absolute truth exists, and at a higher level, knowledge is seen as tentative and evolving.

"Attainment of knowledge" is characterised as an accumulation of facts or a number of highly-interrelated concepts (Schommer, 1990; 1994). Therefore, a high score on this scale represents an individual who focuses on acquiring facts, and a low score depicts an individual who is concerned with understanding the information and how it relates to other knowledge.

"Source of knowledge" refers to where the individual gains their information. An individual who obtains a high score on this dimension acquires their information from external sources, whereas those with low scores will gain knowledge through interaction with others and self-discovery (Hofer, 2000).

"Justification for knowing" subsumes an individual's ability to evaluate knowledge claims. This manifests itself in the way evidence is used, and how authority

and expertise are presented as justification. A person with a high score on this dimension emphasises the importance of being critically aware of the reliability of information, whereas those with a low score do not seek to justify their acceptance of information.

2.2.6.2. Development of the instrument.

This questionnaire was adapted from existing instruments, for example, Perry's Checklist of Educational Values (1970) and Schommer's Epistemological Beliefs Questionnaire (1990). Additional items that were written were in accordance with the four proposed dimensions of epistemological theories (Hofer, 2000).

The questionnaire was developed by a team of researchers familiar with the literature, and reviewed by three psychologists for wording, content, validity, and relevance to each of the four dimensions. Hofer (2000) reported that, "The new instrument used to measure these differences needs further validation and piloting" (p.402).

2.2.6.3. Structure of the inventory.

The DEBQ (Hofer, 2000) contains 27 items which cover four factors or dimensions:

- Certainty of knowledge
- Justification for knowing
- Source of knowledge

Attainment of knowledge In this study, each item was adapted to refer to the module rather than the subject matter in general; therefore the module became the frame of reference.

2.2.6.4 Scoring the data.

Students were asked to complete the questionnaire with a certain module in mind when responding, rating each of the 27 items on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree). The scores are then totalled for each dimension, and a mean score calculated for certainty of knowledge, justification of knowing, source of knowledge, and Attainment of knowledge.

2.3 Qualitative Data – See Appendices VIII - X

In order to elaborate on the quantitative measures, a series of qualitative questions as part of the bank of questionnaires was used to enable a better interpretation of the results found in the questionnaires. These questions aimed to examine the rationale students gave to explain their approaches to learning and their motivation (see Appendix I). Semi-structured interviews were also used to elicit a deeper understanding of teachers' perspectives on teaching methods, assessment practices, approaches to learning, and motivational factors. This method was used in the constructive alignment study (see Chapter 5) when the researcher interviewed each of the tutors involved in the study at the beginning of the semester. This interview was to further explore the design and rationale for the design of their module. The questions were based around the learning objectives for the subject, the method of assessment used to measure students' achievement in these learning objectives and the teaching approach used to develop students' understanding in the module. These interviews were used to categorise the level of constructive alignment in each module, and were part of the protocol described in more detail in Chapter 5.

Chapter 3

The Effect of Viva Assessment and Teaching Methods on Students' Approaches to Learning and Motivation

3.1. Introduction

Higher education aims to encourage students to achieve a higher level of understanding of their subject matter. In order for students to achieve these higher levels, they have to approach their learning at a deeper level (Prosser and Trigwell, 1999; Barrab and Plucker, 2002), and be motivated to achieve (Deci and Ryan, 1985). One factor that is seen as a major influence on students' intentions is their perception of the assessment of their learning (Gibbs, 2007; Ramsden, 2003; Biggs, 2000; Bransford, Brown and Cocking, 2000). A learner, who perceives that the learning outcome requires demonstration of understanding, application, and critical analysis, will approach their studying in a way that promotes this. Students who perceive the assessment can be achieved through memorising and regurgitation will approach their learning in a different manner. This study was to investigate if, as part of a constructive teaching methodology that allowed for practice, the introduction of a viva voce examination that required a deep approach to learning to achieve would have an influence on the students' approaches to learning and motivation.

Footnote:
This chapter is an adaptation of two previously published papers:
Fazey D.M.A. and Lawson R.J. (2000). Structuring the learning environment to promote deep approach to learning to study. *In C.Rust. Improving Student Learning through Assessment.* Oxford Centre for Staff Development.
Lawson, R.J. and Fazey, D.M.A. (2000). The Impact of Teaching Styles and Methods of Assessment on Students' Psychological Characteristics and their Performance Level, in Higher Education. Scottish Journal of Adult and Continuing Education (6) 2

Evidence that assessment practices promote students' preferences for a particular approach to study (see for instance, Boud, 1990; Gibbs, 1992; Ramsden, 1993) is intuitively sound, though often not empirically tested. Entwistle (1988) examined why students want to learn, and the processes by which they acquire information. Three main approaches to study were initially identified by Entwistle – deep, surface, and strategic (which is now labelled achieving; see Chapter 1) (Entwistle and Tait, 1994). Differences in approach between genders and across ages have been widely investigated. The more recent studies on gender that are the most methodological found find no differences in gender for any of the three measures (e.g. Wilson, Smart and Watson, 1996). Differences, however, have been found for age on approaches to study, with students that are classified as mature (that is over the age of 21 when beginning a university course) showing higher levels of a deep approach to learning, and lower levels of a surface approach than those more traditionally aged (that is, attending university following a school education – i.e., 18 to 21 years old) (Fazey, 1999; Zeegers, 2001). In order to achieve the "graduateness" described by Prosser and Trigwell (1999), a deep approach to learning is essential (Biggs, 1999).

Most studies have found, that at the contextual level (e.g. degree programme), approach to study is stable over time (e.g. Busato, Prins, Elshout and Hamaker, 1998; Fazey, 1999). However, Meyer and Scrivener (1995) reported a significant decrease in deep approach scores over a year of study and an increase in variables, such as fear of failure and disorganised study. At the situational level (e.g. a module), the results are possibly less equivocal. Most studies report a decrease in deep approach at the end of the module (e.g. Newstead, 1998; Solominides and Swannell, 1995). Newstead attributed the increase in surface scores as a response to the proximity of

formal examination assessments, suggesting that approach might change in relation to particular demands within a module, such as assessment mode.

A goal for teachers in HE is to develop students' deep approach to learning (see Chapter 1; Fazey and Fazey, 2001). This can be a challenge for teachers as many students use a surface approach to learn (Biggs, 1999). There is evidence that teaching and assessment methods strongly influence students' intentions concerning study, and that these, in turn, are associated with approaches to learning and students' motivation for academic work (Bransford, Brown and Cocking, 2000; Boud, 1990; Gibbs, 1992; 2007; Ramsden, 2003).

Students' motivation is concerned with the intention to act to achieve a goal, and determines the direction and intensity of behaviour towards that achievement. Effective teaching approaches can be designed when teachers have some understanding of their students' reasons for behaving in particular ways, as student motivational orientation underlies their intentions, behaviour, and therefore, outcomes.

The notion of categorising motivational orientation has been investigated, with intrinsic and extrinsic motivation known as a common method of showing different types of motivation. Deci et al. (1985; 1991) expanded on the original concepts of intrinsic and extrinsic motivation in a manner that aligns with the propositions of this thesis, proposing a self-determination continuum that involved gradations of internalisation, of reasons for acting from extrinsic to intrinsic motivation. They argued that there are different forms of reasons for behaviour that can be found on this motivational continuum that are closely related to a perceived locus of causality. This perspective has developed thinking on motivation from separate categories to an orthogonal dimension. Extrinsic regulation (which shows no internalisation) is at one

end, and intrinsic motivation (high in internalisation) is at the other end of the continuum.

Deci, Vallerand, Pelletier and Ryan (1991), broke extrinsic motivation into three components:

- External Regulation. This is behaviour that is controlled by external sources, i.e., material rewards or constraints imposed by others. The individual perceives there to be little choice, and does not value the behaviour or outcome.

- Introjected Regulation. This is when the external source of motivation has become internalised. Behaviours regulated by introjection are reinforced by negative internal pressures, e.g., anxiety or guilt. Choice is perceived to be limited, and behaviours are driven by negative emotions rather than internalised values.

- Identified Regulation. This is when the individual comes to value or judge the behaviour as personally important, and therefore performs it out of choice. It is still performed for instrumental reasons (e.g., to gain a degree) but is internally regulated and self-determined.

Intrinsic motivation is also subdivided into three subcategories, which unlike the gradations with extrinsic motivation, are not hierarchically organised.

- To Accomplish. When this is a motivation, students interact with the environment in order to feel competent; they are striving to gain a feeling of mastery.

- To Experience Stimulation. Stimulating experiences like pleasure, aesthetic experiences, and excitement derived from one's involvement in an activity are the stimulus for students motivated in this way.

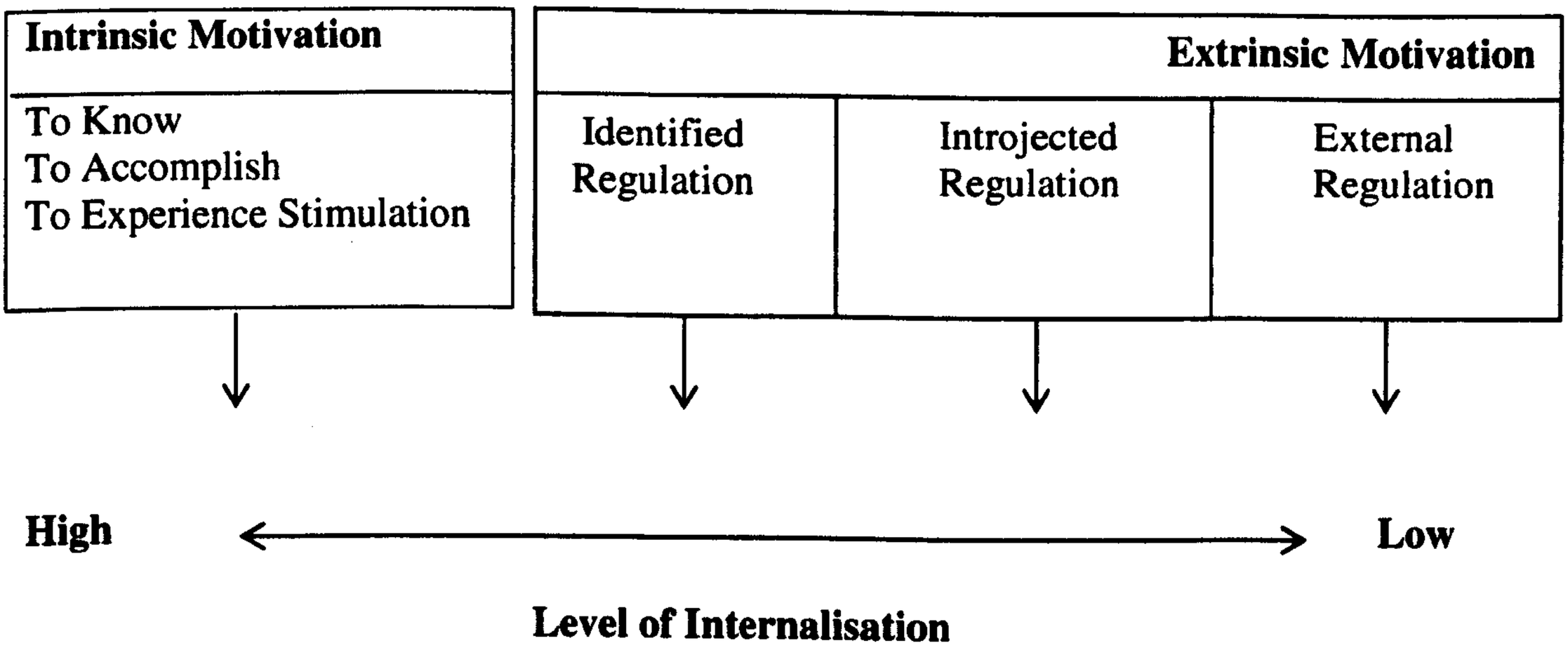
- To Know. Curiosity, learning goals, and exploration features in this sub-category. It is performing an act for the pleasure and experience of learning.

The final sub-category described by Deci and Ryan is not part of the continuum, as it describes a non-motivated state:

- Amotivation. Students in this category do not perceive links between their own actions and the outcomes. They see their behaviour as being caused by forces outside of their control.

Deci et al.. (1991) believed that the degree of autonomy or control felt whilst participating in activities is an important antecedent of intrinsic motivation. Actions that are initiated from within the self will be more intrinsically motivating than are tasks engaged in as a result of external influences. This concept has been widely accepted in the motivational literature.

Figure 1: Continuum of Self-Determination (Ryan and Connell, 1987)



However, there may be activities that are initiated within the self but for externally-motivated reasons, and so Ryan and Connell (1989) distinguished between external, introjected, and identification regulation of extrinsically motivated behaviour as representing different degrees of internalisation. Vallerand, Pelletier, Blais, Brière, Sénécal, and Vallières (1992) used these models and applied them to a hierarchical model of trait and state, concluding that although individuals will have an inclination towards a motivational orientation; motivational orientations do in fact alter continually as a result of the context.

Developmental shifts have been noted in motivation. These findings show a systematic change from being mainly intrinsically oriented when younger, to being more extrinsically inclined by the age of 14 years (Harter, 1983). Increasingly, attention is drawn to the products of learning, for example grades, and so the learner shows less interest in the process of learning itself, leading to the decrease in intrinsic motivation. Deci et al. (1991) suggested that an increase in knowledge about educational systems with age is related to the developmental decline in intrinsic motivation. Learners also compare themselves with others as they get older, and so

competitiveness occurs. The majority of research has found that gender does not have an effect on motivational orientation (Ginsburg and Bronstein, 1993; Pintrich and De Groot, 1990).

Throughout the development of the Approaches to Studying Inventory (Entwistle, 1988), the motivation-approach relationships are explicit and integral to the structure of the inventory. A deep approach is characterised by an intrinsic motivational orientation, a surface approach by an extrinsic motivational orientation, and a strategic approach by achievement or competence motivation (Entwistle and Ramsden, 1983; Entwistle and Tait, 1994; Entwistle, 1998). Whilst the final version of the inventory has, to a large extent, removed the explicit links with motivation, the features of the deep approach in particular are closely associated with an intrinsic motivation to study (Fazey, 1999).

Empirical studies that provide evidence for the associations between motivation and approaches to study generally focus on competence-motivation, rather than on the intrinsic-extrinsic motivation continuum. The motivational climate is strongly influenced by the teacher in a learning context (Purdie and Hattie, 1995). Purdie and Hattie used motivation training techniques with secondary school students, and compared changes in motivation with changes in approaches to study (surface, deep, and achieving). They found differential effects of this training on high or low achieving students, and suggest that these differences are associated with the self-perceptions of competence that are critical for expectations of achievement. One of the factors in the learning context that teachers control is the assessment, and the perception of assessment demands strongly drives students' motivation (Biggs, 1999; Bransford et al. 2000).

3.2. Applying Theory to Practice

Whilst a student may be intrinsically motivated to come to the university, the learning environment needs to actively support students' interest in studying, if intrinsic motivation and a deep approach to study are to be maintained. Facilitating personal control and responsibility is an important aspect of this interaction (Ryan and Connell, 1987). In choosing to study at the university, most students are already exhibiting self-determined motivation; although, for some, the "choice" may be at the less self-determined end of the continuum, influenced by parental desires, rather than their own (Fazey, 1999). Within the learning environment, the teacher's role is to move students towards self-determined motivation, in which choice is paramount and students are committed to personal development, rather than merely earning marks.

In order for learners to have the best opportunities in a learning situation, the environment that the teacher provides should be consistent, well-organised, and offer a clear framework in order for students to be able to structure their learning (Fazey, 1999). Advice and guidance must be available, as well as appropriately-designed learning opportunities for the students, which reinforce achievement behaviours, give constructive feedback, apply sanctions, and allow the students to engage in discussions about their work. This will encourage students to focus on personal improvement of performance, providing feedback that uses self-assessment of both strengths and weaknesses (Gibbs, 1992; Dickinson, 1993).

As part of the provision of a suitable environment, the assessment system is recognised as exerting a powerful influence on student learning (Bransford et al., 2000; Fazey and Lawson, 2000; Gibbs, 1992). If the teacher's intention is to promote a deep approach to study, methods of assessment should be implemented to encourage this, so that the students develop a level of understanding that demonstrates the

graduate competencies expected of them. Typically students will adopt the approach to learning that they perceive will result in the highest marks, as higher marks lead to a better degree category. If the assessment is perceived by students to require and reward to reproduce material in order to gain high marks, then they are more prone to adopting a surface approach (Biggs, 1999; Biggs and Telfer, 1987; Ramsden 2003). Many students appear to narrow their learning focus as final assessments approach, putting effort into remembering, rather than understanding (Newstead, 1998; Williams, 1992; Shepard, 2000). Therefore, to encourage deeper approaches to learning, it is important to use assessment methods that explicitly encourage a demonstration of understanding of the subject, rather than the recall of facts that would be indicative of a surface approach.

Students tend to focus on the outcomes of summative assessments when gauging their progress. Unless teachers consistently encourage and reward students' deep approaches to study, thereby providing opportunities to develop skills and confidence, it seems unlikely that students will risk being divergent or creative in their work. They will "play safe" until they are very sure that they have the requisite skills to be successful (Norton and Dickins, 1995). Using an appropriate assessment methodology is a necessary but insufficient indicator to the student that a deep approach to learning is required.

The aim of this investigation was to structure an undergraduate module to actively promote a deep approach to study by emphasising the need for students to adopt this approach throughout the module. Deep, divergent, and holistic thinking and study behaviours were explicitly and consistently encouraged and reinforced. The authors were interested in measuring the extent to which the students' approaches to learning changed or maintained over the module; given the evidence (e.g.

Newstead, 1998) that students' approaches to study tend to become more surface-oriented towards the final assessment point. Additionally, changes in motivational orientation that have been shown to be highly correlated with approaches to study (e.g. Fazey, 1999) were measured.

3.3. Hypotheses

The initial hypotheses were:

- There will be a significant difference in approaches to learning between pre and post module scores with:
  - a significant decrease found in surface approaches to learning,
  - a significant increase found in deep approaches to learning,
  - a significant increase in strategic/achieving approaches to learning,
  - a significant decrease found in lack of direction.
- There will be a significant difference in motivational orientation between pre and post module scores with:
  - a significant decrease found in extrinsic motivation factors,
  - a significant increase found in intrinsic motivation factors.
- There will be a difference in module assessment scores, with those who scored high on deep approach to learning at the beginning of the module scoring higher than those who scored low on the deep approach to learning at the beginning of the module.

The remaining hypotheses were to confirm previous research findings on the relationships between approaches to learning and motivational orientation (Fazey, 1999):

- There will be significant positive correlations between: deep approach to learning and the intrinsic subcomponents of motivational orientation; surface approach and the extrinsic components of motivational orientation; and there will be negative significant relationships between: deep approach and the extrinsic components of motivational orientation; and surface approach and the intrinsic components of motivational orientation.
- There will be significant age differences in line with previous research, with mature students scoring significantly higher than the traditional aged students on deep approach to learning and the intrinsic components of motivational orientation.
- There will be significant gender differences in line with previous research, with female students scoring significantly higher than males on deep approach to learning and the intrinsic components of motivational orientation.

3.4. Methodology

3.4.1 Participants.

Fifty first-year undergraduates volunteered to take part in the data collection. There were 31 women and 19 men, with an age-range from 18-57 (12 mature aged (i.e., over 21 years when beginning university), 38 traditional aged (i.e., 18-21 years when beginning university) (mean =20.17; SD=4.47)).

Table 1: Distribution of gender and age across the module

Gender	Age	
	Mature (12)	Traditional (38)
Male (19)	4	15
Female (31)	8	23

3.4.2 Measures.

3.4.2.1 Motivational orientation - the Academic Motivation Scale (AMS) (Vallerand, Pelletier, Blaise, Briére, Senécal and Valliéres, 1992).

- Perceptions of intrinsic motivation (sub-divided into, "to know," "to achieve," and "to experience stimulation"), and extrinsic motivation (sub-divided into "identified regulation," "introjected regulation," and "external regulation") were measured. Students responded to statements such as: "Why do you go to University?" on a 7-point Likert-type scale rated as *"Does not correspond"* (score of 1*)* to "*Corresponds exactly"* (score of 7*)* to their reasons for study. A mean score was derived for each of the motivational orientations and sub-components (see Chapter 2 for more detail).

3.4.2.2 Approaches to learning - the Revised Approaches to Study Inventory (RASI) (Entwistle and Tait, 1994).

Thirty two of the forty four questions were used in this study, as these questions focused on the main factors - deep, surface, and strategic approaches - and an additional section - lack of direction. Items are scored on a 1 to 5 Likert-type scale, with a score of 1 representing "disagree," up to 5 representing "agree" for each statement. Mean scores can then be calculated for sub-scales and approaches to study (see Chapter 2 for more detail).

3.4.3 Performance.

Course work and examination marks for the module were recorded. Marks are referred to as "coursework," "exam" (i.e. viva), or "total" (which is the overall, weighted mark for the module).

3.4.4 Qualitative questionnaire.

A series of questions was compiled to examine the students' usual methods for studying, such as, taking notes in lectures, reading, and revising. Students were also asked to reflect upon this specific module, in particular the process of being assessed by viva. They were asked if they had altered their approaches to learning as a result of the way the module was taught and assessed. These questions were presented in an open answer format (see Appendix I).

3.4.5 Procedure.

The students were studying on a 10 credit, compulsory module in the second semester of their first year on a BSc Sport Science Programme. The researcher was part of the teaching team. Students completed the AMS and RASI both at the beginning and again at the end of the module. The qualitative questions were asked at the pre and post module stages. In the module, the teaching style was designed to promote and reinforce a deep approach to learning. Each week was normally divided into a lecture (one hour) and a workshop (one hour). In the one-hour workshop, students worked in small groups on a number of tasks that required them to debate issues, discuss articles that they had been asked to read, and collate information that they had researched individually on a topic. This gave them the opportunity to practice the communication skills needed for their viva examination, gaining instant

feedback from both their peers and tutor about their discussion points. Tutor feedback consistently challenged students to think critically and constructively about the topic being studied. Students also wrote short essays, and presented them to the group. These were constructively criticised before the essay was submitted for their mid-term assessment (30% of the summative mark). In one workshop, each group produced a poster, which was presented to the larger group. This provided more opportunity for a variation of practice and a chance to gain feedback. An end-of-module viva voce with an experienced postgraduate student or with the tutor was the assessment for the remaining 70% of the summative work. Students were offered the opportunity of a practice viva before the summative assessment. The teaching method provided students with practice in the use of concept maps, discussion, and presentation of ideas - all skills required for the viva voce.

3.5 Results

3.5.1 Descriptive statistics.

The means for all the pre and post scores were examined before any initial analyses were conducted (see Table 2). The raw data were examined to check the assumptions necessary to conduct parametric tests. Levene's Test was used to test for homogeneity of variance in the scores. Lack of Direction and Identified Regulation were found to have significance levels of less than .05, which indicates a lack of homogeneity in the data. However, according to Vincent (1995) analysis of variance (ANOVA) is a very robust test and, by using a more conservative p value, the researcher can guard against the risk of making a Type I error when homogeneity is lacking.

Table 2: Descriptive Statistics Pre and Post Module Scores

	Pre		Post	
	Mean	Std. Deviation	Mean	Std Deviation
Approaches to Learning				
Deep approach	3.6000	.71190	3.7367	.58191
Surface approach	3.2667	.97379	3.0163	.70159
Strategic approach	3.4353	.71828	3.6163	.64883
Lack of direction	1.7304	.90670	1.4235	.65392
Motivational Orientation				
To know	5.0833	1.27345	5.3250	1.09527
To accomplish	4.4265	1.26124	4.9400	.98271
To experience stimulation	3.4167	1.37810	3.9650	1.17912
External regulation	4.8039	1.33165	4.5900	1.42120
Identified regulation	5.6078	.83405	5.5400	.96542
Introjected regulation	4.5147	1.38240	4.8350	1.06379

Table 3: Levene's Test of Equality of Error Variances for Lack of Direction and Identified regulation

	F	df1	df2	Sig.
Lack of direction	3.573	3	44	.021
Identified regulation	3.571	3	45	.021

The skewness and kurtosis of all the variables were checked. Lack of direction was found to be skewed, as it had a score that was higher than twice its standard error score. As this figure was positive, it indicates the distribution is unequal with a long right tail. The kurtosis was also high for these two variables, indicating that the observations cluster more, and have longer tails than those in the normal distribution.

Table 4: Skewness and Kurtosis Test Results for Lack of Direction.

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
Lack of direction	51	1.681	.333	2.321	.656

Although there were some problems with distribution and variance, it was considered that the parametric tests were robust enough to withstand the discrepancies found (Vincent, 1995). However, these factors would be taken into consideration when discussing the results.

3.5.2 Analyses of variance.

A repeated measures ANOVA was used to test the hypotheses that there will be a significant difference in approaches to learning between pre and post module scores with:

- a significant decrease found in surface approaches to learning,
- a significant increase found in deep approaches to learning,
- a significant increase in strategic/achieving approaches to learning,
- a significant decrease found in lack of direction.

It was also hypothesised that there would be a significant difference in motivational orientation between pre and post module scores with:

- a significant decrease found in extrinsic motivation factors,
- a significant increase found in intrinsic motivation factors.

3.5.2.1 Differences between approaches to study over time.

A MANOVA with repeated measures on time was used to explore the three variables within approaches to learning (deep, strategic, and surface) and "lack of direction."

The results revealed a significant main effect for approaches to study ($F(1,44)=45.823$; $p<0.01$; $\eta^2 = .766$). The partial eta squared scores indicated here show a high degree of association between approaches to learning, and a low association for the two way interactions and time.

Table 5: MANOVA Results for Revised Approaches to Study Inventory with time as the repeated measures variable

Variable	F	df	Sig.	Partial Eta Squared
time	1.111	1	.298	.025
approaches	45.823	3	.000	.766
time * approaches	3.917	3	.015	.219

Follow-up Tukey tests showed a significant difference between the pre and post scores for strategic approach to learning ($F(1,44)=4.192$; $p<0.05$), as the post module scores were higher. There was also a significant decrease in scores from pre to post module for lack of direction ($F(1,44)=7.357$; $p<0.01$).

Table 6: Differences in Means for Approaches to Learning Scores

Approach to Learning	Pre Module mean (SD)	Post Module mean (SD)	Sig.
Deep Approach	3.60 (0.712)	3.74 (0.582)	ns
Strategic Approach	3.44 (0.718)	3.62 (0.649)	p<0.05
Surface Approach	3.19 (0.722)	3.02 (0.702)	ns
Lack of Direction	1.730 (0.907)	1.424 (0.654)	p<0.01

3.5.2.2 Differences between motivational orientation over time.

A MANOVA with repeated measures on time was used to explore the motivational orientation variables. Significant main effects for time ($p<0.05$), and for motivation ($p<0.01$) were revealed. A significant two way interaction was also found between time and motivation ($p<0.05$). The partial eta squared scores indicated a high degree of association between motivational orientation, and a low association for all the other interactions.

Table 7: MANOVA Results for Academic Motivation Scale with time as the repeated measures variable

Variable	F	df	Sig.	Partial Eta Squared
time	6.100	1	.017	.119
approaches	379.164	5	.000	.983
time * approaches	2.612	5	.031	.282

Follow-up Tukey tests showed within subject effects with significant differences from pre-to post-test between the scores for to accomplish ($F(1,45)=5.433$; $p<0.05$) and to experience stimulation ($F(1,45)=5.769$; $p<0.05$), and the post module marks were significantly higher in both.

Table 8: Means and standard deviations for Motivational Orientation Scores across time

Motivation sub scale	**PreModule mean (SD)**	**Post Module mean (SD)**	**Sig.**
Intrinsic to know	5.083 (1.274)	5.325 (1.095)	ns
Intrinsic to accomplish	4.447 (1.261)	4.940 (0.983)	p<0.05
Intrinsic to experience stimulation	3.417 (1.378)	3.965 (1.179)	p<0.05
Extrinsic identified	5.608 (0.834)	5.54 (0.965)	ns
Extrinsic introjected	4.515 (1.382)	4.835 (1.064)	ns
Extrinsic external	4.804 (1.332)	4.590 (1.421)	ns

3.5.3 Correlation analyses – motivational orientation and approaches to learning.

Pearson's Product Correlations were used to test the hypotheses that there will be significant positive correlations between: deep approach to learning and the intrinsic subcomponents of motivational orientation; surface approach and the extrinsic components of motivational orientation; and that there will be significant negative relationships between: deep approach and the extrinsic components of motivational orientation; and surface approach and the intrinsic components of motivational orientation. To avoid the risks associated with repeated correlations, a Bonferroni adjustment was used to determine that the acceptable level of significance was $p \leq .006$. The results indicated that the hypothesised relationships existed as in previous research (Fazey, 1999).

Table 9: Correlation matrix for Revised Approaches to Study Inventory and Academic Motivation Scale variables

	Lack of Direction	Strategic Approach	Deep Approach	Surface Approach
To know	-.639(**)	.306(*)	.532(**)	-.102
To accomplish	-.511(**)	.323(*)	.430(**)	.081
To experience stimulation	-.365(**)	.295(*)	.508(**)	.032
External regulation	.238	-.178	-.318(*)	.397(**)
Identified regulation	-.245	.148	.072	.374(**)
Introjected regulation	-.256	.115	.266	.289(*)

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

3.5.4 Gender and age differences.

Two repeated measures ANOVAs (gender x time) with repeated measures on time were used to explore gender differences in a. approaches (3) and b. motivational orientation (6).

An interaction was found between appropaches and gender ($F(2,44)=3.142$; $p<0.05$). Follow-up Tukey HSD tests showed highly significant gender differences for the surface approach to learning at both the pre ($F(1,49)=10.764$; $p<0.01$) and post ($F(1,47)=7.526$; $p<0.01$) module times, with females scoring significantly higher than males at both times. The repeated measures ANOVA for motivation did not find any significant differences.

No differences were found for age when repeated measures ANOVAs (age x time) were conducted to investigate for differences in motivational orientation and approaches to learning.

When a two-way ANOVA (gender x age) was used to look for differences between age and gender, a significant interaction for age and gender was not found. However, when the scores were broken down by age and gender groups, interesting trends were seen. Although three groups showed a non-significant increase in their scores from pre- to post-test in deep approach to learning, the mature male group ($n = 7$) decreased significantly ($p<0.05$).

The same breakdown was also conducted for the strategic approach results. Traditionally aged males significantly increased their strategic approaches scores ($p<0.05$). Again, mature males decreased in this approach, although not significantly in this category.

3.5.5 Grouping.

In order to examine differences between students who scored high or low on the deep approaches to learning at the beginning of the module, the range of scores in the factor was divided into three. Students were categorised as being normatively high, middle, or low scoring in deep approach. Of interest were the high and low

categories, and so only the high (n=17) and low (n-18) groups were used as the independent variable in an ANOVA, with the scores from the modules used as the dependent variables. The high, mid, and low groups for deep approaches to learning were established by equally dividing the range of scores into thirds, and then categorising each student into one of these three groups.

3.5.5.1 High and low deep approach to learning groups.

A significant difference was found between groups in the marks they achieved for the viva ($F(2,47)=1.767$; $p<0.05$). Students who scored normatively high in deep approaches to learning at the beginning of the module achieved an average of 65.47% in the viva examination, whilst those in the low scoring group gained an average of 56.88%.

A follow up Chi-square test was conducted on the number in the high, mid, and low groups at the beginning, compared to the numbers in these groups at the end. Although there was an increase in the number of students in the high and mid categories by the end of the module (n= 19 high deep approach; n= 17 mid deep approach; n= 14 low deep approach), the change was not significant.

3.5.6 Qualitative categorisation – See Appendix X.

When parts of the qualitative data were examined, comments that confirm the categorisation by the questionnaires were evident. The remarks of the high scoring deep approach group, when answering questions about how they approached their studies and revision, reflected a deep approach. Examples of comments from the high group when reading were: "Try to relate notes to the whole paper," "Read sections to comprehend," and "Summarise and link points together." Their comments when

revising were: "Read then re-read and try to understand," "Use background material from other subjects," "Try to gain a good understanding," "Lay down foundation to which I add detail," "Reinforce principles and ideas," "Reading to help understanding and enhances weak areas," "Try to gain understanding of the notes," and "Spend a lot of time to understand and relate theory."

The high surface approach group students made comments that suggest an approach that relied more on memory: when reading – "Read it line by line," "Read through once then re-read;" when revising – "Read through notes and try to memorise," "Memorise points by joining them with a rhythm or tune,"and "Re-read notes."

These qualitative comments give extra credence to the validity of the RASI and AMS instruments with these students, as they demonstrate that students' comments correlate with the scoring they achieved on the scales.

The qualitative data were then examined to look for the comments students made about the type of assignment used in the module. Students made remarks, such as: "It was difficult at first and mind wasn't switched on, but then I read then re-read and tried to understand," "Excellent, it allowed for areas of discussion," "It gave a chance to give all the information you know not just information asked in questions," "It took a lot of time to understand and relate theory," "It was good – enabling you to keep focussed on the topic," "Very good, got good understanding," "Interesting to research," "Better than a written exam now it is over," "It was dependent on students' ability and confidence to talk in a formal, public manner," "Gets people used to speaking in public and giving presentations," "Good to have different assessments instead of exams," and, "Enjoyed it – felt it was easier than writing essays."

The students were also questioned about whether they had changed their approach to learning, and if so, how. The majority of students had made changes in the following ways: "Talked about it more," "Tried to understand the information with friends," "Used concept maps," "Practised verbally with others," "Tried to see the links between theories."

3.6 Discussion

There is plenty of evidence to show that a deep approach to study is strongly correlated with positive psychological characteristics, such as intrinsic motivation (see for instance, Purdie and Hattie, 1995; Entwistle and Ramsden, 1983; Entwistle and Tait, 1994). However, apparently no studies have intervened to explicitly change students' learning approaches across a module, and to track changes in other factors that are associated with positive achievement behaviours. The aim of this investigation was to examine the effect on students' approaches to study, motivation, and achievement, by designing an undergraduate module that explicitly fostered a deep approach to study. The teaching approach and assessment method emphasised and reinforced the need for students to adopt this approach throughout the module if they wished to earn higher marks. To track changes, measures were taken of students' approaches to study and motivational orientations at the beginning and end of the module. The extent to which the mark attained in the viva reflected a deep approach to study was also of interest.

3.6.1 Initial analyses.

The initial analyses did find some discrepancies with homogeneity of variance, kurtosis, and skewness. Lack of direction and identitifed regulation were

found to have significant homogeneity of variance. Lack of direction was also found to be out of range for both skewness and kurtosis. These results alerted the investigators to treat the results for these elements with caution; however, the parametric tests were judged to be robust enough to be able to continue to include them in the main analyses (Vincent, 1995).

3.6.2 Differences over time.

There was an overall significant increase in the scores for strategic approach across time. However, even though the scores increased in the deep approach, the difference between times was not significant, despite the very explicit and consistent reinforcement of such an approach. There was no significant decrease in the surface approach either, although they showed a decline. A significant change was found for strategic approaches to learning, with students demonstrating higher scores at the end of the subject than at the beginning. This would make sense, as the trends in the deep and surface approaches would indicate that students are being mindful of what is expected of them in the assignment, and adjusting their approach accordingly. There was also a highly significant decrease in scores for lack of direction, which was encouraging. These results, although not as strong as was hoped, are still positive; showing that although a significant increase in deep approach was not found, it is possible to maintain a deep approach to study throughout a module. This contradicts earlier work (Newstead, 1998) that found a decline in deep approach and an increase in surface as the student approached the final assessment. The fact that lack of direction decreased was encouraging, showing that students were able to take more control of their learning, and in doing so, operate as more autonomous learners.

Generally, it was found that despite the intervention, approach scores did not change significantly over time. However, an interaction pattern between increasing deep and strategic scores and decreasing surface scores, indicates an important and positive shift in approach, which suggests that interventions such as what were used in this study enabled students to maintain positive approaches to their work.

These results do have significance to educators in HE. Although the significant increase in deep approaches and decrease in surface approaches were not found, the shifts in data were in the right direction. The fact that the students' deep approach to learning was maintained is an important finding. This result demonstrates that by designing learning, and in particular assessment methods so that they foster understanding, critical questioning, application of theory to practice, and relating concepts, we can influence how learners approach the learning situation. This re-emphasises the importance of assessment in teaching and learning in driving student learning (Ramsden, 2003; Gibbs, 2007; Bransford et al., 2000). Lecturers do not always consider the impact of assessment and design on learning, and often treat assessment as a "bolt-on;" the last part of the curriculum design process. Empirical evidence like this study shows that academics need to be made more aware of how they can adapt their teaching to develop this higher order thinking in students, by framing the learning goals effectively in the assessment method.

The author repeated this study with the same group of students throughout their degree, finding more evidence to support that assessment drives approaches to learning. During the second year of study, students were given the option of being assessed by viva voce or by a written examination (Lawson and Fazey, 2000). The class was evenly divided in the method by which they chose to be assessed. The results of this study showed that again the deep approach to learning was maintained

and there was a trend for the surface approach to decrease. These results were the same for both the viva voce and the written examination students, which demonstrates that it is not the assessment method itself, but what is expected within an assessment that drives the approach. This relates to Biggs (1999), who has defined a model that states it is the students' perception of the assessment that drives their intention, which in turn will impact on approaches to learning, and this path will terminate in performance on the assessment.

The last study in the series was with the students in their third year, and it compared their marks in this subject with their other subject marks (Fazey and Lawson, 2000). Again, the same trends were found over the course of the module for the deep and surface approaches, but the students were scoring significantly higher in their overall mark compared to their other subjects. As these subjects were internally verified for consistency, the author is confident to report that the maintenance of the deep approach to learning led to superior learning, which supports Prosser and Trigwell's (1999) work.

When the motivational orientation scores were examined, two of the intrinsic motivation components (to accomplish, and to experience stimulation) were found to increase significantly over time, with the third element "to know" showing the same pattern, but not demonstrating a significant change. Increasing students' intrinsic motivation is an important part of learning, and is an important element in encouraging autonomous lifelong learning. Intrinsic motivation consistently correlates with deep approaches to learning, therefore a teaching and assessment methodology that increases students' intrinsic motivation has to be seen as advantageous in approach terms. This finding, again, has to be reported to academic staff so that they can design their courses to promote intrinsic motivation. Being reminded of

Ramsden's (1993) overview of graduate qualities, it is evident that students should be independent thinkers who can operate in an autonomous fashion. In order to develop these skills in students, it is vital that behaviour is internalised, making them less dependent on external sources like teachers. To be able to foster intrinsic motivation in students is therefore a crucial element of developing a more autonomous student; therefore, methods to do this need to be adhered to by staff.

The trend for external regulation was to decrease, whilst introjected regulation scores increased, and identified regulation remained quite constant over time, and these were trends and not found to be significant. The increase in introjected regulation was of concern initially to the investigator, but can be explained in two ways. First, people do not shift their motivational orientation from one end of the self-determination continuum to the other, but move gradually through the subcomponents. It may be that students who had been externally regulated at the start had begun to internalise their behaviour, and thus occurred the trend of a shift to the introjected regulation category. This explains both the decrease in external regulation and the increase in introjected regulation. Second, the nature of the main assessment meant that students were more likely to feel higher levels of anxiety and pressure, as they had to perform publicly in front of their tutor, unlike the usual, more private written method of examination. This again could be the reason for the shift towards introjected regulation.

3.6.3 Relationships between approaches to learning and motivational orientation.

In order to confirm expected relationships, a series of correlations were conducted. Preliminary investigations into relationships, using correlation analyses, indicated that the data exhibited the same positive and negative relationships between

variables as in previous studies (e.g. Fazey, 1999; Fazey and Lawson, 2000). Analyses revealed the anticipated positive relationships between a deep approach and intrinsic motivation, and between surface approach and extrinsic motivation. The negative association between lack of direction and both deep and strategic approaches was also in line with expectations. These results support similar findings by Fazey (1999).

In light of these initial analyses, the investigator was confident to accept that the data exhibited similar relationships to that in previous research. Although these findings have been reported in previous work, it is important to be aware of the impact these factors have on each other. Educators who aim to promote a deep approach to learning in their students, but who do not allow them to have control, choice, and autonomy in the learning ,are going to restrict the intrinsic motivation levels in their students, which will relate to the student adopting a deep approach to learning. The design of learning and assessment is not a simple process, and not only what the students are being required to do, but how they are to do the work, and how they will be supported in their efforts, are all important components of the design.

3.6.4. Age and gender differences.

Within the approaches to study data there were some interesting age and gender differences in response to the teaching style. Younger male students showed significant increases in strategic approach over time. With the significant difference between mature and traditional aged students in deep approach disappearing over time, it appears that the students who benefited most from the intervention were the younger students, and particularly the younger males. These findings correlate with those of Kayle and Fazey (2006), whose studies found that mature students enter the

university with an intention to learn and understand, and therefore exhibit a high deep approach to learning scores. They report that within a short time of entering HE, these older students soon revert to more strategic approaches in order to be able to achieve in systems that allow success through a combination of surface and strategic driven assessment. Therefore, although this module was designed to foster a deep approach in all the students, it was only the traditionally aged students who underwent a change in their approach over time; however, the mature students were able to maintain their already elevated deep approach. This is also a positive finding if one is to consider previous research that has shown decreases in deep approaches to learning over time, and in particular, the closer the student gets to assessment (Newstead, 1998).

3.6.5 Grouping.

Examining the groups of students when they entered the module was very interesting. It was found that students, who were in the high deep approach category at the beginning of the module, achieved higher scores than those in the low group. This shows that those that start with an intention to understand achieved higher than those with alternative intentions. These findings show that by assessing students' psychological factors at the beginning of a learning episode, it is possible to identify students who may find it more difficult to adapt to a different learning climate. These students can then be coached, so that they can gain the optimum amount from their learning and so achieve in the set assessment.

3.6.6 Qualitative.

Qualitative data were collected from the students, in order to test for validity and reliability in the quantitative findings of this study, and to gain additional

supporting material. The open-ended questions found that the student responses showed a shift as the module progressed. Students reported that they changed the way they studied; they began to read for understanding, rather than for memorising and reproduction. This change in part may have been a coping strategy to achieve in the assessment, rather than an internalised desire to understand and learn, but the shift in intrinsic motivational scores shows that it did affect how the students were motivated towards their work. The students also used more verbal forms to learn, often working with peers to gain full understanding and feedback on their performance. As feedback is seen as a highly contributing factor to effect learning (Gibbs and Simpson, 2004), working in a manner that allowed for students to get instant feedback must be beneficial to the learning experience. The other main point raised by the open-ended questions was the use of concept maps; students moved away from operating in a linear style of note taking, and started to build diagrams that showed the relationships between the theories presented to them.

The use of the revised approaches to study inventory was supported by the qualitative comments collected about approaches to learning. Students who recorded high surface approaches to learning at the beginning of the module reported methods of learning that included memorising and re-reading, whereas those who were approaching their learning with a deeper approach spoke of gaining an understanding and trying to relate theories with each other. This validation of the quantitative data gave the author increased confidence in the findings of this research.

This work has implications for teaching practice in HE, and is a starting point for further work to examine what influences students' behaviour when learning. Future studies should be aware of some of the limitations of the current research when developing their approaches to investigating similar questions. The research was

conducted by the module tutors, and so even though data was collected anonymously, it is possible that students felt compelled to answer the questions to comply with the academic's expectations, and so socially desirable responses were recorded. The number of students for the study was sufficient to conduct the statistical testing, but the chance of error may have been decreased with an increased sample. The assumption tests that showed of concern were again accepted by the author due to the robustness of the parametric test used, but some data could have been eliminated from the study if a higher number of students had been available. The last area for consideration is using marks as an indication of performance. These must be treated with caution, as unless care is taken to note benchmarks within and across subjects, it is unwise to compare marks from different tutors and across different subjects. Despite these concerns, the author had confidence that the results found were valid and worthy of dissemination to higher education academics.

3.7 Implications

The results of this study indicate that the interventions were successful in encouraging the maintenance of deep and strategic approaches. They emphasise the importance in designing teaching methodologies that required students to: present their ideas, explore concepts and relationships, reconstruct aspects of their knowledge, and not to expect that there is ever a final answer to a question or necessarily only one solution to a problem, in order to create a positive learning environment. The implication of this might be that we have to develop a learning atmosphere within degree programmes that continually and explicitly reinforces students' attempts to work in ways that are considered "deep," or more sophisticated, in learning terms. This is problematic if teaching staff do not have the will or the skill to develop deep

learning approaches, or do not understand what it means to adopt a particular learning approach. This research suggests that, essentially, teachers need to provide opportunities for students to develop their thinking in ways that are non-threatening, competence-enhancing, and reinforcing. One challenge to achieve this is for staff-developers to develop courses for teaching staff that introduce the impact of learning and assessment design on students' behaviour. They can also coach staff in how they can adapt their teaching approaches to encourage both intrinsic motivation and deep approaches to learning. This will develop the graduate skills that are believed to be an essential part of a degree programme.

The next area to question based on these findings is that of the students' context at the presage stage. This study examined the impact of assessment during the process stage, but it is of interest to see if the conceptions that the students bring to a learning experience will have an impact on their behaviour during the learning process. There are many factors that a student will bring to the start of a new learning opportunity, for example, previous experience, self-efficacy, and reasons for participating, but the element that the author will explore in more detail in the following chapter is that of the students' concept of ability in their area of study.

Chapter 4

Concepts of Ability and their Effect on Approaches to Learning and Motivational Orientation

4.1 Introduction

The previous study found that the design of the learning, and in particular the assessment, will have an effect on the students' learning behavior. The next area that the author felt relevant to investigate was an examination of the impact of the concepts that students enter the classroom with have on their learning. There are a wide variety of experiences, psychological attributes, beliefs, prior knowledge and skills that students enter a learning situation with, that have been acknowledged (see Chapter 1 - Biggs, 1999). They also enter with a range of expectations about their learning (Prosser and Trigwell, 1999). For example, the value that students' place on the learning experience will have an impact on their motivational orientation during their learning (James, 1892). Their self-efficacy will also affect their learning behaviours, with low self-esteem and motivation leading to lack of effort and persistence (Bandura, 1986). The concept of ability (whether it is fixed or changeable), is a belief that has been shown to impact on a learner's behaviour through persistence, effort, and motivation (Dweck, 1999), but no work had been conducted about the effect concepts of ability have on students' approaches to learning.

Footnote:This chapter is an adaptation of a paper presented at the SELF Conference, Michigan, July, 2006 and published: Lawson R.J. (2006). Concepts of Ability and their Effect on Approaches to Learning and Motivational Orientation. *Self-concept, Motivation, Social and Personal Identity for the 21st Century Conference Proceedings, Michigan, July 2006.*

4.2 Concepts of Ability

Concepts of ability (incremental or fixed) have an impact on students' achievement behaviours and self-perceptions (Dweck, 1999). This theory is valued in the teaching and learning research domain, and is supported by complimentary theories of self-efficacy (Bandura, 1997) and perceived competence (Harter, 1985). The level that students feel they are able to succeed directly impacts on their learning behaviour, and influences motivation and effort. Those with a fixed belief of ability perceive that they cannot change their level of ability. As they do not feel that they can affect their levels of ability, they may choose to perform easy, low-effort tasks in order to achieve a satisfactory outcome and maintain their levels of self-esteem by trying to demonstrate ability to themselves and others. Individuals who have an incremental concept of ability perceive that what they do will have an impact on their level of competence. They are not afraid of challenges where they may fail as these challenges are seen as an opportunity to learn (Duell andand Schommer-Aitkins, 2001; Stone, 1988). A relationship is also proposed between perceptions of ability and motivational orientation, with fixed belief students more extrinsically motivated, looking for external rewards and attempting to avoid anxiety and guilt. Incremental belief students are more driven by intrinsic factors, whereby they chose to try to accomplish personal goals and to gain understanding (Elliot andandThrash, 2001; Mueller and Dweck, 1998). They are less concerned than those with a fixed ability concept about demonstrating their ability to others.

This study explores the relationships between HE students' concepts of ability and motivational orientation, examining whether these factors are related to the approach students take to their learning. It then goes on to explore whether concepts

of ability can be influenced by the approach taken to teaching. The implications for educators are discussed in the light of the findings.

4.2.1 Theoretical underpinnings of concepts of ability.

Individuals develop beliefs that structure their world. These individual beliefs or meaning systems impact how the person feels, thinks, and acts in each situation (Dweck, 1999; Piaget et al., 1991), and have been recognised as an important influence on students' thinking. One aspect of the meaning system that must be examined in questioning these beliefs is the individual's concept of ability. This concept can be examined under two frameworks: fixed ability and incremental ability.

Fixed ability (or entity belief) is a concept whereby ability is understood as a fixed trait. Those holding this conceptual definition of ability believe that people have a certain amount of ability, and nothing can be done to change that amount (Bandura and Dweck, 1985; Dweck and Legget, 1988). The second framework is the concept of malleable ability (or incremental belief). This is a belief that ability levels are cultivated through learning, and that these levels can be increased through effort (Dweck and Leggett, 1988). People who hold this concept do not deny that there are differences in individuals' ability levels, but perceive that everyone can improve their personal level through guided effort (Binet, 1909; Nicholls, 1978; 1984; Mueller and Dweck, 1998).

These two frameworks are seen as independent of each other, rather than on a continuum, and are conceptualised as having an orthogonal relationship (Biddle, 1997). This means that individuals may score high on both incremental and fixed ability when measured, which appears contradictory. Although people's fixed concepts may determine the limits of their ability (e.g., I am capable of being a 2:1

student), they can apply an incremental concept to their learning within these capabilities (e.g., if I study hard I will be able to improve my research skills to obtain a high 2:1 grade in my dissertation).

4.2.2 Impact of concepts of ability on behaviour.

Both of the concepts of ability have repercussions for learners. Fixed ability students with high ability levels may worry about the amount of ability they possess and how they can demonstrate this to their peers (Sorich and Dweck, 1999). Therefore, in order to be able to maintain an appearance of competence, learners with fixed concepts are more likely to choose easy, low-effort tasks which they can achieve easily so they can be seen as able by those around them (Dweck and Bempechat, 1983). This means that challenges are seen as a potential threat to self-esteem, in so much as those holding an entity theory of ability may avoid learning opportunities if those opportunities are likely to show inadequacies (Stone, 1998). Boosting self-esteem can encourage these vulnerabilities, with praise for ability fostering an entity theory.

Holding a high incremental concept of ability makes students want to learn. In contrast to those with fixed concepts, these learners are not deterred by failure or by the perceptions of their peers, but favour opportunities to learn and develop (Sorich and Dweck, 1999). This is true even when the learner's confidence levels are low; they will still thrive on challenge (Stone, 1998; Henderson and Dweck, 1990), with self-esteem raised by effort and a feeling that learning has been achieved.

Dweck (1998) observed that many talented students do not seek challenges. She noticed that they sometimes struggle to cope with failures and question, if not condemn their ability, when faced with setbacks. However, many less-accomplished

students however were not affected at all by failures and continued to seek challenges even after setbacks. This led Dweck to believe that these behaviours were not the result of actual ability levels. With her colleagues, she went on to identify two reactions to failure. These were helplessness and mastery-oriented patterns (Dweck, 1998). Students show helplessness reactions when they believe they have no control over the situation. It was proposed that this belief is associated with a fixed concept of ability, or concerns about their competences. On the other hand, mastery-oriented patterns were demonstrated when students remained focused on their goals, believing they could achieve despite any current difficulties.

4.2.3 Concepts of ability and other factors.

4.2.3.1 Self-esteem.

Individuals can customise self-esteem by attaching different levels of importance to different behaviours and domains, with the more highly valued having the greatest influence on global self-esteem (James, 1892). In order to be able to maximise outcomes and protect self-esteem, there is a tendency to self-serve and discount. Self-serving is where a greater importance is given to the domain in which the individual is likely to experience a sense of accomplishment. This has the effect of maintaining or raising self-esteem. In discounting, the individual reduces the importance of domains in which competence is perceived as lacking. These mechanisms allow us to manipulate our self-esteem so that we can protect it from continuous failures. Harter (1988) found that children with low self-esteem are those that are less able to incorporate these protective processes into their strategies for dealing with failure.

Concept of ability has an impact on self-esteem through the individual's value system and perceived competence. For students who do not value learning or studying, ability beliefs are unlikely to impact on self-esteem. However, for those who highly value their learning, ability concepts are important. Students with a belief that is predominantly a high fixed concept of ability must have perceptions of competence that are robustly high. Achievement behaviours may be detrimentally affected if the challenges of learning appear too great in a situation where ability is believed to be fixed. There is a potential threat to self-esteem if ability in learning cannot be demonstrated. For students with an incremental belief, perceptions of competence do not have to be high for achievement behaviours (effort, persistence, challenge-seeking, etc.) to be consistently demonstrated. Self-esteem, for these students, is not damaged by the failure to achieve a particular outcome.

Robins and Pals (1998) conducted a study with college students to examine, amongst other questions, whether concepts of ability predicted changes in self-esteem. They found that those students with an entity theory of ability had lower levels of self-esteem, and that this difference became more exaggerated by the end of their college experience. A path analysis indicated that the performance goal that the entity group adopted, along with their negative affective responses to their learning and their helplessness behaviour, all contributed to the lower levels of self-esteem.

4.2.3.2 Motivation.

Elliot and Dweck (1988) suggested that those students who adopt a helplessness approach and those who implement mastery-oriented patterns set different types of goals (see also Eccles and Wigfield, 2002; Covington, 2000). Two types of achievement goals were linked to these two different patterns. Performance

goals focus on positive judgements about competence and avoid negative ones. This type of goal is often found when students are concerned with their level of ability. They need to appear capable to both themselves and others, and avoid looking unintelligent. This type of student will play it safe to avoid failure, or select harder tasks in which they are confident they can succeed, but will be motivated to impress others, rather than to learn (Roeser, Midgley and Urdan, 1996).

The second type of goal is a learning goal, which focuses on increasing competence levels. This goal has been seen to foster and sustain greater intrinsic motivation and higher interest levels in tasks (Duda, Fox, Biddle and Armstrong, 1992; Butler, 1987; Mueller and Dweck, 1998; Deci and Ryan, 1985). For example, Goudas, Biddle and Fox (1994) found that students appeared to be differentially motivated for different tasks. Those adopting task orientated/learning goals had greater intrinsic interest for the activities.

Both of these achievement goals are normal, with students striving to have their achievements validated as well as wanting to improve (Elliot and Church, 1997). However, in particular situations these two goals are often in conflict, and students have to opt for one goal or the other (Dweck, 1999). This is where differences can be found in students' behaviour in learning. Those students who select performance goals often fall into a helplessness response when they are failing, whereas those who have learning goals do not feel their intellect is being threatened by failure, and so persist in mastering the task, trying out different strategies to achieve. Cury, Biddle, Sarrazin and Fambose's (1997) studies into participation in sporting tasks, showed that those who were ego/performance-involved had a weaker investment in the training situation than those who were task/learning-involved, regardless of the perception of their ability. Ego-involved pupils used an attributional bias to minimise

the effect of effort on performance. A second study confirmed these results, by underlining the motivational deficits of ego involvement for those with a low perceived ability.

Bandura and Dweck (1985) proposed that the reason for this goal choice derives from the way students think about their ability. In a study comparing students' views on intelligence, they found a clear and significant relationship between students' concepts of ability and their motivation goal choices. The stronger the fixed concept, the more likely they were to choose a performance goal, whereas those with a strong incremental belief were more prone to learning goals and were more intrinsically motivated. The mastery-oriented pattern is self motivating, with those students who adopt it seeking more intrinsically oriented motivation, like challenges (Dweck, 1999).

Although most of these studies have used the task/ego categorisation of motivation, this present study investigates using the self-determination continuum, which utilises intrinsic and extrinsic motivational factors. However, these two ways of categorising have been considered to have overlapping characteristics. Ego orientation is linked to extrinsic motivation, in that behaviour is motivated and controlled by external factors, whereas task and intrinsic motivation are more internally managed.

4.2.3.3 Approach to learning.

The author is not aware of any empirical work to investigate the relationships between approaches to learning and concepts of ability; however, links have been made between approaches to learning and motivational orientation. A deep approach is characterised by an intrinsic motivational orientation, a surface approach by an extrinsic motivational orientation, and a strategic approach by achievement or

competence motivation (Entwistle and Ramsden, 1983; Entwistle and Tait, 1994). This was supported by the research conducted in Chapter 3 where positive relationships were found between deep approach and the subcomponents of intrinsic motivation, and weaker positive relationships were also found between surface approach and the more external factors of motivation. Empirical studies that provide evidence for the associations between motivation and approaches to study generally focus on competence-motivation, rather than on the intrinsic-extrinsic motivation continuum.

Purdie and Hattie (1995) used motivation training techniques with secondary school students and compared changes in motivation with changes in approaches to study (surface, deep, and achieving). They found differential effects of this training on high or low achieving students, and suggest that these differences are associated with the self-perceptions of competence that are critical for expectations of achievement. In this study, it is also hypothesised that as an incremental concept of ability has been shown to be related to intrinsic motivation, and intrinsic motivation to a deep approach, there will be a relationship between incremental concept of ability and deep approach to learning. Similarly, as entity concept of ability is related to extrinsic motivation, and extrinsic motivation to surface approaches to learning, it is anticipated that there will be a relationship between entity concept of ability and surface approach to learning.

4.2.3.4 Approaches to teaching.

Questions to be addressed in this study are whether these concepts of ability affect student intentions, and whether they can be manipulated by the teaching and learning environment. Dweck (1999) and Hong, Chiu, Dweck and Lin (1998) conducted

studies with college students, and found that the teaching climate could strongly influence students' concepts of ability. However, a follow up study found that it was not only the teaching climate during classes that impacted on students' concepts of ability, but also the feedback about students' performance on the task that was provided that affected future learning behaviour. They found that students, who received positive feedback that they had performed well, were more likely to accept tutorial help to improve further, regardless of the teaching climate, indicating that they had an incremental concept of ability. Those who received negative or no feedback about their performance reacted differently to the offer of extra tutorial help, showing more fixed concepts of ability.

These studies by Dweck demonstrate that conceptions of ability can be manipulated through both the actual teaching climate and the type of feedback students receive, but these effects can be viewed as tenuous. Therefore, it is valid to continue this line of research to investigate these relationships further in HE students.

4.3. Hypotheses

This study aimed to further explore the relationships between students' predispositional concepts of ability with contextual levels of motivational orientation, approaches to learning, and perceived competence, hypothesising that:

- Incremental concepts of ability will correlate significantly and positively with intrinsic motivation and deep approach to learning.
- Fixed concepts of ability will correlate significantly and positively with extrinsic motivation and with both surface and strategic approaches to learning.

- There would be a significant relationship by the end of the module, between the students' concept of ability and the approach to teaching, which they had experienced. Students taught by teachers who promoted conceptual change will have significantly higher scores on incremental concept of ability, and those taught by information transmission lecturers will have significantly higher fixed concept of ability scores.

4.4. Methodology

4.4.1 Participants.

The study involved 796 undergraduate students (366 Male, 430 Female; ages ranging from 18-49 years old, mean age of 22) studying a variety of subjects (15 modules, each taught by a different teacher) at the University of Wales. All the participants provided data at the beginning of the module, and 361 students (142 Male, 219 Female; ages ranging from 18-49 years old, mean age of 23) provided repeat data at the end of the module.

4.4.2 Measures.

The following validated questionnaires (see Chapter 2 for details) were used in this study:

- Motivational Orientation - The Academic Motivation Scale (AMS) (Vallerand, Pelletier, Blaise, Briére, Senécal and Valliéres, 1992)
- Approaches to Learning - The Revised Approaches to Study Inventory (RASI) (Entwistle and Tait, 1994)
- Concepts of Ability – Theories of Intelligence Scale (TIS) (Dweck, Chiu and Hong, 1995)

- Approaches to Teaching - Approaches to Teaching Inventory – ATI (Prosser and Trigwell, 1999).

4.4.3 Procedure.

Students were asked in the first lecture of their module to voluntarily complete a series of questionnaires (AMS, RASI, and TIS). This process was then repeated during the last two weeks of the 15 week module. The lecturers for each of these modules were also asked to complete the ATI at the beginning of the module.

The questionnaire data collected were treated with the appropriate statistical analyses using SPSS v12.

4.5 Results

4.5.1 Descriptive.

The raw data were examined to check the assumptions necessary to conduct parametric tests. Levene's Test was used to examine the homogeneity of variance in the scores. There was a significant result for the intrinsic subcomponent "to know" at the beginning of the module. Despite the indication that there was a lack of homogeneity in this variable, Vincent (1995) argues that parametric testing is robust enough to cope with unequal variance. The skewness and kurtosis of all the variables were checked. All the data fell within the accepted levels of skewness and kurtosis recommended (Vincent, 1995).

4.5.2 Results at the start of the module.

4.5.2.1 Relationship between concepts of ability and approaches to learning.

Using data from the 796 undergraduates, Pearson Product Correlation analysis was used to examine the relationships between concepts of ability and approaches to learning at the beginning of the module. Table 1 shows the weak but significant results, which were generally consistent with expectations.

Table 1: Correlations between Approaches to Learning and Concepts of Ability at the beginning of the module

		Fixed Concept	Incremental Concept
Deep approach	Pearson Correlation	-.153(**)	.079
Surface approach	Pearson Correlation	.038	-.009
Strategic approach	Pearson Correlation	-.185(**)	.158(**)
Lack of Direction	Pearson Correlation	.292(**)	-.078
N=796			

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

4.5.2.2 Relationship between concepts of ability and motivational orientation.

Pearson's Product Correlations were conducted on the 796 undergraduates for the subcomponents of motivational orientation and the concepts of ability at the beginning of the modules. The weak but significant relationships can be seen in Table 2.

Table 2: Correlations between Motivational Orientation and Concepts of Ability at the beginning of the module

		Fixed Concept	Incremental Concept
to know	Pearson Correlation	-.090(*)	.143(**)
to accomplish	Pearson Correlation	-.009	.105(**)
to experience Stimulation	Pearson Correlation	.008	.043
identified regulation	Pearson Correlation	.001	.130(**)
introjected regulation	Pearson Correlation	.017	.097(**)
External regulation	Pearson Correlation	.099(**)	.123(**)
N = 796			

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

As the initial correlations provided some significant but weak relationships, the author felt the data warranted further exploration to investigate the extent of the impact of concepts of ability on approaches to learning and motivational orientation.

4.5.2.3 Differences in approaches to learning for different categories of concept of ability.

In order to examine if high or low levels of incremental and fixed concepts of ability showed differences in approaches to learning, the scores for the two concepts of ability were each divided into three groups; normatively high, mid and low. Two one way ANOVAs (using the categories of concept of ability (3) as the independent variable, and approaches to learning (3) as the dependent variable) were then conducted (one for each concept). Only students who fully completed all questions for

each factor on the instrument were included in the analyses. In the fixed concept ANOVA, there was a significant within subject effect for concept category in deep approach to learning ($F(2,520)=4.847$:$p<0.01$, $\eta^2=0.018$). Tukey's HSD test showed that the higher fixed group scored significantly lower on deep approach than the low scoring fixed group did ($p<0.01$). There was also a significant difference within strategic approach ($F(2,519)=8.238$:$p<0.01$, $\eta^2=0.031$), with the mid and low fixed groups scoring significantly higher than the high group on strategic approach ($p<0.01$).

For the incremental category, there was a significant within-subject difference in scores for strategic approach ($F(2,517)=3.118$:$p<0.05$, $\eta^2=0.012$), with the high scoring incremental group scoring significantly higher than both the mid and low incremental category groups ($p<0.05$).

The students were then categorised to reflect their high and/or low scores on both concepts (that is: high incremental and high fixed (HiI/HiF); low incremental and low fixed (LoI/LoF); high incremental and low fixed (HiI/LoF); and low incremental and high fixed (LoI/HiF)). A one-way ANOVA (with concept category (4 levels) as the dependent variable, and approaches to learning as the dependent variable (3 levels)) was used to examine the data. Significant within-subject differences for deep approach to learning ($F(3,178)=2.949$:$p<0.05$, $\eta^2=0.047$) were found, with follow-up Tukeys showing the HiI/LoF group scoring significantly higher than the LoI/HiF group ($p<0.05$). There were also significant differences for strategic approach ($F(3,175)=3.477$:$p<0.05$, $\eta^2=0.056$), again with the Tukeys showing the HiI/LoF group scoring significantly higher than the LoI/HiF group ($p<0.05$).

4.5.2.4 Differences in motivational orientation for different categories of concept of ability.

Fixed concept.

The high and low grouping for fixed and incremental ability categorisation was used again to conduct another two one-way ANOVAs (with category of concept (either fixed or incremental) as the independent variable, and motivational orientation subcomponents as the dependent variables). Fixed concept of ability group results indicated significant differences ($F(2,775)=4.878$:$p<0.01$, $\eta^2=0.012$), and follow-up tests found these differences to be between the intrinsic motivation subcomponent to know, with the high scoring fixed concept students significantly lower in their to know scores than the mid group ($p<0.01$). Tukey's results were also recorded for the most extreme extrinsic motivation component, external regulation, with the mid fixed concept group scoring significantly lower on external regulation than the higher scoring fixed concept group ($p<0.05$). Also the amotivation scores revealed significant differences, with the high scoring fixed concept students scoring significantly higher on amotivation than both the mid and low scoring groups ($p<0.05$), when the fixed concept categories were considered.

Incremental concept.

The ANOVA exploring incremental concept of ability groups found there were significant differences between the groups ($F(2,772)=4.448$:$p<0.05$, $\eta^2=0.011$). Tukey's follow-up analyses found differences for identified regulation, with the high incremental concept group scoring significantly higher on identified regulation than the low incremental group ($p<0.05$). The high scoring incremental group also scored significantly higher than both the mid and low scoring groups in external regulation

($p<0.01$), and the low incremental group scored significantly higher on amotivation than did the high scoring incremental group ($p<0.01$).

Students were categorised into the four groups using both incremental and fixed concept scores, and a one-way ANOVA was used to explore motivational orientation. Significant differences were found within subjects for the external regulation category ($F(3,270)=2.924$:$p<0.05$, $\eta^2=0.031$), with follow-up tests showing the HiI/HiF group scoring significantly higher than the LoI/LoF group ($p<0.05$). Differences were also found within amotivation ($F(3,270)=8.254$:$p<0.01$, $\eta^2=0.084$) with Tukeys showing the HiI/HiFgroup, and the LoI/HiF group both scored significantly higher than the HiI/LoF group ($p<0.01$). Also, the LoI/HiF group scored significantly higher than the LoI/LoF on amotivation ($p<0.01$).

4.5.3 Results at the end of the module.

4.5.4 Changes over time in concepts of ability, motivational orientation and approaches to learning.

A paired sample t-test over time, for those individuals that were tested at the beginning and end of the module ($n=361$), found a significant difference ($t(1,338)= -5.052$; $p<0.01$) in fixed concepts of ability, with fixed concept scores being significantly higher at the end of the modules.

Differences were also found for "to know" ($t(1,365)= 2.740$; $p<0.01$), with a significant decrease found over time and amotivation ($t(1,350)= -2.459$; $p<0.05$), with amotivation significantly higher at the end of the teaching periods. All the approaches to learning were found to significantly decreaseover time (surface ($t(1,142)= 6.186$; $p<0.01$); strategic ($t(1,148)= 8.573$; $p<0.01$) and deep ($t(1,150)= 6.161$; $p<0.01$)) with all the approaches significantly decreasing over time.

4.5.4.1 Relationship between concepts of ability and approaches to teaching.

A Pearson's Product Correlation was conducted on the data from the 361 students who completed the questionnaires at the end of the module, to examine if there was an overall relationship between approaches to teaching (conceptual change or information transmission) and students' concept of ability (incremental or fixed) by the end of the module. A significant but weak negative relationship was found between conceptual change student focused approach to teaching, and fixed concept of ability ($r= -0.248$; $p=0.01$), and a significant but weaker positive relationship was evident between information transmission and fixed concepts of ability ($r=0.170$; $p=0.01$).

4.5.5 Differences in concepts in ability for different approaches to teaching.

When the approaches to teaching (conceptual change or information transmission) were categorized as high, mid, or low, and a MANOVA (with teaching categories as the independent variable, and concept of ability as the dependent variable) conducted, a significant difference was found for fixed concept of ability ($F(178,2)=8.126: p<0.01$, $\eta^2=0.084$). Teachers in the high and mid information transmission approach had students who scored significantly higher in fixed ability at the end of the module than those taught by the low information transmission group.

4.6 Discussion

The results from this study generally support the framework proposed by Dweck and her colleagues, showing that students' concept of their ability has a relationship with

motivational orientation, and with the new line of investigation, approaches to learning.

The first hypothesis proposed that there would be a positive relationship between incremental concepts of ability and intrinsic motivation. The data supported this, showing a weak correlation, with two of the subcomponents of intrinsic motivation: to know and to accomplish. A positive but weak relationship was also found with identified regulation, which is classified as an internalised form of motivation on the self-determination scale. Although weak, these findings support earlier works (Elliot and Thrash, 2001; Mueller and Dweck, 1997) that proposed a relationship between incremental concepts of ability and intrinsic motivation. As the intrinsic motivation components and identified regulation involve placing personal value on learning, the relationship with an incremental but not with a fixed concept of ability is not unexpected. The intrinsic category that was not found to correlate with incremental concepts of ability was to experience stimulation. This subcomponent is more connected with a feeling rather than an action, which may explain why it did not show a relationship. However, these findings do indicate that overall an incremental concept of ability is associated with a self-determined motivation, which is most likely to lead to positive achievement behaviours. This needs to be of note to educators who recognise the importance of creating an intrinsic environment for learners. Identifying students who do not have a high concept of ability, and who may be at risk of being less intrinsically motivated early in a module, would allow opportunities for lecturers to work with these students, reinforcing that fact that it is possible for all students to develop within a subject.

The positive relationships with the motivational subcomponents introjected and external regulation with incremental concepts of ability were not expected. It

could be suggested that even though the students have a belief, they can improve and set learning goals, so they may still be influenced by more external factors, such as avoiding anxiety or guilt if they do not develop their levels of competence (or by rewards for showing improvement). Learners who have a more incremental concept of ability may also believe that they are capable of achieving more, and thus are motivated to gain external rewards. It is important to note that motivational orientation is not exclusive, and so it is plausible for an individual to be both intrinsically motivated at the same time as being extrinsically motivated. For example, a student may be motivated to study in order to learn and understand, but at the same time want to gain a first class degree, and please significant others. Therefore, even though correlations were found with the more external components of the motivation, it does not preclude learners from being motivated in what is viewed as a productive manner as well, intrinsically. It could also be suggested that it is in fact the level of motivation that is important, and that having an incremental concept of ability that promotes motivation will therefore drive learning. The concern with this view is that if the extrinsic motivation is not matched with equal or higher intrinsic motivation than if rewards are not forthcoming or negative reinforcement is received, both of which are externally controlled, then motivation is likely to reduce.

A positive relationship was not found between deep approaches to learning and incremental concept, which was unexpected. However, a significant relationship was found with strategic approach, which suggests that the students are not continually striving to reach a higher level of understanding, but recognise that they can develop by focusing on the parts of their subject in which they need to spend more time to gain an understanding. Being strategic means considering what must be done to achieve the highest grades and this might involve adopting a deep or a surface

approach, depending on what is perceived as required by the teacher. Considering learner behaviour, it is quite acceptable that students are strategic in their approach. Students are often time-poor, especially in the present day when many undergraduates have to work at the same time as studying, and so they have to be strategic in their work. Depending upon the class requirements the student will make decisions about what type of approach is needed for the different elements of their study and adopt a deeper approach when prompted to by the learning and assessment design. This, again, reinforces the importance for academics to design their learning so that it fosters a deep approach to learning.

Categorising students into high, medium, or low levels of incremental concepts of ability enabled the researcher to examine the differences between the groups. These tests mirrored the correlation results, showing that with the subcomponents of motivational orientation, the high scoring incremental concept group was significantly higher scoring than the low group for identified regulation, higher than the low and mid groups for external regulation, and lower on amotivation than the low incremental concept group. This helps to re-affirm the initial findings, with the addition of the students with lower levels of incremental concept showing higher levels of amotivation. This can be explained, as those students who do not have a strong belief that they can improve are more likely to be low in motivation than those who can see that they are capable of developing.

The second hypothesis was also accepted with the finding of a positive relationship between a fixed concept of ability and external regulation. This supports Dweck's proposal that individuals with a high fixed concept are motivated in a much more externalized manner, trying to show competence to others in order to appear capable, rather than trying to develop as a learner. However, the strength of this

relationship was weaker than the relationship found between external regulation and the incremental concept of ability. This was not expected. The negative relationship found between fixed concept and the intrinsic component "to know" (which could be interpreted as remembering facts) does reiterate that students with fixed concepts are not striving to learn, but merely to demonstrate their competencies.

It was also encouraging to find the expected negative relationship between fixed concepts and both deep approaches and strategic approaches to study, although no positive relationship was found with surface approaches. The negative relationships are important factors of which educators should be aware. A good teaching environment should try to encourage students to adopt a deep approach to learning. If climates can be created that encourage students to believe that they are able to improve, rather than believe that they have no control over their ability, students are more likely to adopt a deeper approach to their work.

Again, the categorisation of students into high, medium or low fixed concept groups re-affirmed these findings. The motivational orientation results mirrored the correlations, also showing a difference in amotivation scores, with the high scoring fixed concept group scoring significantly higher than both the other two groups. This fits with previous understanding of concepts of ability, showing that students who do not believe that they can improve in an area are less motivated than those who believe that they can. The approaches to learning ANOVAs showed a difference in deep approaches, as well as strategic approaches. The students with higher concepts of fixed ability scored significantly lower than those in the low fixed concept group, which was the finding that was predicted but not found through the correlation analysis.

Fixed and incremental concepts are not mutually exclusive, and it is therefore possible for students to score high or low in both scales. As a result, a final analysis was conducted with students grouped into four new groups (high fixed and incremental, low fixed and incremental, high fixed and low incremental, and low fixed and high incremental). The findings of this analysis found differences in deep approaches to learning, with the students with high incremental and low fixed scores scoring significantly higher in deep approaches than the low incremental/high fixed group. This, again, supports earlier research by Dweck and her colleagues, who discuss how students with a belief that they can improve in an area in which their ability is not restricted are more likely to adopt an approach to their learning that looks at learning and developing. This result was not evident for the incremental results, which can be explained in light of these findings, by the influence of the fixed ability concept in conjunction with incremental beliefs, which acts as a moderator. The same groups were also found to be significantly different for strategic approaches to learning, with the high incremental/low fixed once again scoring higher, This suggests that although these students are more driven to adopt an approach that seeks understanding, they are still strategic in order to invest their efforts in the best possible manner to ensure success.

Again external regulation provided a puzzling result. The high fixed and high incremental group scored significantly higher on external regulation than the low fixed and low incremental groups. This finding was unexpected, but may indicate that those who scored high on both concepts of ability are simply more highly motivated than those who scored low on both. External regulation is not bad, as it is a measure of motivation, which is what stimulates action. Motivation that is at the self-determined end of the spectrum is more robust in the face of difficulties, but external

regulation can be just as powerful in its stimulus for action. There were significant differences between the groups on amotivation scores with both of the groups with high fixed concepts of ability scoring higher than the ones with low fixed concepts. This result shows the strong influence that fixed concepts have on motivation, regardless of the level of incremental concepts of ability. Therefore, it would suggest that learning climates that persuade students that ability is fixed are more likely to result in a higher proportion of amotivated students.

Lack of direction was also found to be related to the concepts of ability, with fixed concept having a positive relationship, and incremental a negative one. In order for a student to perform at their optimal level, they need to have a focus that they can use to set goals. They have to have an understanding of what is required in order to be able to approach their learning in the most constructive manner. This data shows that those students who have a fixed concept belief do not have this focus, as they are high in lack of direction, whereas those with an incremental concept do not score highly in lack of direction. This is another reason to try and create learning opportunities that encourage an incremental concept of ability.

The hypothesis that there would be differences in perceived competence levels between fixed and incremental conceptual belief students was not supported by this study. The lack of significant findings in relation to perceived competence may have been a result of the instrument used to measure perceived competence. Previous literature had referred to self-esteem, rather than perceived competence, and this work used the academic scales of perceived competence to try to identify differences. If self-esteem is considered from a hierarchical perspective, then it would be expected that the academic domain would be less stable than global self-esteem, and would highlight more differences between the groups, but this was not found to be the case.

It was a concern to find that when all the students were considered together, their fixed concept of ability increased over time. Changes were also found for motivational orientation, with the intrinsic component to know decreasing, and amotivation increasing, and for all the approaches to learning decreasing from the beginning to the end of the module. These findings showed that the different elements were dispositional, and could alter over time. Follow-up studies then examined if the approach to teaching had an influence on students' results at the end of the module.

A follow-up analysis took place at the end of the module to discover if the approach to teaching showed a relationship with the students' concept of ability. Relationships were found between fixed concepts of ability and approaches to teaching. Those teachers who adopted a conceptual change approach to their teaching showed lower student scores on fixed concepts, whereas those teachers who used information transmission approaches to teach had students with higher fixed concept scores. The approach to teaching did not affect the students' incremental concepts of ability. This was an important finding in this study, as it shows that the learning climate created by the teacher can impact the students' concepts of ability. Knowing from both these and previous results that incremental concepts of ability correlate with intrinsic motivation and strategic approaches to learning; it is encouraging to know that by adopting an approach to teaching that requires students to engage with content in order to develop their understanding, and in doing so change their conceptions of the material, they will also develop a concept of ability that sees it as possible to improve in a subject. Educators should be alerted to this finding so that they can adapt their teaching to a more student focused/ conceptual change mode that will promote incremental concepts of ability.

When the teachers' approaches were considered in categories of high, medium, and low for each of the two approaches, again lecturers who adopted a high or medium information transmission approach to teaching had students with significantly higher fixed concepts of ability, than did those who had low scores on information transmission. This confirms expectations, and indicates that concepts of ability themselves are malleable.

This shows that concepts of ability are not trait but state, and educators can influence their students. It is especially important in light of the higher levels of amotivation and the lower scores in deep approach to learning found in the fixed concept students. These results showed that teachers who adopt a teacher-focused, information transmission approach to their lecturing influence students to have an increased fixed concept of ability, which relates to more negative learning characteristics, for example, extrinsic motivation.

The findings reported in this study support the hypotheses; however, the results are not as strong as would have been expected. Therefore, it is recommended that more work is conducted in this area to further explore the impact of concepts of ability on approaches to learning and motivation, in order to see the impact of teaching styles has on these concepts of ability. These future studies may consider the instrument used to measure concepts of ability; though it has been found to be valid and reliable, it has predominantly been used in the United States (and mainly by Dweck and colleagues), and so the language should be re-examined. It could also be reviewed to be made more specific to the learning in the modules in which it is used, so that the data collected could be deemed more relevant. Complementing the quantitative methodology with some open-ended questions would also help

investigators to decipher the responses given on the instrument, and strengthen further work.

4.7. Conclusion

These findings are of interest to educationalists, but what is perhaps of the greatest interest is the impact that approaches to teaching can have on changing concepts of ability over time. It is important to acknowledge that the approach to teaching can affect the students' fixed concept of ability, a concept that is detrimental to achievement through approaches to learning and motivational orientation. Therefore, educators need to provide learning environments that will allow students to adopt lower levels of fixed beliefs about ability.

The general belief (Dweck, 1999) is that students with high ability and conceptual understanding exhibit mastery-oriented qualities, but frequently worry about failure and question their competence levels. Another widely-held belief is that success leads to both mastery-oriented qualities in students and a drive to seek challenges. This is not always the case, as students who are accustomed to success do not necessarily have highly developed coping strategies for dealing with failure, and so tend to select tasks that are within their capability level (Dweck, 1998). Praising intelligence in students leads to mastery-oriented qualities and a relish for challenge is another belief, but these words of praise can make the learner fear failure and disappointing others, and so they avoid this by not taking risks. These students live in doubt when failure does occur and no praise is evident. The last belief is that confidence levels in students leads to selecting challenges and the adoption of mastery-oriented qualities, but these students do not want their competences tested, as self-esteem and confidence can be easily affected.

Why some individuals function effectively and others act in self-destructive ways when faced with the same situation is continually of interest in educational research. Evidence suggests that the learners react differently in learning situations based upon their perception of ability. This is not based in reality, but on a reaction to the situation, whether it appears as helplessness or mastery-oriented patterns. Some students will perceive their failure as a learning opportunity, whereas others who show vulnerability will perceive their lack of success as a public measure that cannot be altered.

The next chapter takes a different perspective on examining teaching and learning in higher education by building on the findings from Chapter 3 to examine the level constructive alignment in teaching approaches and design, in line with the degree that these approaches foster deeper levels of learning.

Chapter 5

Constructively Aligned Teaching Methods and Students' Approaches to Learning and Motivational Orientations

5.1 Introduction

Fazey and Lawson (2000) examined the effects of a teaching approach designed to consistently raise students' expectations that a deep approach to learning was required, and whether the assessment methodology and criteria applied to the assessment, a viva voce examination, rewarded such an approach. They found that students maintained their deep approach to study across the module, and significantly decreased their surface approach scores from the beginning to end of the module.

The studies reported here further explore this concept of the constructive alignment of teaching and learning approaches in a variety of subjects, testing the effect of the teaching methodologies and assessments on the students' approaches to learning and motivational orientations. Modules were classified as having a high, moderate, or low alignment through the development of a protocol that included the lecturer's self-reported approaches to teaching, an observation of the module, an interview with the lecturer, and a measure of the student's perception of the module.

Footnote:
This chapter is an adaptation of a previously published paper:
Lawson, R.J., Fazey, D.M.A. and Fazey, J.A. (2006) Constructively Aligned Teaching Methods and their Impact on Students' Approaches to Learning and Motivational Orientation. *In C.Rust. Improving Student Learning through Assessment.* Oxford Centre for Staff Development.

5.2 Literature Review

Students' approaches to learning are dependent upon their intentions and motives, and are associated with their prior knowledge and experiences (Biggs, 1999). According to Biggs, learning occurs when there is a personal interaction with the world. This has been described as the person-world relationship, which, it is suggested, is the "understanding" a person has, and what changes when that person learns (Fazey and Marton, 2002). As people learn, their conceptions change and they see and act in the world differently than they previously had. It is not the knowledge itself that causes this development, but the way the learner structures and reconstructs the information (Barab and Plucker, 2002). Therefore, one version of learning is about transformations that occur in individuals. It is facilitated by teachers who intentionally provide opportunities for these transformations, rather than merely aiming to transmit information.

Researchers argue that transformational learning is most likely to occur when the intended learning outcomes for an activity are obvious (Biggs, 1999), when students are motivated to achieve (Jacobson and Archodidou, 2000; Vosniadou, Ioannides, and Dimitrakopoulou, 2001), when risk taking is allowed (Freire and Fagundes, 1997), and when interaction and collaboration with others is encouraged (Soller, Goodman, Linton and Gaimari, 1998). It is closely aligned to a deep approach to study, in which learners focus on acquiring a holistic, reconstructed understanding of material, rather than on retention of facts for reproduction in an assessment (Marton and Säljö, 1976).

There are perceived advantages of a deep approach to study, as students are actively involved in constructing knowledge, rather than simply storing it for recall. This is supported by Barab and Plucker (2002; 2004), who discuss how in order to

learn; there is a need to actively reconstruct understanding. With surface approaches, repetition and reproduction are the intention, rather than understanding. This approach has perceived disadvantages for higher levels of learning, as retention does not lead to long term learning, and does not allow the learner to operate at a higher level using, for instance, application of theory and abstract thinking (Spencer, 1999; Brown, Bull, and Pendelbury, 1997). As degree students are working at an educational level in which higher order thinking has to have primacy over an ability to recall and reproduce material, University teachers need to be given opportunities to understand the impact of these teaching and assessment methods on students' approaches to learning, providing them with time to reflect on their current practice and support them further develop their teaching design and practice.

Approaches to learning are not fixed characteristics, but are enhanced or constrained by factors within the teaching and learning situation. To provide a framework for discussing the potential factors that enhance or constrain student intentions, Biggs (1999) proposed the 3P model of the interactions between the learner and the teacher (see Chapter 1). Based on Dunkin and Biddle's (1974) model, Biggs' version works at three points in time: before the learning (presage); during the learning (process); and at the outcome of the learning (product). The presage stage considers the student factors, such as relevant prior knowledge and experience, interest in the topic that they bring into the learning event, motivational orientation, and ability. It also considers the teaching context, which includes teaching methodology, assessment methods, and learning outcomes for the activity. These teaching based factors will interact with student characteristics during the learning-focused activity. Such characteristics include student approaches to learning, motivation, locus of control, and causality and perceptions of competence, which will

interact with contextual factors to affect students' intentions, expectations, and behaviour to determine the outcome of the learning experience (Fazey, 1999).

As the Biggs (1999) model indicates, no two teaching experiences can ever result in the same outcomes, as learning is dependent on a number of factors that vary from situation to situation. Teachers can construct a learning environment that provides the best opportunities for the students to acquire the learning goals. According to Shuell (1986), "If students are to learn desired outcomes in a reasonably effective manner, then the teacher's fundamental task is to get students to engage in learning activities that are likely to result in their achieving those outcomes" (p. 429). However, whilst no two teaching contexts are identical, one aspect of effective teaching must be constant; that is, all elements from learning outcomes to teaching methodology and assessment must be positively aligned with each other, in a manner that fosters a deep approach to learning as an integrated part of a whole system. What is now generally referred to as Biggs' Theory of Constructive Alignment (1996), proposes that student attributes, intentions, and behaviours must be congruent with the characteristics, demands, and intentions of the learning environment, if effective learning is to occur.

Whilst university teachers can see the sense of a constructive alignment between teaching approaches and intended learning outcomes, it appears that much teaching in the university is not constructively aligned with students' higher level expectations, intentions, or their learning needs. For example, Trigwell and Prosser (1996) showed that teachers who predominantly use a teaching style which transmits information, without providing opportunities for students to do much more than rehearse and recall what is given to them, use assessment methods that encourage learners to recognise and recall the "givens," rather than show understanding.

Although this approach is aligned, it does not encourage a deep approach to learning. If students perceive the assessment to require them to reproduce facts, then they will more likely adopt an approach to learning that is surface. However, if an assessment is seen to demand the student demonstrates understanding, then a deep approach to learning is usually selected. For learning in HE, it is this deep approach that is encouraged, as students are expected to be critically thinking, and in doing so operating at the higher order learning levels (Barab and Plucker, 2002; 2004). This means that teachers must adopt techniques that both encourage and provide opportunities for students to apply this approach where the students perceive the benefits of learning. Although it is recognised that there are a variety of approaches and styles of teaching, the important message is to select a methodology appropriate to the learning objectives of each particular learning situation.

Another factor that has a strong influence on students' behaviour is their motivational orientation. Motivation to achieve an outcome determines the relationship between intentions, behaviour, and outcomes. Deci and Ryan (1985) developed a model of motivational orientation based on a continuum of self-determination. This model suggests that individual reasons for acting may be intrinsically and/or extrinsically motivated, with the level at which individuals internalise their behaviour determining their place on the motivation continuum. Intrinsic motivation has been established as being closely associated with a deep approach to study (Fazey, 1999; Henderlong and Lepper, 2002).

Vallerand, Pelletier, Blais, Brière, Sénécal, and Vallières (1992) saw motivation occurring in a hierarchical fashion, with individuals exhibiting global motivational traits that can fluctuate in different contexts and situations. The global level of motivational orientation is a dispositional type of motivation, which although

relatively stable, can vary depending upon the context. For example, a student may be prone to motivation for extrinsic reasons, in that they usually intend to gain good marks rather than learn for interest or excitement. However, in the context of learning about their hobby, they may be motivated by more intrinsic reasons. The most fluctuating level of the hierarchy is the situational level, which can alter from moment to moment. A student who may usually be motivated by, for example, introjected regulation, in that they behave in way that reduces anxiety and guilt, may at times be motivated to get a word of encouragement from their lecturer (external regulation), or have moments of real interest in learning (intrinsic motivation to know).

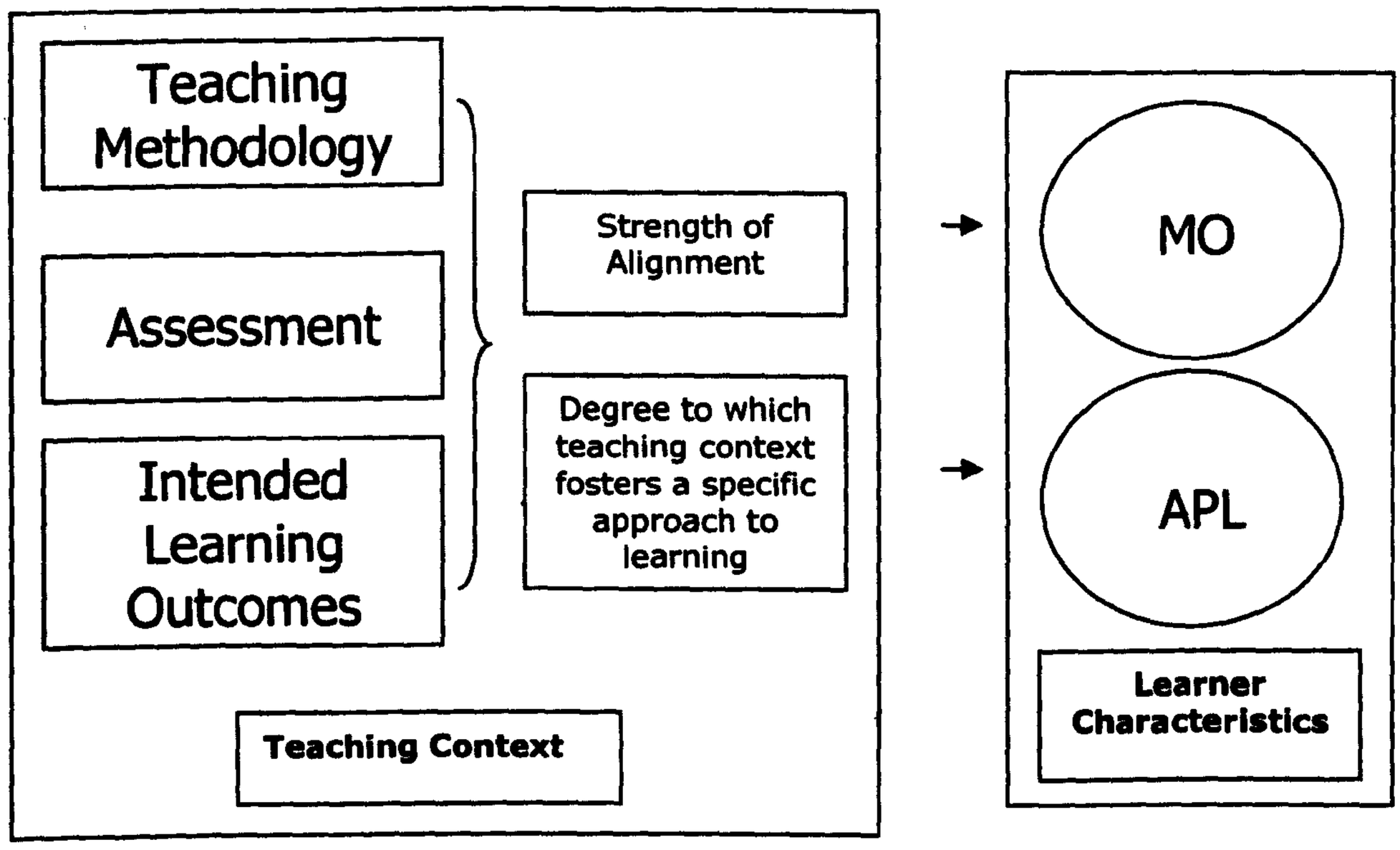
Whilst a student may come to the university with motivation at the intrinsic end of the continuum, dynamic interaction is required between the environment and the individual in order to maintain an intrinsic motivational orientation (Biggs, 1999). This dynamic interaction is rarely achieved, and a progressive reduction of reported intrinsic motivation and deep approach to learning over the course of three years of undergraduate study is a well-recognised phenomenon (Kayle and Fazey, 2006).

Trigwell and Prosser (1999) conducted a study about the impact of approaches to teaching on students' learning. They found that teachers who took a predominantly student-centred approach that focused on conceptual change had students who adopted a deeper approach to learning, whereas those lecturers who used a more information transmission technique that was teacher-focused had students who were more likely to use a surface approach. They also found that those students who adopted a deeper approach were more likely to demonstrate superior learning. The finding that was, perhaps, most important in their study, was that the level of information transmission that a lecturer demonstrated was unimportant if it was accompanied by high levels of conceptual change approaches.

Students' approaches to learning (APL) and motivational orientations (MO) are well-established as characteristics of students that affect learning and are moderated by aspects of the learning context (for instance, the approach to teaching, the assessment process, and the learning outcomes for the module). Figure 1 builds from Biggs' model of constructive alignment, taking the presage elements connected with the teaching context (the teaching methodology, the way students will be assessed, and the intended learning outcomes for the learning), and assessing how strongly aligned these three elements are, as well as how much they foster a deep APL. It then looks at the characteristics of the students in the process stage (MO and APL), and considers whether or not the teaching context is impacting on the learners' motivation and intentions.

The extent to which this alignment in HE is associated with positive or negative aspects of students' APL and MO was investigated in this study. Of interest is the extent to which the learning climate could influence students' APL and MO at a situational level. It is hypothesised that a robust positive alignment between the teaching elements that foster a deep APL would lead to students adopt deeper APL and demonstrate higher levels of intrinsic motivation.

Figure 1: Model of Constructive Alignment Impact on Motivational Orientation (MO) and Approaches to Learning (APL).



Two studies were conducted to investigate these hypotheses. The initial investigation took a snapshot of students' characteristics mid-term in relation to the lecturers' intention and actions. The second study again took measures of the teaching context, but used pre and post measures of students' characteristics in order to analyse changes over time.

5.3 Study 1

This initial study was a descriptive investigation into the relationships between teaching characteristics (that is, approaches to teaching, the strength of the alignment and the teacher's intended learning outcomes for students), and learner characteristics (that is, approaches to learning and motivational orientation) during taught modules in HE.

5.3.1 Hypotheses.

- In strongly aligned modules, students' approaches to study will reflect the teaching approach that is used.
- In strongly aligned modules that foster a deep APL, students' intrinsic motivation will be significantly higher than in those modules that foster a surface approach.

5.3.2 Methodology.

5.3.2.1 Measures.

Motivational orientation - the Academic Motivation Scale (AMS) (Vallerand, Pelletier, Blaise, Briére, Senécal and Valliéres, 1992).

Approaches to learning - the Revised Approaches to Study Inventory (RASI) (Entwistle and Tait, 1994).

Approaches to Teaching – Approaches to Teaching Inventory (ATI) (Trigwell and Prosser, 1996;1999).

Teachers were measured on two scales: information transmission, which describes a teacher-focused strategy in which there is an intention of transmitting information that will be recalled by students; and conceptual change, which describes an approach where students are the focus of the teaching, with the teacher providing an environment in which students can construct and reconstruct their understanding.

5.3.2.2 Participants.

Participants were 240 undergraduates (ages ranging from 18-50 years, mean age = 22.37 and SD=3.68) from a range of levels of study in six different undergraduate degree programmes at the University of Wales Bangor. The sample was selected opportunistically from the degree programmes offered at Bangor at each level.

Table 1: Student participants in the study

Module	**Subject**	**Department**	**Level**	**Number of Participants**
A	Introduction to Physiology	Sports Science	3	27
B	The Art of Writing: Fact and Fiction	English	2	14
C	Cognitive Psychology	Psychology	3	88
D	Introductory Economics	Business	1	77
E	Debussy	Music	2	12
F	Statistics	Psychology	2	22
			Total	***240***

5.3.2.3 Procedure.

Students completed both the AMS and RASI at the midpoint of their module. The level of constructive alignment for each module was assessed using a pilot protocol. This protocol was developed from consideration of the information required to make a judgement about alignment between teaching, assessment, and learning

objectives, in conjunction with accessible methods to obtain this method, so that it was not subjective. The process consisted of triangulating three sources of information, which were:

- Before their teaching session each lecturer completed the ATI. This measured their intentions to transmit information and/or change students' conceptions. Based on these scores, the lecturers were categorised as being normatively high or low in each of the conceptual change and information transmission approaches to teaching.
- Each lecturer was observed by the primary investigator during a one-hour teaching session, using a standardised peer observation process. This record was then analysed by the researcher to categorise the strength of alignment of the various elements of the teaching, and the extent to which a deep approach to learning was being actively encouraged in the students.
- An interview with each lecturer to ascertain their aims within the module and scrutiny of the module validation forms enabled intended learning outcomes, teaching, and assessment methods to be classified.

The information from these three sources was collated, and the researcher classified each module as having high, medium, or low alignment between all the elements of teaching (content, assessment process, teaching style, and encouragement of a deep APL). A second researcher also considered the data and classified each module. Between the two researchers, agreement was reached about the alignment category and the extent to which deep approach was supported in each module.

This decision-making process was based upon the learning objectives set for each module in line with how these assessments were being assessed; for example, did the assessment criteria mirror the learning objectives? The teaching methodology

used to reinforce this learning to help the students achieve these objectives was examined to ascertain if it aligned with the objectives and assessment requirements. It was important that the lecturer's perspective was used alongside the researcher's, to examine whether the practice matched with the intention of the academic.

The second researcher considered the data independently to assign categories for the extent of alignment. The author and second researcher then compared their classifications. Agreement was consistent for all but one of the modules, and the data from this module was reviewed a second time in a collaborative setting, where rationale was provided by each researcher until agreement was found.

5.3.3 Results.

5.3.3.1 Classification of constructive alignment of modules.

The following factors were considered, and classification was based on two dimensions. These were: the degree to which it was felt that the learning outcomes, teaching methodology, and assessment procedure were aligned with each other, and the extent to which these factors fostered a constructively aligned deep APL. Agreement was found between the experimenter and a second neutral educationalist on these classifications at alpha = 0.92, using Cohen's kappa analysis.

Module A – Physiology.

The teaching method for this module was mainly lectures and an occasional practical laboratory session. The students were required to gain an understanding of the physiological factors affecting exercise rehabilitation, and to apply these factors to formulate rehabilitation plans. The method of assessment was an essay to review the literature, and an unseen, formal written examination to test the application of theory. The observed teaching style was seen as information transmission of theory, as the

majority of the lecture was spent giving information to the students using a Powerpoint presentation. There were rarely chances for questions.

On the ATI, the lecturer scored 2.88 for the information transmission category and 2.25 for the conceptual change category. The classification given to this module was: low alignment, fostering some deep APL. The module was delivered in a style that was predominantly traditional lectures. The assignment did ask students to show a deeper level of learning by asking for application of theory, but the lecturer failed to provide opportunities for practice of this application. The approaches to teaching scores reflect that the lecturer was approaching his teaching with a strong inclination towards transmitting information, and this was confirmed by the observation.

Module B – English.

This was delivered through a series of interactive workshops and seminars where students were encouraged to read and discuss a range of written work from a variety of authors. The aim of the module was to create greater familiarity with different genres of writing, in order to be able to produce short pieces of both fiction and non-fiction work. The students were assessed on their portfolio of short pieces that they developed throughout the module, gaining peer and tutor feedback continually.

The lecturer scored 2.75 for information transmission and 4.38 for conceptual change on the ATI. The module was classed as highly aligned fostering a deep approach to learning. All the elements of this module supported each other, allowing plenty of opportunity to practice writing relevant to the assessment. The assessment method required the students to show their understanding of the subject by applying their learning into the compilation of a portfolio of a variety of styles of writing. Continual feedback from peers and the tutor was given on these portfolios. The

approaches to teaching score showed a strong tendency to approach teaching in order to elicit a conceptual change from students. This was confirmed by the observation.

Module C – Psychology.

This module was delivered in a lecture format, which was broken up with student activities to allow the students to apply the theories to which they were being introduced. The outcomes for the module were to identify different memory systems, providing evidence from research methods, to show relationships between the factors, and to apply the knowledge and research methods developed to practical problems. Assessment came in a mid-term multiple choice questionnaire, and then an unseen, final written examination which had some multiple choice questions and three short answer questions.

The ATI revealed that the lecturer scored 2.5 for information transmission and 2.63 for conceptual change. Module C was classified as moderately aligned, with some evidence of fostering a deep approach. This module did ask students to interact with the theory with which they were presented on a regular basis. The assessment method (multiple choice questionnaire – MCQ), although structured to elicit some understanding from the learners, was problematic. The perception of the assessment is a powerful driver of students' approaches to learning (Biggs, 1999), and MCQ examinations are perceived by students to require a surface approach to learning (Gibbs and Simpson, 2004). Therefore, the perceived assessment is not aligned with the teaching and learning outcomes, with students likely to adopt a surface approach to the MCQ assessment. This type of assessment did not allow students to gain detailed feedback about their progress in the module. The lecturer recorded equal amounts of information transmission and conceptual changes scores. Again, this was categorisation that was agreed by the second assessor.

Module D – Economics.

This module was delivered through traditional lectures with an example exercise given to the students at the end of each lecture. This exercise was not assessed, and students did not get an opportunity to gain feedback on their performance of these examples. The aims of the course were to be able to locate relevant information from the library, to be able to complete simple mathematical models, and to show understanding of the theory presented.

The lecturer scored 3.46 for information transmission and 1.94 for conceptual change for their teaching approaches in this module. The module was classified as: very low alignment, in which achievement is possible by adopting a surface approach. The teaching, learning outcomes, and assessment methods were not supportive of each other. The lectures were teacher-focused and only involved information transmission. Chances to practice for the assessment were provided, but these practice examples were not explained, and no feedback was provided. The assessment did ask for some application of theory, but the rest of the module lacked support for this element of the module. The lecturer scored very low on conceptual change and high on information transmission. This was confirmed by the second researcher.

Module E – Music.

A combination of lectures, seminars, practical sessions and student presentations were used to deliver this module. Students were expected to gain an understanding of the composer's (Debussy) work to be able to critically analyse it. They were assessed by completing a written essay as course work, sitting for an end of module test with short answer questions, and giving a seminar presentation.

The lecturer scored 2.75 for information transmission and 4.38 for conceptual change on the ATI. The conclusion of the researcher in categorising this module was

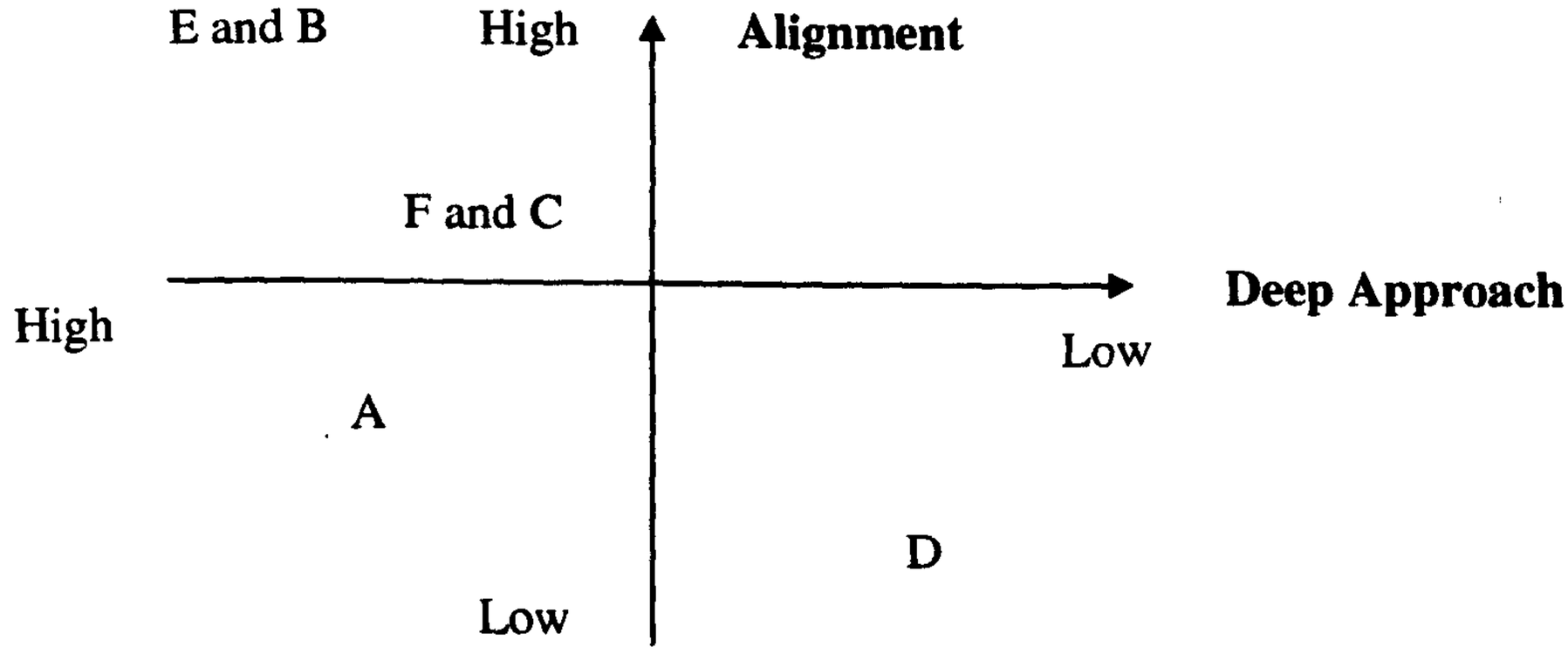
that it was highly aligned, fostering a deep approach to learning. All the elements supported the learner, supplying plenty of chances to practice during the module. The learning outcomes asked for application and analyses of material. Feedback was given regularly through practical sessions. The assessment method using a presentation encouraged the students to demonstrate their understanding. The lecturer for this module scored high on the conceptual change scale of the approaches to teaching inventory. This was confirmed by observation.

Module F – Statistics.

This module introduced students to the theory and application of statistics. The intended learning outcomes were for the students to be able to recognise which statistic should be applied to different research questions, and for them to be able run the statistical tests and analyse the results. The lectures included theory, demonstration of statistical tests, and a limited amount of time for the students to practice each statistical test. The students were assessed by an examination that required them to select the most appropriate test for the research question posed, and to run the test, explaining the findings.

The ATI showed the lecturer scored 2.63 for information transmission and 2.88 for conceptual change. This module was assigned as moderately aligned with some evidence of fostering a deep approach. The lectures were mainly theory-based, with some opportunities to practice theory, but did not provide feedback to the students on their progress. The assessment method did require students to apply information, and therefore show some deep understanding. The scores for the lecture were equal for information transmission and conceptual change.

Figure 2: Module categorisation according to approach and alignment:



A – Physiology (low aligned, mod deep)
B – English (hi aligned, hi deep)
C – Psychology (mod aligned, mod deep)
D – Economics (lo aligned, lo deep)
E – Music (hi aligned, hi deep)
F – Statistics (mod aligned, mod deep)

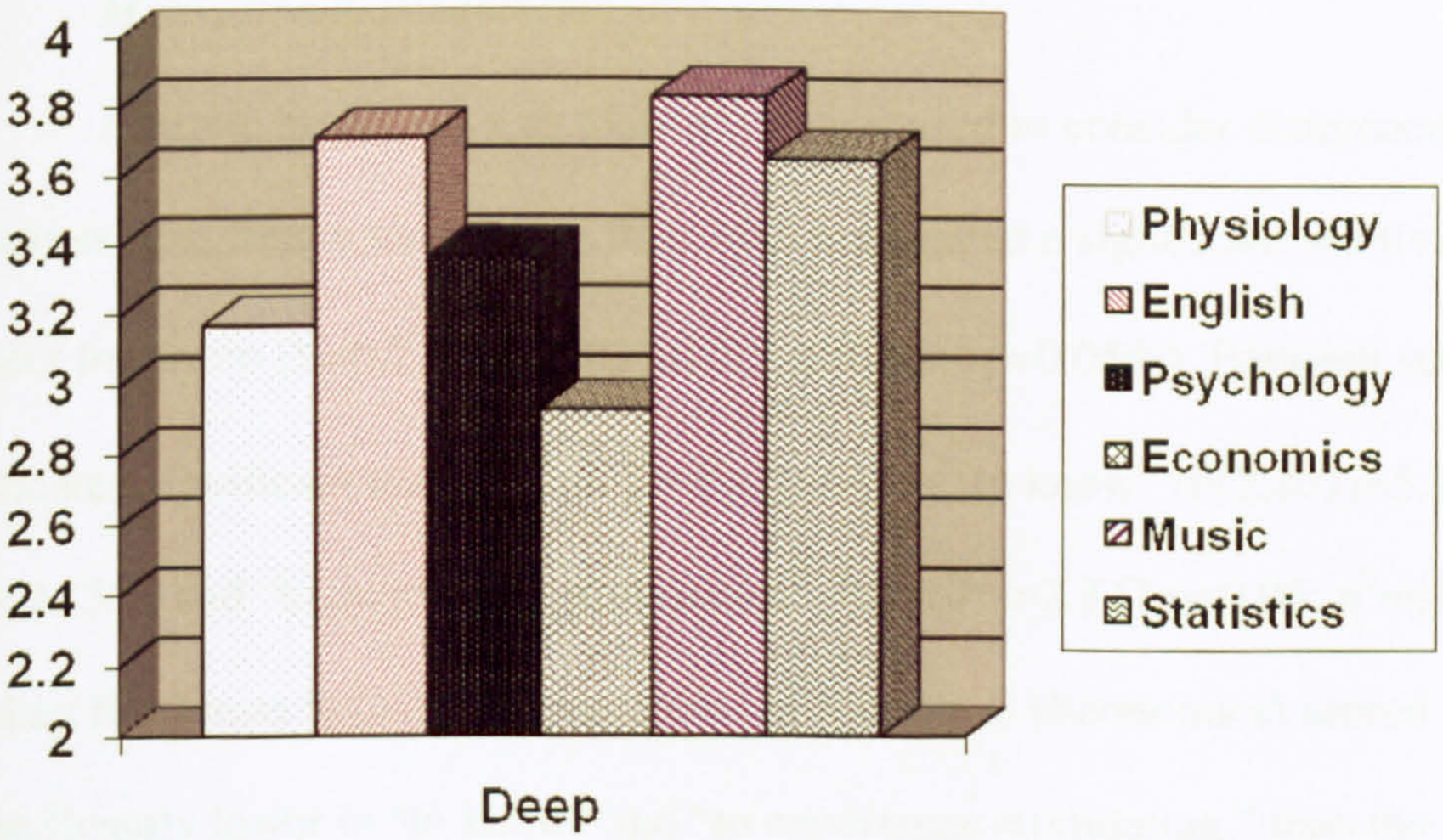
5.3.3.2 Student data.

Analyses of variance were used to investigate differences in approaches to learning and motivational orientation between the six modules examined. Significant differences were found in the student psychological factors between the modules.

Approaches to learning.

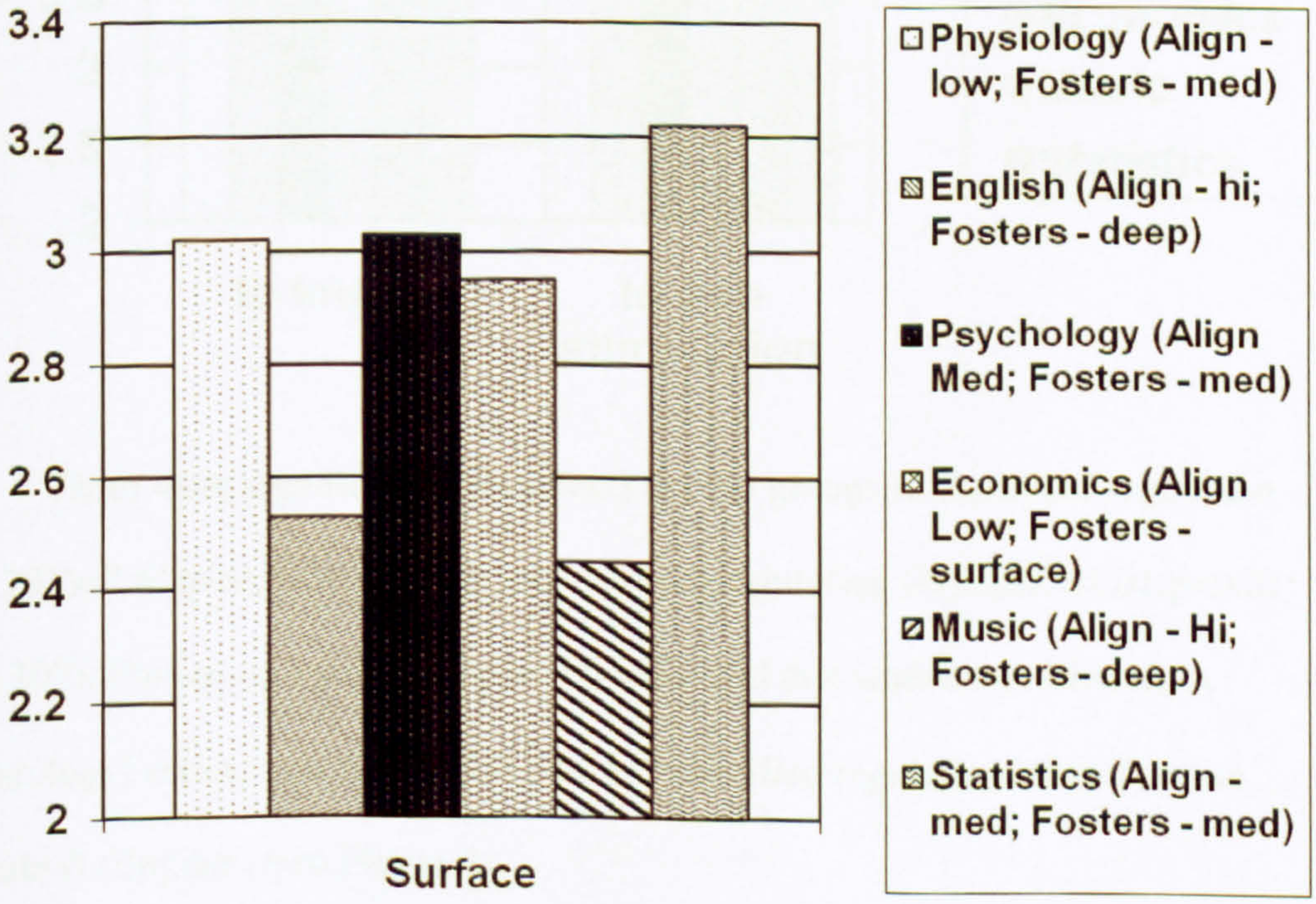
A one-way ANOVA with group as the independent variable, and deep approach to learning as the dependent variable, indicated that there was a significant main effect for group ($F(5, 239)=5.122$:$p<0.01$, $\eta^2=0.144$). A Tukey HSD test showed that the students in Module D (Economics) scored significantly lower in deep approach ($p<0.05$) than students in all the other modules, except Module A (Physiology) ($p>0.05$) (see Figure 4).

Figure 4: Differences in deep approaches to learning between modules



A one-way ANOVA with group as the independent variable, and surface approach to learning as the dependent variable, indicated that there was a significant main effect for group ($F(5,239)=2.33; p<0.05, \eta^2=0.055$), with follow-up tests (Tukey HSD) indicating that the students in Module B (English) and Module E (Music) scored significantly lower than the students in other modules (see Figure5).

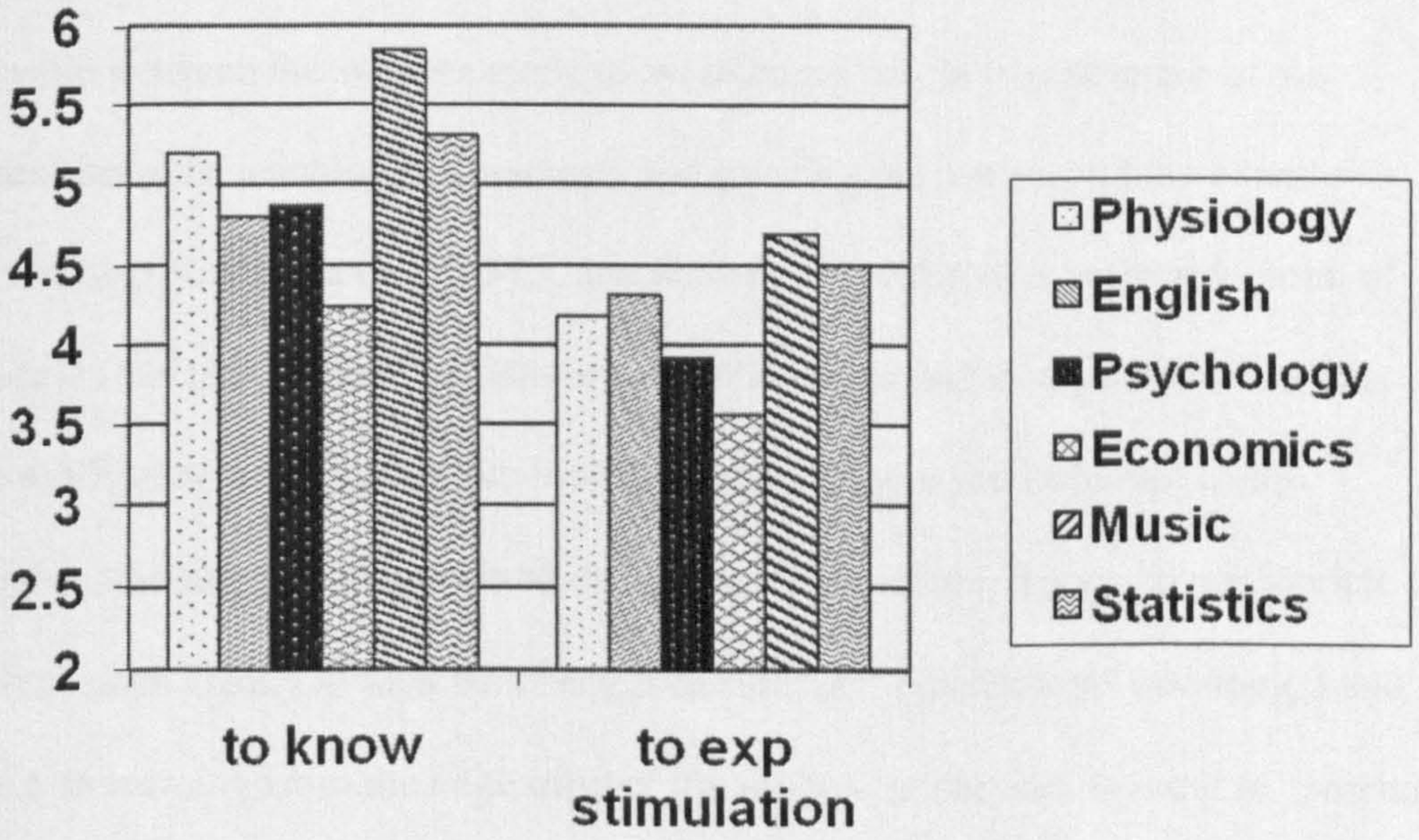
Figure 5: Differences in surface approaches to learning between modules



Motivational orientation.

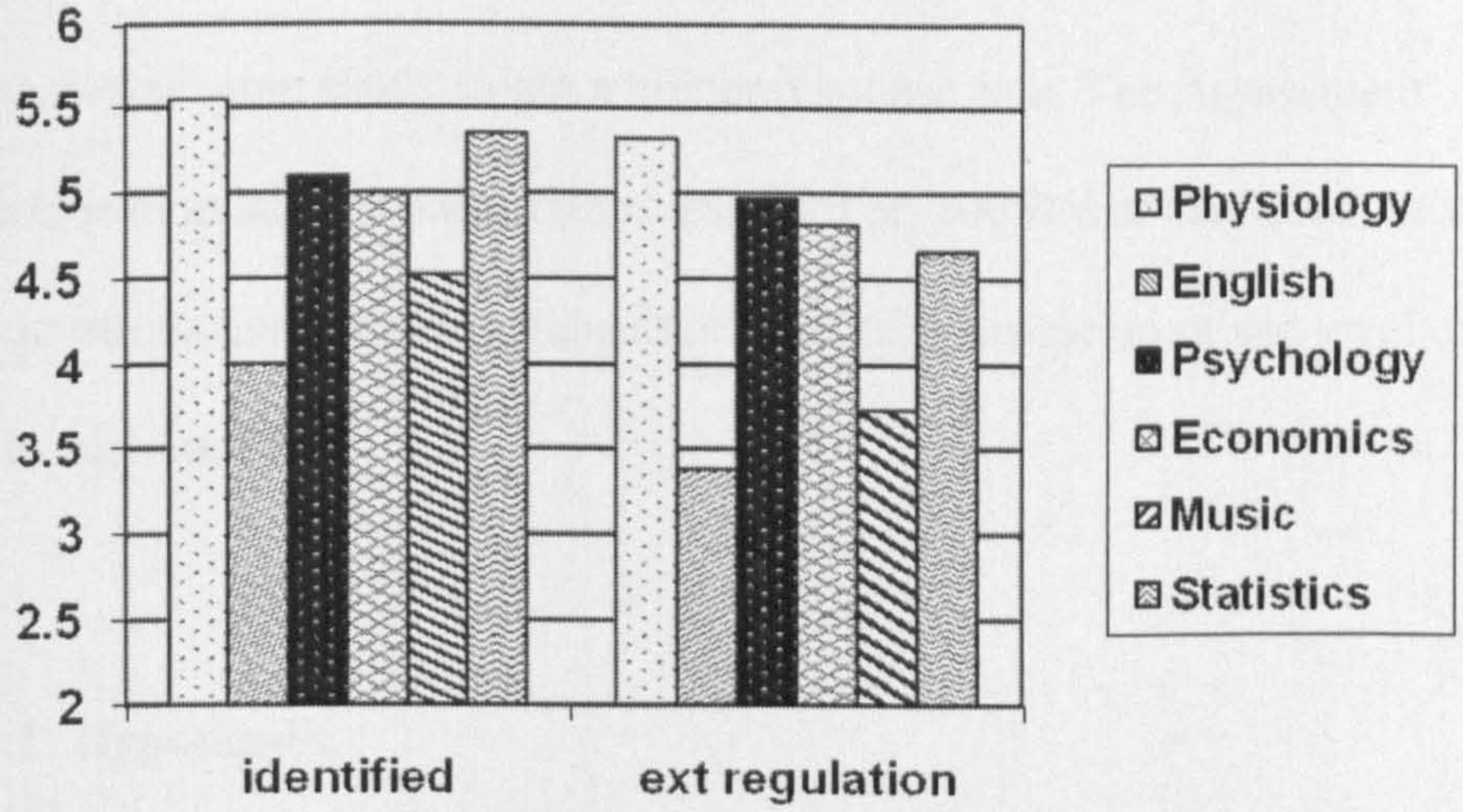
A group by MO (6 x 6) MANOVA was used to consider differences between students on different modules in their MO. It revealed a significant multivariate main effect for group [λ,=0.716(F(6,202)=1.85; $p<0.01$; $\eta^2=0.054$)]. Between subject tests indicated significant main effects for the group in "to know" ($F(5,201)=5.227$;$p<0.01$; $\eta^2=0.135$), and "to experience stimulation" ($F(5,201)=2.337$;$p<0.05$; $\eta^2=0.065$). Tukey HSD tests indicated that students in Module D (Economics) scored significantly lower in "to know" and "to experience stimulation," than the students in Modules E (Music) and F (Statistics) ($p<0.05$) (see Figure 6).

Figure 6: Differences in intrinsic motivation subscales between modules



There were significant main effects for the groups in identified regulation ($F(5,202)=2.61$;$p<0.05$; $\eta^2=0.072$) and external regulation ($F(5,202)=4.01$;$p<0.01$; $\eta^2=0.107$). Follow-up tests (Tukey HSD) indicated that students in Module A (Physiology) scored significantly higher in "identified regulation" than those in Module B (English) (see Figure 7).

Figure 7: Differences in extrinsic motivation between modules



5.3.4 Summary of Study 1.

In this study, differences were found between modules, which indicated a relationship between the way the students were being taught (the strength of the alignment between teaching, assessment, and learning outcomes, and the extent to which teaching fostered a deep APL), and student characteristics at the mid point of the module (their MO and APL). However, it was not possible to state that students were not different at the start of the module and that it was the influence of the teachers' methodologies that affected the students. Therefore, it seemed appropriate to conduct a second study to look for changes in students' motivational orientation and approach to learning from the beginning of the module to the end, in order to ascertain if it was the teaching context that was impacting on the learners.

5.4. Study 2

A second study was conducted, which took both pre and post module measures of students, in order to investigate if there were any changes in student factors over time in relation to the teaching method adopted. It considered the

students' APL using another tool – Approaches and Study Skills Inventory for Students (ASSIST; Entwistle, Tait and McCune, 2000). As this had a reduced number of questions, it was more likely to get a higher response rate. The Assessment Experience Questionnaire (Brown, Gibbs and Glover, 2003) was also used, with additional questions that helped to gauge the students' perception of the level of alignment in each module.

5.4.1. Hypothesis.

- Students in strongly aligned modules that foster understanding will significantly increase deep approach to learning scores and intrinsic motivation from beginning to end of the module.

5.4.2 Methodology.

5.4.2.1 Measures.

Motivational Orientation - The Academic Motivation Scale (AMS) (Vallerand, Pelletier, Blaise, Briére, Senécal and Valliéres, 1992).

See Study 1.

Approaches to Teaching – Approaches to Teaching Inventory (ATI) (Trigwell and Prosser, 1996;1999).

See Study 1.

Approaches and Study Skills Inventory for Students (ASSIST) (Tait, Entwistle and McCune, 2000).

The ASSIST is a quantitative measure of student approaches to study, course and teaching preference, and definitions of learning (Tait, Entwistle and McCune, 2000). The ASSIST contains three sections covering conceptions of learning,

approaches to studying, and preferences for different types of course and teaching. This study used the concepts of a learning section, which consists of six questions, to establish either transformational, reproductive, or application in the students' APL, and an additional eight questions to categorise preference for teaching that promotes understanding or information transmission.

The 'Assessment Experience Questionnaire' (AEQ) (Brown, Gibbs and Glover, 2003).

The "Assessment Experience Questionnaire" (AEQ) was developed to provide quick and easy evidence from students about the extent to which they experience the "eleven conditions" (Gibbs and Simpson, 2004). Questionnaire items were derived from unstructured interviews carried out at Open University science summer schools in 2002, and from the literature. The AEQ contains six scales (each covering more than one "condition"), and each scale contains six statements. Students are asked to indicate the extent to which they agree or disagree with each statement on a three-point Likert scale, with 1 representing "disagree," and 3, "agree."

Two of the scales were used for this study – assignments and learning, and examination and learning. An additional six questions were added to this scale to evaluate the extent to which students perceived the module to be constructively aligned.

5.4.2.2 Participants.

Participants (n=283; age range 18 – 49 years, SD = 4.5 years) were both undergraduates and postgraduates, from a range of levels of study in seven different degree programmes at the University of Wales Bangor. The sample was selected opportunistically from the four degree levels offered at Bangor.

Table 2: Student participants in the study

Module	Subject	Department	Level	Number of Participants
1	Coping Strategies in Education	Education	1	54
2	Sports Identity	Sports Science	2	41
3	Motor Control	Sports Science	1	36
4	Social Work	Social Policy	4	19
5	Basic Programming	Informatics	1	40
6	Sociology	Social Policy	1	23
7	Physiology	Sports Science	1	70
			Total	***283***

5.4.2.3 Procedure.

Students completed the AMS and the ASSIST at the beginning of the module. They also repeated these questionnaires along with the AEQ at the end of the module. The questionnaire data collected was treated with the appropriate statistical analyses using SPSS v12.

The level of constructive alignment for each module was assessed using the protocol described in Study 1. The students' responses to the AEQ were used as additional information to ascertain the level of alignment for each module.

5.4.3 Results.

5.4.3.1 Classification of modules.

Again, all the factors were considered as well as the AEQ scores. Modules were classified based on the two dimensions of the degree to which it was felt that the learning outcomes, teaching methodology, and assessment procedure aligned with each other, and the extent that these factors fostered a deep APL. Agreement was found between the experimenter and a second educationalist on these classifications at alpha = 0.94, using Cohen's kappa analysis.

Module 1 – Education.

This module aimed to explore coping strategies in education from both a student and an educator's point of view. The module was delivered using experiential learning, allowing for practice and variation. The assessment asked students to deliver a teaching session in a small group, followed by a write-up of this teaching design and delivery.

The lecturer scored 2.38 for information transmission and 4.00 for conceptual change. Students scored 3.96 for the constructive elements of the AEQ, with 3.56 for assessment and learning and 3.94 for examination and learning. It was classified as highly aligned, fostering a deep APL, as the module linked the learning outcomes and assessment procedures well, using teaching methodologies to engage the students in the subject as well as providing plenty of opportunity for practice and feedback. The assessment asked for the students to demonstrate their deep understanding by applying the theory into practice.

Module 2 – Individual Differences.

This module examined the psychological factors that affect individual development. The teaching consisted of lectures that prompted students to interact

through questions and answers, small group discussions, as well as small group seminars, examining relevant academic papers on the subject. The assessment was by a pre-seen question under examination conditions. Students were given a lot of opportunity to discuss their answers to this question, gaining feedback from peers and tutors.

The lecturer scored 2.25 for information transmission and 3.63 for conceptual change. A score of 4.08 for the constructive elements of the AEQ was given, with 3.61 for assessment and learning and 3.53 for examination and learning. It was also classified as highly aligned, fostering a deep APL. The students in this module were introduced to the learning outcomes for the course at the beginning of the module, including how they would be assessed. They were continually given chances to practice the assessment and to gain feedback through putting together a portfolio that could be used in the examination. The examination question itself asked students to demonstrate a high order of thinking about the subject.

Module 3 – Motor Control.

This module was based on elements of motor control in sport. The material was delivered in a traditional lecture style, with an unseen, formal written examination at the end of the module.

The lecturer scored 3.64 for information transmission and 4.00 for conceptual change. A score of 3.41 for the constructive elements of the AEQ was given, with 3.42 for assessment and learning and 3.30 for examination and learning.This module showed moderate alignment, but did not predominantly foster a deep approach. It was based on information transmission, and did not allow students time to interact with the material. The assessment procedure required the students to regurgitate the information given, in order to succeed on the exam.

Module 4 – Social Work.

This module was delivered to postgraduate students, to prepare them to take on various aspects of social work. The delivery consisted of some theoretical input, which was then used as the basis for small group discussion and application to real-life situations. Assessment was through students showing their understanding by applying it to case studies.

The lecturer scored 2.25 for information transmission and 3.50 for conceptual change. A score of 3.98 for the constructive elements of the AEQ was given, with 3.71 for assessment and learning and 3.90 for examination and learning.This was classified as highly aligned, fostering a deep APL. The module has a vocational focus too, as it is developing postgraduates for the career of social worker. The course therefore emphasises gaining a deep understanding to be able to apply in practice. The content and the assessment of the learning all concentrate on applying understanding in real-life situations.

Module 5 – Basic Programming.

This module was an introductory module to computer programming. It was lecture-based, and delivered the theory behind programming. The delivery style asked the students to show their understanding in various examples throughout the module. However, these examples were repetitious, and so no variation was provided in practice. The assessment method was by examination using short answer questions.

The lecturer scored 3.13 for information transmission and 2.75 for conceptual change. A score of 3.88 for the constructive elements of the AEQ was given, with 3.53 for assessment and learning and 3.61 for examination and learning. This module was categorised as aligned fostering mainly surface approaches with some examples of deep.

This module did test the students on the learning outcomes specified, and the teaching provided the tools for them to achieve in the assessment. However, the method of assessment allowed students to succeed who repeated information they were given. No practice or feedback was supplied before the assessment.

Module 6 – Child Development.

This module introduced students to the theory of child development in relation to the principles of social work. It was delivered in interactive workshops and was assessed by a group presentation and an essay.

The lecturer scored 3.13 for information transmission and 3.88 for conceptual change. A score of 3.35 for the constructive elements of the AEQ was given, with 3.71 for assessment and learning, and 3.79 for examination and learning.This was classified as moderately aligned fostering a deep APL. Again, this module has a vocational bias to it; therefore, the theoretical material is treated in a manner so that it can be easily applied to real life situations. The students were able to work together to achieve in their assessment, and were given opportunities to get practice and feedback.

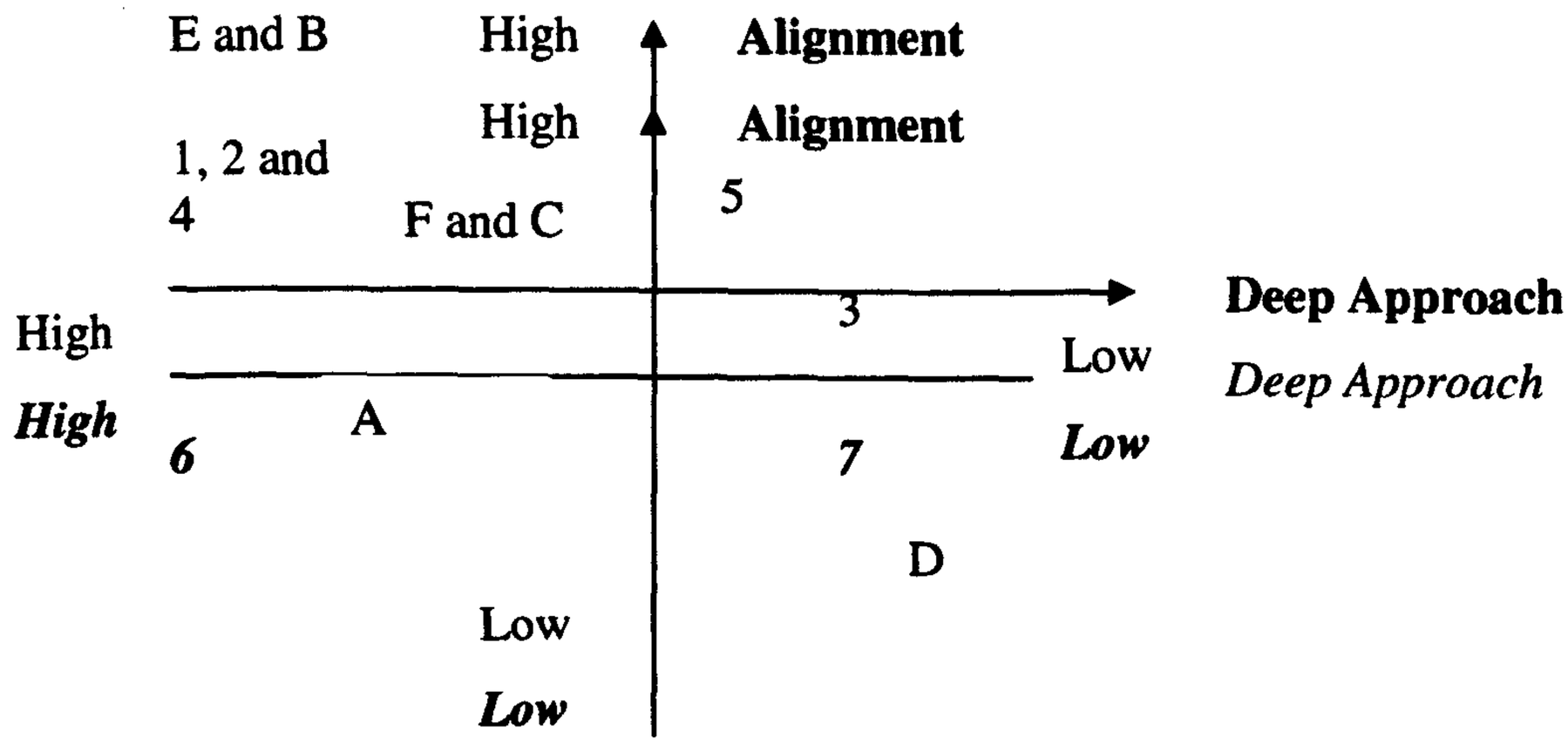
Module 7 – Physiology.

The subject of this module was physiological matters in connection with sports science. It was delivered in a traditional lecture form for one hour per week, and in a laboratory setting for an additional hour. Assessment procedures were an unseen examination at the end of the module and a laboratory report.

The lecturer scored 3.63 for information transmission and 3.25 for conceptual change. A score of 3.49 for the constructive elements of the AEQ was given, with 3.48 for assessment and learning and 3.37 for examination and learning. There was some alignment that did not predominantly foster a deep approach. This module was

heavily loaded with content, allowing some opportunities to interact with parts of the material during laboratory sessions. The assessment was closed book, so students were not able to approach the module in a manner that could guide their learning in order to achieve.

Figure 8: Module categorisation according to approach and alignment:



1 – Education (high aligned, high deep)
2 – Individual Differences (high aligned, high deep)
3 – Motor Control (moderate aligned, low deep)
4 – Social Work (high aligned, high deep)
5 – Basic Programming (high aligned, moderate deep)
6 – Child Development (moderate aligned, high deep)
7 – Physiology (moderate aligned, low deep)

5.4.3.2. Student data.

Analysis of variance was used to investigate differences in APL and MO between the seven modules examined (at both pre and post module times).

Students' approaches to learning.

A Repeated Measures 7x3x2 MANOVA (group by approach by time) was conducted with time as the repeated variable (λ,=0.998($F(154,6)=2.57$; $p<0.01$). No significant effects were found over time for approaches to learning (this was still the case when

you inspect the results from individual modules). A significant multiple main effect for group was found in APL scores (λ,=0.522(F(6,167)=1.76; $p<0.01$; η^2=0.103), with between factor tests revealing that there was a significant main effect for groups in the students' perception of the transform approach to learning data at the beginning of the module (F(275,6)=3.32:$p<0.01$; η^2=0.067). A Tukey HSD test showed that students in Module 6 (Child Development; high aligned, high deep) scored significantly higher in the transform approach than students in Modules 2 (Individual Differences; high aligned, high deep), 5 (Basic Programming; high aligned, moderate deep), and 7 (Physiology; moderate aligned, low deep) ($p<0.01$).

This significant main effect was still present at the end of the module (F(6,197)=2.417; $p<0.05$; η^2=0.052), with the students in Module 6 (Child Development; moderate/high) scoring significantly higher on transform approach than students in Modules 3 (Motor Control; moderate/low),5 (Basic Programming; high/moderate), and 7 (Physiology; moderate/low) ($p<0.05$).

There was a significant main effect for groups categorised by their preference for understanding approach to teaching (F(6,274)=2.613;$p<0.05$; η^2=0.054) at the beginning of the module, with follow-up tests showing that the students in Module 6 (Child Development; moderate/high) scored significantly higher than those in Module 7 (Physiology; moderate/low) ($p<0.05$). This effect was not significant by the end of the modules.

There was a significant main effect for groups in the information approach to teaching data at the beginning of the module (F(6,275)=2.371:$p<0.05$; η^2=0.052). A Tukey HSD test showed that students in Module 4 (Social Work; high/high) scored significantly lower in this approach than those in Module 7 (Physiology; moderate/low) ($p<0.05$).

This significant main effect was still present at the end of the module ($F(6,201)=2.689$; $p<0.01$; $\eta^2=0.174$), with the students in Modules 6 (Child Development; moderate/high) and 4 (Social Work; high/high) scoring lower than those in Modules 2 (Individual Differences; high/high),3 (Motor Control; moderate/low) and 7 (Physiology; moderate/low).

Motivational Orientation

A Repeated Measures MANOVA (group x motivation x time) was conducted with repeated measures on time, using MO as the dependent variable. Although a significant main effect was not found, further analysis took place in order to investigate for changes over time in the individual modules. This post hoc analysis was the result of a belief that the overall effect was masked because the direction of change was different in different modules, cancelling out any overall change. Differences were found from the beginning to the end of the module for some of the elements of MO. Students in Module 2 (Individual Differences; high/high) scored significantly higher in "to experience stimulation," at the end of the module than at the beginning ($F(1,22)= -2.69$; $p<0.05$; $\eta^2=0.108$). Students in Module 3 (Motor Control; moderate/low) had significantly higher amotivation scores at the end of the module than at the beginning ($F(1,19)= -2.83$; $p<0.05$; $\eta^2=0.052$). Module 5 students (Basic Programming; high/moderate) had significantly higher levels of "identified regulation" at the beginning of the module ($F(12,1)= 2.19$; $p<0.05$; $\eta^2=0.067$) than at the end, as did Module 7 students (Physiology; moderate/low) ($F(50,1)= -2.49$; $p<0.05$; $\eta^2=0.104$).

The between factor tests showed there was a significant main effect for group in identified regulation at pre-test ($F(6,272)=2.894$;$p<0.05$; $\eta^2=0.054$). Tukey HSD

tests indicated that students in Module 7 (Physiology; moderate/low) scored significantly lower than did students in Module 4 (Social Work; high/high).

At the end of the module, students in Module 6 (Child Development; moderate/high) scored significantly higher than those in Module 5 (Basic Programming; high/moderate) on identified regulation.

There were significant main effects for group in amotivation ($F(6,273)=2.776; p<0.05; \eta^2=0.166$). Follow-up tests indicated that students in Module 5 (Basic Programming; high/moderate) scored significantly higher than those in Module 6 (Child Development; moderate/high). Significant main effects were also found at the end of the modules, with students in Modules 3 (Motor Control; moderate/low),5 (Basic Programming; high/moderate) ,and 7 (Physiology; moderate/low) scoring significantly higher amotivation than students in all the other modules.

5.5 Discussion

Although some of the findings are equivocal, there is evidence in these studies that teachers' approaches to students' learning have an effect on students' learning approaches, and particularly on their motivation for study. However, the findings are not always clear-cut, and there are some unexpected results that are difficult to explain or interpret.

In the initial study, the observation that the economics module that was categorised as having very low alignment and not having a degree of fostering deep learning showed significantly lower scores for students' deep APL than all the other modules apart from the physiology one, which again was low in alignment and only moderately encouraged a deep approach to learning. This is important, as it supports

Biggs' (1999) idea that constructive alignment is necessary to create optimal learning conditions. However, it is necessary to emphasise that it is not just the alignment, but the emphasis on the construction of knowledge for understanding in the teaching and learning approach that is acknowledged by the teachers and students alike. This finding does emphasise the impact that the teachers' APLL has on students. For educators to develop higher order learning in their students, it is important that they design their teaching to align with the learning objectives and assessments in such a manner that all these elements engage learners in deeper APL.

The modules that were classified as low or moderately aligned, and with a low degree of fostering deep learning (physiology, psychology, economics and statistics), also showed significantly higher levels of surface approach to learning when compared to the other modules in this first study. This shows that the teaching climate impacts the students' learning, and academics must consider this when approaching their teaching design, so that modules are created to avoid fostering a surface approach in students.

The assessment methods may have been the primary factor that influenced students' APL. For example, in psychology where the MCQ was used, students' perceptions of this assessment method were likely to be that they can earn good grades by adopting a remembering and replicative method of working (Scouller, 1998). Even though multiple choice questions can require students to demonstrate deep learning, the majority of students perceive them as only needing surface learning (Gibbs and Simpson, 2004). Biggs (2000) notes, it is the perceived assessment method that has the impact on the student, rather than the actual process. In the physiology and economics modules, students could answer the exam question and essay assignment by reproducing notes given to them in the lecture, or by replicating

examples they had been given. These modules demonstrate that the assessment approach did not encourage students to adopt a deep approach in order to succeed, but rather allowed them to adopt a surface approach in order to succeed. This was reflected in their scores in the approaches to study inventory. This once again enforces the findings of the first study in this thesis, that assessment methods influence students' learning behaviour.

A similar pattern of findings was also shown through the MO data. In the economics module, significantly lower scores in the "to know" and "to experience motivation" subcomponents of intrinsic motivation were recorded than in the more aligned modules that expected an understanding and application of the material (e.g. music). The difference with music was expected, as this module was assessed using application of their learning, which is a higher level of learning, and encouraged higher intrinsic motivation. The fact that the statistics module students scored significantly higher than those on the economics module may be due to the fact that the module assessment for statistics allowed students to apply their knowledge. Again, this was an assessment that required students to demonstrate higher levels of learning (Marton, D'alba and Beatty, 1993), and therefore it is likely that students felt some control and stimulation from achieving in this type of module. Students that are asked to show these higher levels of learning in their assessment are more prone to be intrinsically motivated, which is a state that is seen as an ideal, as it leads to more autonomous students. Therefore, teachers in HE need to ensure that their assessments are set in a way that means that students can only achieve if they demonstrate these higher order skills, so that intrinsic motivation is more likely to be adopted.

The first study was conducted as a mid-module view of characteristics of the teachers and learners; therefore it did not provide pre and post module data. This was

a weakness in the design. This was corrected in the second study, in which student data was collected before and after the module, measuring changes in students' APL and MO in the differently categorised modules.

At the beginning of the module, those students taking the undergraduate social work module in Child Development scored significantly higher on the deeper APL than those taking individual differences, basic programming, and physiology. Although these differences were less pronounced by the end of the module, they were still present between Modules 6 (Child Development), 5 (basic programming), and 7 (physiology). It can be easily understood why those students undergoing a course that leads to a possible vocational career (social work) should begin the course with an approach to transforming their learning. Whilst students on this module still scored significantly higher at the end of the module when compared to those studying Physiology and Basic Programming (both classified as moderately aligned, but not fostering a deep APL) ,they did not score significantly higher than the students studying Individual Differences (high/high). This suggests that the students from the Physiology and Basic Programming modules had not approached their learning in a deeper manner as a result of their experience, whilst the students in the individual differences module had changed, and were no longer significantly different from the Child Development module students at the end of teaching. There was no significant change over time for students in Module 2 (individual differences) in transforming learning approaches, but their scores for transforming learning increased over the module. Therefore, even though it was not powerful enough to cause a significant change, the style of teaching did encourage the students to approach their learning in a deeper manner. These results were not as conclusive as the author had envisaged, but it was encouraging that the trends were in the predicted direction. Again, referring

back to Newstead's (1998) work that students' deep APL are prone to decline over the course of a module, finding a teaching approach that maintains students' deep approach is important. This reinforces that as well as designing assessments to maintain deep APL, it is also important to align these assessments with the learning objectives and teaching methodology, so that all the elements foster this deep approach.

Similar findings were found for the information category of the revised approaches to study inventory. Again, the Child Development module along with the post-graduate Social Work module scored significantly lower on information approaches than other modules (Physiology at the beginning; and Individual Differences, Motor Control and Physiology at the end of the modules). The assessment methods for the Social Work module were based on application of understanding in relation to vocational practice, and so it is understandable that these students rated the information scale low. The other three modules varied in the amount of alignment and the extent to which they promoted a deep APL. The two that were taught in a manner that fostered less deep learning (Physiology and Motor Control) assessed their students in a way that required a lot of memorising of facts. The remaining module (Individual Differences) did not ask students to reproduce a lot of facts, but it did require them to demonstrate understanding of a very broad range of theories. These students may have scored highly on the information element, as they felt overwhelmed by the vast amount of material within the module. This once again must act as a warning for staff when designing learning. Academic developers often warn of the dangers of incorporating too much content into modules, and this data shows the effect this high loading of material had in a subject on students' APL.

The only difference in the understanding classification of the RASI was between the Child Development module, and Physiology at the beginning of the module. Again, this may be due to perceptions that the students have of their subject matter, with those from the vocationally-oriented course believing understanding to be of importance in their learning, with the Physiology perceiving that other factors, such as the gaining and memorising information, were more important to achieve.

When changes were measured between the beginning and the end of the modules, no overall significant differences over time were found. However, if one looks at the trends of movement in the modules, it is evident to see that the two social work modules score lower on all scales by the end of the modules. This phenomenon is likely to be due to the model of awareness (Raiman, 1975), whereby the students over-estimated their commitment to learn at the start of the module, and had a more realistic perception of their learning by the end of the module. The other changes across time in the modules varied in terms of size and direction, but in general the modules classified as aligned and encouraging a constructive, deep approach recorded increases in the transform approach. This is of concern to teachers, as it was envisaged by this study, that these higher aligned modules that fostered a deep approach would develop students' intrinsic motivation and deep APL. This is the conscious/competent stage of Raiman's Model of Awareness (1975). This means that they have become aware of the expectations and standards required in their subject, and in light of this more realistic perception, re-assess their competence levels. This realignment of competence affects APL (Fazey and Lawson, 2000). This is a common occurrence in all learning situations, and is a stage of which teaching staff have to be aware. Structuring learning to help students to understand the criteria and standards required in their learning is vital for students to maintain a realistic perception of their

achievements (O'Donavon, Price and Rust, 2008). This is achieved by making assessments and objectives transparent to students, by providing easily understood feedback that relates to the objectives, and by promoting self-awareness in students (Boud, 1995).

When MO was examined, it was again the Child Development module that was significantly different from Physiology at the beginning if the module, and from Basic Programming at the end in the subcategory of identified regulation. This related to the attitude that these student have in general to their subject, seeing a value in their learning because they are going to be expected to apply it in a real-life situation as part of a vocation. Physiology and Basic Programming were not seen in this light by their students, who were not able to see the importance of their learning. This may be because they were not taught in a manner that encouraged higher order thinking or they were not examined a way that made the learning meaningful.

When amotivation was considered, Basic Programming scored higher than Child Development at the beginning of the module, and Basic Programming, Motor Control, and Physiology were all significantly higher at the end of the module than all the other modules. These three modules (Physiology, Motor Control, and Basic Programming), were all classified as low in alignment and not encouraging a deep APL. It is of interest that these students scored higher than other students in the amotivation scale, indicating that teaching that does not challenge the learners does not motivate students to engage in learning. This is another strong message to academics to design their teaching to encourage a deep approach in an aligned manner to keep their students motivated.

The last analyses looked at differences over time for MO for each of the modules. Basic Programming and Physiology decreased in their levels of identified

regulation over the course of the module, which means that the students were less able to personally value the subject by the end of their learning experience. This is a concern, and could be explained by the method of teaching, that perhaps did not encourage an understanding of the value of the learning. This is a similar situation to the increase in amotivation found in the Motor Control module, which again was lacking in alignment and did not foster a deep learning approach. The individual differences module increased in the intrinsic factor "to experience stimulation" over time. This was encouraging to see that students were getting a 'buzz" out of their learning. The module was very challenging for the students, but even though they appeared to feel there was a vast amount of material to grasp, they were getting a sense of satisfaction from attempting the challenge. The fact that the students in the Social Work modules that were more highly aligned and fostered a deep APL had higher intrinsic motivation levels at the beginning may be the reason that there were no significant changes over time, to the result of a ceiling effect, as these students were already scoring high on the AMS, they did not increase these scores as a result of the module. The differences in these results show that motivation is influenced by the learning climate, and it is important to create a climate that will encourage intrinsic motivation, in order to promote more independent lifelong learners.

These findings are important to educators, as they emphasise both the importance of close alignment between aspects of teaching and the encouragement of deep APL. A teaching methodology that allows students to practice the objectives set out in the module in a variety of ways, with an assessment method that requires students to demonstrate their understanding of these learning outcomes, is necessary to foster a deep APL and high motivation. The assessment method within this aligned teaching method appears to be a driving force behind this impact on the students.

The author recognises that again, these studies have design weaknesses. The first study data collection was timed so that only mid-term results were collated. This meant that although an interesting snapshot view was supplied, in order to run initial data analysis, it was difficult to make any causal links from this data. This problem was rectified in the second study, where a pre and post data collection was conducted.

The second main criticism that could be mentioned is the protocol used to categorise the teaching format into alignment and level of deep approach groups. Even though this protocol used a variety of data to triangulate findings, and protected against subjectivity by gaining perspectives from the author, a second researcher and lecturer, and in the second study, the students, there was still room for a biased rating within the methodology. This could have been alleviated if the categorisation was conducted blind, by researchers who were not aware of the hypotheses of the studies.

5.6 Concluding Remarks

The results from this study are worthy of note by teachers in HE, but they are only the first step in arguing for change in HE practice. Whilst the statistically-based evidence remains tenuous, when combining results like the ones reported here with the understanding expressed by expert teachers in the classrooms of our universities (Fazey, Fazey and Fazey, 2005), it is certain that the way teachers approach their teaching influences the learning outcome (Kember and Gow, 1994; Trigwell et al. 1999). This study is complimentary to these previous works as it shows the impact of teachers approaches to teaching and students' learning behaviour. Clarifying what is understood by expert teachers, and the dispositions that expert teachers possess is still a methodological challenge. The approach adopted by teachers is dependent on their beliefs and assumptions – not only about learning and teaching but, perhaps more

fundamentally, about what constitutes "knowing" in a particular subject domain.(Bain, 2000; Quinlan, 1999).

In order to change how people teach, the way they conceive teaching and learning must be changed (Trigwell, 1995; Trigwell and Prosser, 1996). Further demonstrations of the powerful links between teachers' orientations to student learning, their own teaching approaches, and their underlying beliefs about learning and teaching are needed for beginning professionals. Initial programmes of training for academic staff new to teaching in HE should provide such theoretical and research evidence to their students. Programmes that provide an academic basis for beginning teachers that allows them to test for themselves the efficacy of their own teaching are an effective way to develop an understanding for a long-term impact on an individual's teaching. As Williams and Burden (1997) said,

> Teachers' beliefs about what learning is will affect everything they do in the classroom, whether these beliefs are implicit or explicit. Even if a teacher acts spontaneously, or from habit without thinking about the action, such actions are nevertheless prompted by a deep-rooted belief that may never have been articulated or made explicit. (p.56)

The last study in this thesis moved into the academic development domain. The previous three studies had found that assessment had an impact on learning, that the factors that students come into a classroom can affect their approaches to study and motivation, and that the teachers' approaches to teaching impact on students' learning. The author therefore wanted to examine how these findings along with other current pedagogical underpinnings of teaching and learning in higher education could be introduced and developed in academics beliefs and practice around their teaching.

Chapter 6

The impact of a teaching in HE training scheme on teachers' belief systems, their approaches to teaching, and students' personal epistemologies

6.1. Introduction

Bain (2000) and Quinlan (1999) have recognised that the approach that teachers take to their teaching is derived from their personal beliefs about the subject and their personal philosophy of teaching and learning. These epistemological beliefs exert a strong influence on teachers' chosen methods of teaching (Breen, 1999), their values, and the emphasis placed on curriculum and assessment issues (Braxton, Vesper and Hossler, 1995; Smart and Ethington, 1995). Williams and Burden (1997) said, "Teachers' beliefs about what learning is will affect everything they do in the classroom, whether these beliefs are implicit or explicit" (p.56).

Trigwell and Prosser (1996) extensively researched approaches to teaching, and found that teaching can be categorised as "information transmission," which is predominantly teacher-focused, or "conceptual change," which tends to be student-focused. Kember (1997) and Trigwell et al. (1999) have found that the way that teachers approach their teaching influences the learning outcomes of the students, with the approach adopted by the teacher dependent on their beliefs

Footnote:
This chapter is an adaptation of a previously published paper:
Lawson, R.J, Fazey, J.A. and Clancy, D.M. (2007). The Impact of a Teaching in Higher Education Scheme on New Lecturers Personal Epistemologies and Approaches to Teaching. *In C.Rust. Improving Student Learning through Teaching.* Oxford Centre for Staff Development.

and presumptions (Bain, 2000; Quinlan, 1999). They found that those teachers who adopt a conceptual change/student-focused approach have students who usually approach their learning in a deeper manner than those who are taught by teachers with an information transmission/teacher-focused approach. To encourage the adoption of an approach that is predominantly conceptual change and student-focused, academic developers must consider how to change the way in which lecturers conceive teaching and learning (Trigwell, 1995; Trigwell and Prosser, 1996).

Therefore, there is a need to provide development training for academic staff so that they can be aware of the impact of their teaching approach on students' learning, and develop techniques to teach in the most effective manner. Courses to do this have been developed across the UK. Gibbs et al. (2004) conducted research into the effects of these types of courses on student learning. They demonstrated that where teachers had participated in a systematic scheme of training into effective teaching and learning, students reported better learning experiences and outcomes than those who were taught by teachers that had undergone any formal teacher training.

The University of Wales Bangor has a scheme that recognizes the importance of teachers' beliefs on student learning, and seeks to develop teachers' conceptual understanding of teaching and learning. It aims to introduce participants to theories and models of learning and effective teaching methods, whilst at the same time examining how this knowledge is transferred to a teaching context. The scheme is delivered using discussions of personal beliefs, in conjunction with current understanding of teaching and learning in HE. The research question that this paper examines asks what is changing in both the attitudes and practices of the teachers who

attend the University of Wales Bangor scheme, and discusses the impact it has on the students.

6.2 Literature Review

6.2.1 Personal epistemology.

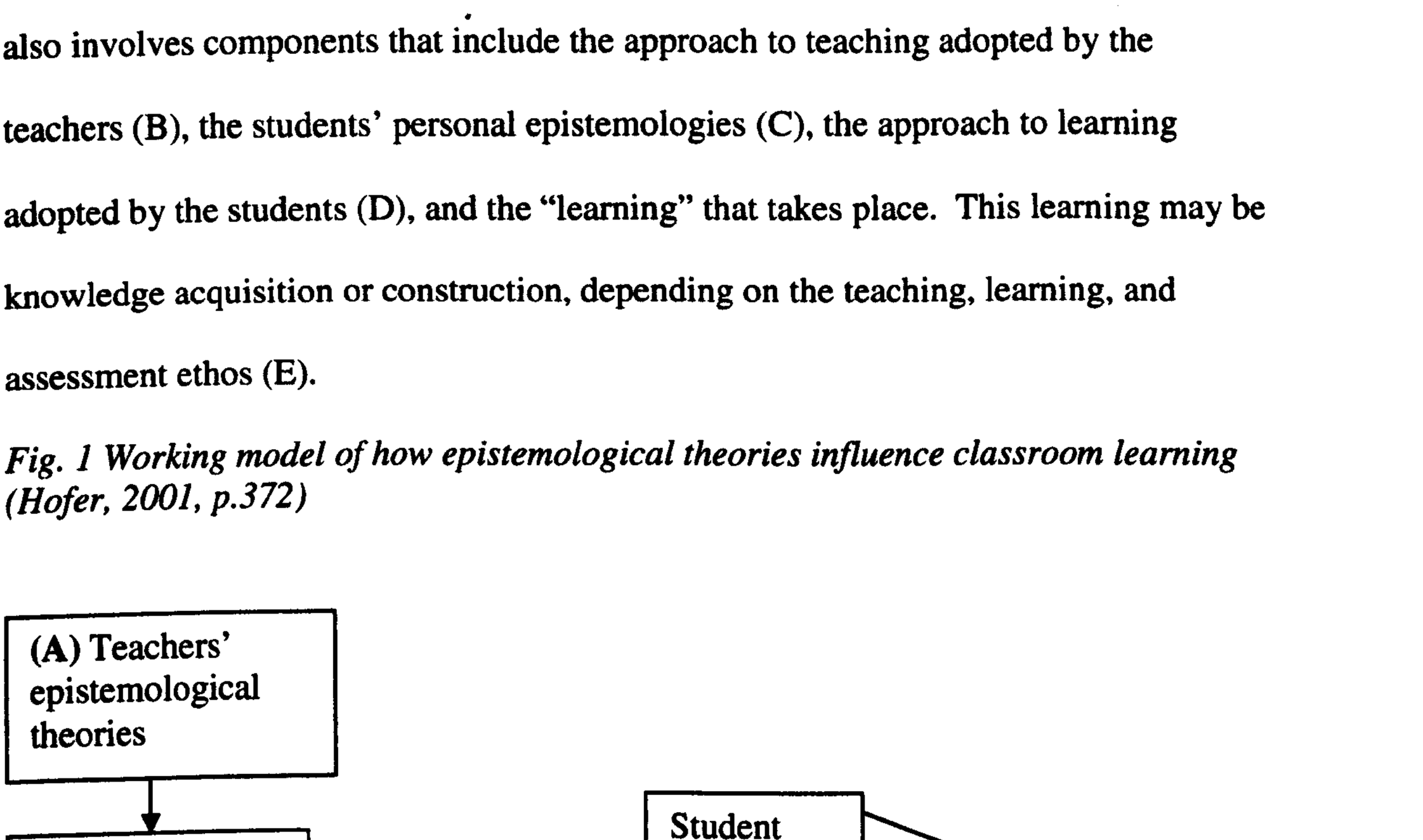
Hofer and Pintrich (2004) stated that personal epistemology describes individuals' beliefs "...about how knowing occurs, what counts as knowledge and where it resides, and how knowledge is constructed and evaluated" (p.1). Hofer (2000) described how four dimensions of personal epistemology characterise much of the research:

- Certainty of knowledge describes the degree to which one sees knowledge as fixed or more fluid. From a developmental view, an individual at a lower level believes absolute truth exists, and at a higher level, knowledge is seen as tentative and evolving.
- Attainment of knowledge is characterised as an accumulation of facts or a number of highly interrelated concepts (Schommer, 1990; 1994).
- Source of knowledge is situated outside the self, and is available from an external party. Within the scale, a certain threshold occurs where the learner possesses self-awareness that it is they who construct knowledge in interaction with others (Hofer, 2000).
- Justification for knowing subsumes an individual's ability to evaluate knowledge claims. This manifests itself in the ways in which they use evidence and make use of authority and expertise.

6.2.2 Personal epistemology and approaches to teaching.

Recently (e.g. White, 2000), the question of how teachers' personal epistemology affects the teaching and learning process has been addressed. However, the majority of the studies into this question have focused on trainee school teachers (Brownlee, Purdee and Boulton-Lewis, 2003; Schraw and Olafson, 2002; White, 2000), rather than examining teacher and student epistemologies in a HE setting. A model has been proposed for HE (Hofer, 2001) that begins with the teachers' perspectives (A) and culminates in the students' learning outcomes (E). The process also involves components that include the approach to teaching adopted by the teachers (B), the students' personal epistemologies (C), the approach to learning adopted by the students (D), and the "learning" that takes place. This learning may be knowledge acquisition or construction, depending on the teaching, learning, and assessment ethos (E).

Fig. 1 Working model of how epistemological theories influence classroom learning (Hofer, 2001, p.372)



Research by Williams and Burden (1997) proposed that teacher beliefs influence everything they do in the classroom, whether acting spontaneously or from habit without thought to their actions. It has demonstrated that teachers in HE have a variety of conceptions about teaching and learning that are influenced by their personal epistemologies. These conceptions about teaching range from teaching as transmitting concepts of the syllabus, to teaching as helping students change conceptions. Teachers' conceptions about learning have also been found to differ, ranging from learning as accumulating more information to satisfy external demands, to learning as conceptual change to satisfy internal demands (Prosser and Trigwell, 1999; Fang, 1996; Kember, 1997). As was discussed in Chapter 5, Trigwell et al. (2004) described these different approaches to teaching as teacher-focus with an intent on covering material (information transmission), and student-focus with the emphasis on changing students' understanding of concepts. These different approaches have an impact on the students, with academics who adopt a conceptual change approach fostering a deeper approach in their students, who in turn show higher levels of learning (Trigwell et al., 1999). It is important to emphasise that these two approaches are not on a continuum but are orthogonal. Therefore it is possible to score highly in both approaches. It is the conceptual change approach factor independent on the level of the information transmission approach that significantly impacts on students' approaches to learning and so is to be encouraged in lecturers' teaching practices.

Martin et al. (2000) have argued "...that the critical issue is not how much teachers know or what their level of teaching skill is, but what it is they intend their student to know and how they see teaching helping them to know" (p.387). Brown and Duguid (2002), amongst others, have also argued that teachers' actions are

strongly influenced by their beliefs and values. These beliefs about the nature of knowledge and conceptions of learning influence students' approaches to learning (Biggs, 1999; Fuller, 1999; Marton, Dall' Alba and Beaty, 1993; Meyer and Boulton-Lewis, 1999; Schommer, 1993). with possible consequences for the nature of learning that results (Kember, 1997; Trigwell et al. 1999). For example, a teacher who believes that learning is about attainment of knowledge is likely to teach in an information transmission manner that promotes accumulation of facts. He or she will then test this learning by assessing the amount of information that the student possesses. A student who is taught and assessed in such a manner is more likely to adopt a surface approach to their studies. This is because achievement in this subject focuses onwhat they can remember and reproduce, rather than understand. However, a teacher who believes learning in their subject is about being able tojustify given knowledgeg they are more likely toteach in with a conceptual change approach, this approach then encourages students to develop their understanding of the subject and to challenge material they are presented with, in order to confirm this understanding. This teaching would be assessed by asking students to discuss concepts and to provide evidence for these concepts. Students in this learning environment are more prone to adopt a deep approach to learning.

Campbell et al. (2001) and Eley (1992) found that the approach to learning adopted by students depended on the conceptions they had of the module, and what they perceived as the requirements for that subject. Similar findings were also evident in Kember's (2001) work, which reported a relationship between how students conceived teaching and learning, and the extent to which these perceptions were consistent with their epistemological beliefs. Furthermore, Buehl et al. (2002) argued"...what is taught and how it is taught could significantly affect students'

beliefs about knowledge" (p.419) (see also Hofer, 2000; Stodolsky, Salk and Glaessner 1991).

6.2.3 The impact of teacher training schemes.

Training of university teachers is now established in all United Kingdom and many international institutions. These courses have gained increasing credibility and receive considerably more support than in previous years, with courses often mandated as compulsory (Gibbs and Coffey, 2004).

Gibbs and Coffey (2000) conducted a study, whereby they interviewed trainers to identify the training goals in the programmes. Three main goals were evident:

- the improvement of teachers' skills;
- the development of teachers' conceptions of teaching and learning;
- consequent changes in student learning.

These three prominent goals have been used to begin to analyse the effectiveness of university teachers training courses. Ho et al. (2001) initially looked at the impact of approaches to teaching on students' approach to learning and their learning outcomes. Then, they expanded this work to examine what was impacting on approaches to teaching. They were able to demonstrate a chain of influence from the training scheme to the teachers' approach to teaching, and then to the students' approaches and outcomes. Similarly, Gibbs and Coffey (2004) also investigated the impact of training programmes on university teachers. They found that training can increase the amount of student-focused/conceptual change approach to teaching, which in turn impacts students' learning, and causes a significant reduction in surface approach to learning. Gibbs and Coffey also found that as a consequence of the effect

of training courses on teaching approaches, students rated these teachers as better teachers, and perceived that their learning had improved.

6.2.4 University of Wales Bangor teaching in HE training scheme.

The teaching in HE (*tHE Scheme)* aims to foster inspirational teaching of particular knowledge domains, whilst establishing the habit of informed, purposeful reflective practice. The *tHE Scheme* provides a model of student-centred learning informed by theory, practice, and empirical evidence. Its purpose is to provide a framework for newly-appointed staff to follow and experience, to strengthen the understanding of the processes involved in teaching and learning in HE. The curriculum has to stimulate and support the changes necessary for participants to achieve their potential as teachers at an appropriate level of development. Fitness for purpose is achieved by building on the intellectual curiosity of newly-appointed members of academic staff, who are encouraged to use their hard won academic expertise in pursuing questions relevant to improving the teaching of their subject. The central principles are drawn from a broadly constructivist view of learning, which sees understanding as an outcome of the variations experienced by learners in questioning their personal relationships with the world. Coherence in the programme is achieved by "playing out" the application of the theoretical principles in a wide range of varied learning activities, within which individual reflective practice is encouraged in collaborative settings. Teaching and assessment methods are chosen to exemplify practices that predictably create transforming experiences for learners and stress the relationships between aspects of teaching and learning (Wideen, Mayer-Smith and Moon, 1998).

The intended learning outcomes of the *tHE Scheme* remain congruent with those developed over the past 15 years by the Staff and Educational Development

Association (SEDA) and adapted by the Higher Education Academy. They are contextualised by the work-based learning approach, which emphasises the relevance of the content and process in a particular context. The *tHE scheme* was first developed at Bangor University, but has since been expanded to a collaboration of Welsh HE Institutions (Aberystwyth, Swansea, Cardiff Institute, and Lampeter), who work together to continually develop the programme.

Therefore, one can hypothesise that effective training courses aiming to change teachers' approaches to teaching that are more student-focused will improve the student learning process. The aim of this chapter was initially (Study 1) to look for changes in approaches to teaching and personal epistemologies as a result of new lecturers attending the tHE induction course. A second study then followed a group of staff, to investigate whether their approaches to teaching and personal epistemologies impacted upon their students' approaches to learning and personal epistemologies.

6.3 Study 1 – The Impact of the tHE Scheme on Teachers' Approaches to Teaching and Personal Epistemologies

6.3.1 Hypotheses.

- Student focus/conceptual change approaches to teaching scores will be significantly higher at the end of the induction course than at the beginning of the course.
- "Justification of knowledge" will be scored significantly higher at the end of the induction course than at the beginning of the course.

6.3.2. Methodology.

Measures.

6.3.2.1 Personal epistemologies - Discipline-Focused Epistemological Beliefs Questionnaire (DEBQ) (Hofer, 2000 .

The DEBQ (Hofer, 2000) contains 27 items which are rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). These 27 items cover four factors or dimensions – Certainty of Knowledge, Justification for Knowing, Source of Knowledge, and Attainment of Truth (see Chapter 2 for further detail).

6.3.2.2 Approaches to teaching – Approaches to Teaching Inventory 22 (ATI 22) (Trigwell and Prosser, 2005).

The Approaches to Teaching Inventory (ATI 22) is a quantitative measure of a teachers' approach to teaching, based on Trigwell and Prosser's (1996) original 16-item ATI. It contains two subscales – Information Transmission/Teacher Focused (ITTF) and Conceptual Change/Student Focused (CCSF).

Participants

Early career lecturers (n=143) from five Welsh HE institutions completed the DEBQ and ATI (22) questionnaires at the beginning of the three-day tHE induction programme based on the University of Wales Bangor model. By the end of the induction, course data was collected from 84 of these lecturers. Participants were from a range of subject areas, with teaching experience ranging from zero to four years.

Procedure

The scheme begins with a three-day induction course, during which constant opportunities are given for examining personal epistemologies about teaching and learning, as well as chances for practice and variation of teaching. Examples of these opportunities to discuss personal beliefs include examining the participants' initial

beliefs of teaching and learning in HE in their subject area through pre-prepared learning statements, followed by group discussion using these learning statements as cues. Participants further explore their beliefs about teaching and learning through the presentation of a short piece about a learning episode. This presentation includes their personal analysis about both the effectiveness and reasons for the effectiveness of this session. These beliefs are again discussed in a group setting.

Participants on the tHE Scheme consented to complete the ATI 22 and the DEBQ on arrival at the three day induction and then again at the end of the third day of the initial course, in relation to one module that they were preparing to teach in the next semester. Data collected was treated using SPSS v12.

6.3.3 Results.

6.3.3.1 Descriptives.

The skewness and kurtosis of all the variables were checked. All the data fell with the accepted levels of skewness (range = -0.532 to 0.460) and kurtosis (range = -0.977 to 0.738) recommended by Vincent (1995).

6.3.3.2 Changes between pre and post induction course scores for approaches to teaching and personal epistemologies.

To test the hypotheses that there will be a change over time for approaches to teaching and teachers' personal epistemologies, a repeated measures ANOVA was conducted that found significant differences in the lecturers' scores from the beginning of the course to the end of the induction.

A repeated measures ANOVA was used to explore differences from pre to post test in teaching approaches. Conceptual change approach was significantly

higher at the end of the induction than at the beginning of the module ($F(1,83)=3.318$; $p<0.01$). There was no significant effect for information transmission approach. When a repeated measures ANOVA was conducted to explore differences in personal epistemologies, justification of knowledge approach was significantly higher at the end of the induction than at the beginning ($F(1,83)=2.682$; $p=0.01$). There was no significant effect found for the other three categories: certainty of knowledge, source of knowledge, and attainment of truth.

6.3.3.3 Relationship between personal epistemologies and approaches to teaching.

The next hypothesis that was tested was that there will be relationships between the approaches to teaching dimensions and the categories of personal epistemologies. Pearson Product Correlations with a Bonferroni adjustment were conducted at both the beginning and end of the induction course. A positive significant correlation were found between the conceptual change teaching approach with justification of knowledge which showed moderate strength, and weaker negative correlations with certainty of knowledge and source of knowledge. The information transmission approach had relatively strong positive correlations with certainty of knowledge, source of knowledge and attainment of truth. These relationships are shown in Table 1.

Table 1: Correlations between teachers' personal epistemologies and approaches to learning

End of Induction		Certainty	Justification	Source	Attainment
Conceptual Change	Student Focus	-.249(**)	.325(**)	-.297(**)	-.0254(**)
Information Transmission	Teacher Focus	.301(**)		.367(**)	.326(**)

** Correlation is significant at the 0.01 level (2-tailed).

6.3.4 Conclusion.

The findings of this study indicate that the induction course is significantly and positively changing new lecturers' approaches to teaching and personal epistemologies. The increase in lecturers' approach to teaching in a conceptual change manner is very encouraging as it is this approach that promotes deeper learning in students, resulting in superior learning (Prosser and Trigwell, 1999). The fact that there is no significant change for information transmission approach is not of concern as the level of this approach does not impact on learning as long as it is complimented with the higher conceptual change approach.

Aspects of approaches to teaching and personal epistemologies are related, although not overly strongly, at the end of the induction course. These correlations were as predicted. The personal epistemology category that is concerned with the individual evaluating the knowledge they gain, which is justification of knowledge, relating to a conceptual change teaching approach. This relationship makes sense as a person who believes that knowledge should not just be accepted but should be critically examined would value allowing students' opportunities to challenge concepts as a form of learning. Three of the categories, certainty and source of knowledge, and attainment of truth were negatively related to conceptual change. This

again was expected as high scores on these beliefs are about absolute truth (certainty of knowledge), knowledge deriving from external parties (source of knowledge) and the amount of information collated (attainment of truth). These factors that do not fit with conceptual change approaches to teaching as they are not about the student experiencing the learning in order to further develop their own understanding. The correlations found for information transmission teaching approach were the source of knowledge, certainty of knowledge, and attainment of knowledge, all expected as they beliefs are about an external source providing a large amount of facts about a subject, which is characterised in information transmission.

Having established that a change is occurring to teachers as a result of their training, the next question was whether this would have an impact on their students' epistemologies of learning. It builds on the findings from Chapter 5 that indicated how teaching in a constructively aligned manner that fostered a deep approach to learning influenced students' approach to learning. The next study investigated how teachers can be trained to approach their teaching in a manner that encourages conceptual change in their students.

6.4 Study 2

6.4.1 Hypotheses.

- There will be significant relationships between:
    - teachers' and students' personal epistemologies, with a positive relationship found between the teachers' beliefs and the matching student beliefs.

- approaches to teaching and students' personal epistemologies, with students who have a teacher who adopts a conceptual change adopting a justification of knowledge epistemology.

Although approaches to teaching and teachers' personal epistemologies had already been tested in Study 1, the relationship was tested again in Study 2 to see if any stronger relationships could be detected.

6.4.2 Methodology.

Measures.

The same measures for teachers were used as in Study 1. Students were also measured on the DEBQ (Hofer, 2000).

Participants.

Undergraduate students (n =283) studying a range of seven subjects taught by lecturers who had attended the tHE scheme induction course at University of Wales Bangor participated in this study.

Procedure.

Students consented to complete the DEBQ at the end of their module. Teachers were asked to complete the ATI and DEBQ in relation to the module they were teaching.

6.4.3 Results.

6.4.3.1 Descriptives.

Skewness was found to range from –1.242 to 0.559, which is within the accepted levels (Jöreskog and Sörbom, 1981), and kurtosis from –1.953 to 2.426. Identified regulation fell out of the normal range at the beginning of the module.

A Levene's test of homogeneity of variance showed a number of factors had significantly different variance (see Table 2). Parametric tests were used, as they were considered robust enough to handle to data, but care was taken when interpreting the results to avoid possible Type I errors (Vincent, 1995).

Table 2: Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Certainty (pre)	2.348	11	54	.019
Certainty (post)	4.392	11	32	.000
Justification (post)	3.179	10	23	.011
Attainment (post)	2.735	10	23	.022

6.4.3.2 Relationship between teachers' and students' personal epistemologies.

A Pearson's Product Correlation was used to test the hypothesis that there would be a relationship between teachers' and students' personal epistemologies. It indicated strong significant positive relationships between all the teachers' and students' personal epistemology components ($p<0.01$) (see Table 3).

Table 3: Correlations between students' and teachers' personal epistemologies

	Students			
Teachers	Certainty	Justification	Source	Attainment
Certainty	.658(**)	-.569(**)	.617(**)	.371(**)
Justification	-.437(**)	.397(**)	-.387(**)	-.188(*)
Source	.560(**)	-.527(**)	.572(**)	.278(**)
Attainment	.418(**)	-.315(**)	.432(**)	.296(**)

** Correlation is significant at the 0.01 level (2-tailed).

6.4.3.3 Relationship between approaches to teaching and teachers' personal epistemologies.

The hypothesis that there would be a relationship between approaches to teaching with teachers' epistemologies was also tested using a Pearson's Product Correlation (see Table 4). The results mirror those in the first study but in this study the correlations are much stronger than the original findings. Again conceptual change approach to teaching is positively related to justification of knowledge, and negatively related to the three other epistemological beliefs. The information transmission approach was positively correlated to certainty and source of knowledge and attainment of truth and negatively correlated to justification of truth.

Table 4: Correlations between teachers' personal epistemologies and approaches to teaching

		Certainty	Justification	Source	Attainment
Conceptual Change	Student Focus	-.848(**)	.540(**)	-.502(**)	.023
Information Transmission	Teacher Focus	.971(**)	-.676(**)	.933(**)	.544(**)

** Correlation is significant at the 0.01 level (2-tailed).

6.4.3.4 Relationship between approaches to teaching and students' personal epistemologies.

A Pearson Product Correlation was also used to test the last hypothesis that there would be a relationship between the teachers' approaches to teaching and students' personal epistemologies (see Table 5). Once again these results followed the same pattern between approaches to teaching and personal beliefs. This time it was the students' beliefs that were strongly correlated to the teaching approaching with students taught in a conceptual change manner have a relationship with their justification of knowledge belief, and a negative link to the other categories. There was a positive relationship between students who had teachers that adopted an information transmission approach, with students showing higher levels of beliefs about attainment of truth, certainty and source of knowledge. This relationship was reverse for the same cohort of students who showed low levels of beliefs about justification of knowledge.

Table 5: Correlations between students' personal epistemologies and teachers' approaches to teaching

		Student			
Teacher		Certainty	Justification	Source	Attainment
Conceptual Change	Student Focus	-.583(**)	.498(**)	-.510(**)	-.354(**)
Information Transmission	Teacher Focus	.650(**)	-.558(**)	.622(**)	.367(**)

** Correlation is significant at the 0.01 level (2-tailed).

6.5 Discussion

The results from these two studies generally support the hypotheses that there will be a relationship between approaches to teaching and epistemological beliefs. These

findings are important as they emphasise the impact of beliefs on both teachers and students behavior in the teaching and learning environment. Academic developers should be aware that personal belief systems impact on lecturers' teaching approaches and so should design developmental courses to allow academic staff to explore these beliefs. Teachers should also be aware of how their beliefs impact on both their teaching approaches and students' beliefs, and ensure that they have fully considered their epistemologies in relation to their subject in order to provide the most beneficial learning environment for their students.

To summarise the main results:

- The University of Wales Bangor tHE induction course was found to influence participants' personal epistemologies and approaches to teaching with significantly higher scores found for justification of knowledge and conceptual change/student-focused approach to teaching at the end of the induction;
- Strong relationships were found between both teachers' and students' personal epistemologies;
- Strong relationships were revealed between the approaches to teaching and students' personal epistemologies by the end of the module of study.

The change in the lecturers' approaches to teaching as a result of the induction course supports the work conducted by Ho et al. (2001) and Gibbs and Coffey (2004), who found that teacher training courses can impact on lecturers' practice. The results from this study demonstrated a change in student focus/conceptual change approach to teaching, but no difference over time for teacher focus/information transmission. As these two classifications are exclusive from each other, it is not of concern that no decrease was found in information transmission, but very encouraging that conceptual

change approaches had increased. The fact that teachers were adopting a student focus/conceptual change approach suggests that their students would adopt a deeper approach to their learning and achieve higher level learning outcomes (Gibbs and Coffey, 2004).

The increase in the personal epistemology factor justification of knowledge was also an expected and significant result. This factor is concerned with individuals taking some control over their learning, using experts and evidence, all things to be encouraged in learning. The three other factors of personal epistemologies clustered together in the results, in that they behave in a similar manner in each of the analyses (see Tables 1, 3, 4 and 5). This is theoretically sound, as these elements are concerned with reliance on more external sources of information. High scores indicate belief in an absolute truth (certainty of knowledge), that knowledge is available from an external authority (source of knowledge), and that knowledge is an accumulation of facts (attainment of truth).

When the relationships were investigated between the teachers' personal epistemologies and their approaches to teaching, the expected correlations were found, although the correlational strength was not high. A relationship was found between students focus/conceptual change approach to teaching and a belief about justification of knowledge for academics at both the beginning and end of the induction course. This is to be expected, as both of these factors increased over the three day course. The relationship that was evident between conceptual change and the other three elements of personal epistemologies were negative, which again was to be expected. These factors are concerned with accumulating facts and using experts as a frame of reference. Both of these indicate that teachers are likely to encourage students to rely on external sources of knowledge, rather than to adopt control over

their learning in order to develop their concepts. This relationship was evident when these factors significantly correlated with the teacher focus/information transmission to teaching.

The results of this first study are very encouraging and strongly support the adoption of this type of training for early career HE lecturers. Knowing that approach to teaching has an impact on students' approaches to learning, and that the conceptual change approach is the teaching method that fosters a deep approach to learning, then running a course that increases this approach to learning has to be an important step. It is important to acknowledge the relationship between the teachers' beliefs and their approach to teaching. This emphasizes that teacher training courses should not merely educate about how to teach, but also examine the rationale behind teaching and learning, providing opportunities for participants to examine their belief system in line with other practitioners and current theories.

The second study investigated if these changes in teaching impacted on the students' personal epistemologies. The results from this study were again very encouraging in that predicted relationships were evident. Strong relationships were found between the approaches to teaching and the students' beliefs. There was a positive relationship between a conceptual change approach and students' justification of knowledge. The author had hypothesised that those students taught in a manner that required them to explore concepts in order to gain an understanding were more likely to believe that knowledge has to be justified, should not be taken on face value, and, where the requirement is to test information, to trust and understand it. Positive relationships were also found between the information transmission approach to teaching and students' attainment of knowledge, source of knowledge, and certainty of knowledge scores. Again, these results were expected. Teachers who have a

preference for information transmission have students who believe that their subject is about acquiring facts, and that experts hold the truth. Negative relationships were also found between conceptual change and the three components of personal epistemologies that clustered together (attainment of truth, source of knowledge, and certainty of knowledge), showing that the conceptual change approach to teaching discourages these more surface beliefs. These findings again support the idea that by developing teachers' beliefs and approaches to teaching, they will have a direct impact on the students that they teach.

Another factor that must be considered when examining students' personal epistemologies is whether they have been influenced by the epistemologies of their teachers. Reasonably strong positive relationships were found between the students' beliefs and the teachers' by the end of the module (these were not evident at the beginning), which would suggest that the teachers' beliefs do exert an influence on the epistemologies of students. Whether this influence comes from purely holding those personal epistemologies, or manifests itself in students as a result of the teachers' behavior (for example, their teaching methodologies, the type of assessment that they set) cannot be answered using this data, but there is a suggestion that this relationship does exist.

6.6 Conclusion

These findings are important, as they support academic development programmes for HE staff in developing teaching approaches. The format of the induction course required participants to review their current belief structure, and then to reflect on this perspective in light of their familiarity with peers beliefs about teaching and learning, and the current theoretical foundations of HE. This process was reinforced by asking

the teachers to write a statement about their understanding of teaching and learning in their subject area, by asking them to run a teaching session for their fellow participants which required a rationale behind the approaches they adopted, through regular discussions about their understanding of contemporary concepts of learning, and by consolidating the experience in an action plan for future teaching practices. These activities allowed the new lecturers to build on their current view of teaching and learning in both theoretical and practical settings, and, as is evidenced in this study, impacted on both their recorded belief and approach scores at the end of the induction.

The author has conducted follow-up research as to the long term effects (six to 12 months) on these staff (Lawson, 2007), finding that the increased conceptual change approach and justification of knowledge do remain significantly higher than at the beginning of the induction course, but that these differences are lower than they were at the end of the course. This shows that the course does have a long term impact on staff in these factors. This is a positive result, as the recorded relationship between the approach and belief, which then affects the students' beliefs about their subject, is beneficial to students working at a higher order of learning in their studies.

Chapter 7

Discussion of Findings

7.1 Introduction

The key findings from this thesis were:

- the maintaining of HE students' deep approach to learning over the course of a module by the adoption of an assessment method, a viva voce, that required students to show a higher level of understanding.
- that courses that used a constructively-aligned design that focused on higher order learning fostered students to adopt a deeper approach to learning than courses that were not constructively aligned to encourage deeper learning
- the impact of academic development programmes to develop teaching staff as effective ways for new lecturers to examine their personal beliefs and approaches to teaching.

These findings are important to the educators' understanding of teaching and learning in HE, and should be utilised to inform teaching practices. The message from these studies is not a prescriptive one, which recommends a certain type of assessment or top down control on teaching approaches and academic development, but one that shows the impact that different factors have on students' learning behaviour. These factors should be considered to prompt academics to review their current teaching beliefs and practices, in order to strive for development in their practice. In particular, teaching staff should

appreciate the power of assessment on students' learning and design assessments that require learners to demonstrate higher levels of learning, rather than memorisation and reproduction. This assessment design should also be a part of a constructively-designed approach to teaching that ensures assessment is linked to the learning objectives, and that delivery allows students to develop and practice these learning objectives. Educators should be aware that it is not only the alignment of these factors that impacts on students' learning, but also the degree to which these factor encourage a deep approach to learning. All of these factors should be noted by academic developers who are working with HE teachers to enhance teaching skills. These findings should be introduced to staff in a manner that allows the academic to consider them within their own context, allowing them to explore their own personal beliefs, and build upon these beliefs in order to develop these epistemologies and develop effective approaches to teaching.

The work contributes to knowledge in a way that supports previous research findings, for example, it reinforces the relationships between intrinsic motivation and deep approaches to learning, but it also adds to the picture by introducing new findings to the learning in HE research. Findings, such as the maintenance of a deep approach to learning in students who underwent an assessment requiring them to demonstrate an understanding of concepts and how these concepts were interrelated, build on previous work of researchers like Newstead (1998), who had found a decrease in deep approaches to learning the closer the student was to an assessment time. The finding is also in line with Dweck's (1995) body of work on concepts of ability, shown in the relationship found between approaches to learning with incremental and fixed concepts of ability. The most important contributions to the theoretical underpinnings of teaching and learning in

HE however, must be seen as firstly the empirical evidence that supports Biggs' (1999) work on constructive alignment, and secondly the strong evidence that properly designed academic development courses for teaching staff can promote the teaching qualities that lead to more effective, constructively aligned teaching in the classroom.

The findings around the effect of courses for new academic staff are also a key contribution to knowledge. It supports the work of Gibbs and Coffey (2004), who advocate the need for training for staff in relation to teaching. It links to Pill's (2005) message about further research needed into the preferred teaching and learning models that should be used for the initial and continuing professional development of HE teachers. In her study she found that professional development that used a model of reflection led to more internal changes in academics behavior. This supports the design of the teaching in Higher Education course that was used at the University of Wales to devlop new teaching staff. The findings in this study also provide evidence of the impact of teaching beliefs and approaches on teaching and learning in HE, and should be considered as sound evidence for developing academic development programmes. Kandlbinder and Peseta (2009) examined key concepts that are used in current foundation courses for teaching staff. They identified reflective practice, constructive alignment, approaches to learning, and assessment-driven learning as important in developing teaching skills in staff. These concepts are all considered within this body of work; therefore, the findings should be are of interest to academic developers in developing both pedagogies for teaching and learning in HE, as well as methodologies for training academics in effective teaching approaches. The research findings and their contribution

to the understanding of teaching and learning are discussed in more detail in the following section.

At the beginning of this thesis, Biggs' (1999) 3P model was introduced to explain the stages of a learning situation, and it is this model that will be used as the framework for a discussion of the main findings of the research. The model considers three different stages in the learning process: the presage, before the learning; the process, during the learning; and the product, the result of the learning. As most of the studies in the thesis feature changes in students' and/or teachers' characteristics in relation to a teaching or learning experience, the main focus will be on the process and product stages. Prominent findings from the various studies, which extend or confirm our understanding of the stages, will be considered in this chapter, together with the extent to which these findings are congruent with previous research.

7.2 Presage

Biggs (1999), in his 3P model of teaching and learning, recognises two main influences at the presage stage: student based, such as prior knowledge and experience, interest, motivation, self-efficacy, ability, and commitment; and teacher based, for example, what is being taught, the teacher's intentions concerning the intended learning outcomes as demonstrated in the design, including the assessment procedures, the expertise of the teacher, and the institutional context. These contextual factors will affect students' intentions towards their learning, and impact on the adoption of a particular approach to learning, students' motivational orientation, and their perceptions of competence in the process stage.

For the student-based influences, this research re-affirmed, at the start of a teaching episode, previous correlational relationships between learners' psychological variables, such as motivational orientation, approaches to learning, and concepts of ability. This emphasises the complexities of the student characteristics in learning, and how designing effective learning environments is not a prescribed task, but needs to consider the many dimensions of the individual learner and the world in which they are functioning. This is often a difficult task for teachers who may not have met these individuals before the first session. It requires both sensitivity and adaptability on the part of the teachers. For example, an awareness of the students who enter a learning situation with an incremental concept of ability (which leads them to seek learning experiences that challenge them and thus achieve positive learning outcomes) is important. However, it cannot be regarded as a single determining factor, as these characteristics can be mediated by other influential internal and external factors, including the teaching context.

The significant correlations found in this thesis were as expected, and supportive of the author's beliefs about teaching and learning in HE. For example, significant positive correlations were found between: intrinsic motivation and deep approach to learning; intrinsic motivation and strategic approach to learning; and extrinsic motivation and surface approach to learning. In the first study, there was also evidence of a negative relationship between lack of direction and intrinsic motivation. Practitioners in HE hope that students will arrive at their learning intrinsically motivated, looking for challenges in their learning, having a desire to accomplish, and an expectation that their learning will be stimulating. However, students are very rarely motivated purely for these reasons, and

often external influences affect the learners' motivational orientation. The significant, positive relationship between motivation at the intrinsic end of the spectrum, and deep and strategic approaches to learning indicates that students can have higher learning intentions whilst being motivated for extrinsic reasons. This was also supported by the parallel finding of a significant, positive correlation between external regulation and surface approach to learning, and that the students who scored high on lack of direction had lower scores on intrinsic motivation than those who scored lower on lack of direction. Course leaders who have higher order learning objectives and aligned teaching, and assessment methodologies designed to encourage student engagement in their learning, need to communicate these aspects of the learning context to students at the start of the teaching episode. This "setting of the scene" is an important part of defining expectations as explained in Chapter 3 and emphasised by Biggs (1996). Barab and Plucker (2002; 2004) discuss the advantages of a deep approach to learning in developing students' graduate skills that are sought by employers. Given the close relationship between this and motivational orientation, educators should aim to promote a motivational climate that is intrinsically motivating.

Another example of student characteristics at the presage stage stems from the work in Chapter 4 on students' concepts of ability. Here, weak correlations were found between approaches to leaning and concepts of ability, with positive relations between incremental concept and a strategic approach to learning, and lack of direction and fixed concepts of ability. Weak, negative relationships were also found between deep approach to learning and fixed ability concepts and strategic approach and fixed concepts. All these relationships were weak, but nonetheless provided further evidence of how different

presage factors relate to each other. Educators need to understand these relationships to recognise, for instance, that a student who believes that his ability is fixed might be "at risk" from lower levels of deep and strategic approaches to learning, and higher levels of lack of direction.

Biggs (1999) and Pintrich (1992) both acknowledge that the learner and teacher arrive with characteristics from prior experiences, and that these lead to levels and type of motivation, concepts of ability, self-efficacy, epistemologies, expectations, and intentions. These dispositional characteristics will influence both the learners' and their teachers' behaviour, but it is important to appreciate that these factors can be influenced by both the learning process, perceptions of the situation, and the climate that is developed by external others (e.g. peers, teachers) (Vallerand, 1997). Changes that were observed in this thesis show that these initial dispositional factors can alter during the process stage of learning as a result of the learning climate that is constructed. The presage stage includes not only the learner and teacher context, but also the institutional and departmental climates in which they operate. The change in the institutional context has been at the forefront of government policies over the last five years, with a major drive for widening participation. These changes in student intake have affected departmental climates, and the pressure to adapt has been passed on to teachers. These factors all influence the teacher in their presage stage. They colour the expectations they have of their students, and affect the manner in which they operate. This has had an effect on the teaching and learning in universities, as students enter HE with more varied educational backgrounds and abilities, and teachers have particular expectations of these differently-skilled students. Therefore, it is a new challenge to design learning climates

that can cater to a wider range of students, and there is obviously a requirement to develop the expertise of teaching staff so that they can adapt to meet these challenges.

7.3 Process

The next stage focuses on the process when the teaching and learning activity takes place. In Chapter 3, there were changes in student characteristics which were related to the context of their learning. Students were confronted with an assessment method that required them to demonstrate understanding of the subject in order to achieve. This assessment method was aligned with the teachers' intended learning outcomes and supported by the teaching approach. Elements of intrinsic motivation increased, as did the strategic approach to learning, whereas the "lack of direction" scores decreased. The conclusion was that the design and implementation of the module created a process stage of learning for the students, which facilitated higher order learning. According to Bransford et al. (2000), assessment-driven learning is an important condition in any context. Biggs (1999) supports the emphasis placed on assessment as a motivator, but highlights the importance of students' *perception* of the assessment requirements, rather than the actual requirements as understood by the teacher. The perception of the assessment will drive the students' intentions and behaviour when learning. Whilst evidence from Chapter 3 indicates that the assessment methodology demanded that the learners demonstrated how an understanding of the theoretical underpinnings of the subject could be applied in practice, it was the teaching methods that consistently reinforced this message. A teaching method was used that supported the intended learning outcomes by encouraging the student to continually engage cognitively

with the subject concepts, by discussing, comparing, challenging, and applying in a variety of learning episodes. Case study analysis and problem-solving, for instance, with varied and frequent practice, enabled students to understand the complexities of relationships between theories and applications. This process demonstrated a highly-aligned teaching approach, which encouraged students to maintain their deep approach to learning, in line with the intended learning outcomes. Previous research had repeatedly found a decline in deep approach to learning as modules progressed, with the lowest scores being close to the time of assessment (Newstead, 1998).

Another impact of assessment methods was revealed when the students who undertook the multiple choice exams in the psychology module in Chapter 5 exhibited a surface approach, even though the questions had been written to encourage demonstrations of understanding, application, and relationships between factors. Although not specifically tested, it is presumed that surface approaches to learning were adopted because the students perceived the assessment as requiring a surface approach (Gibbs, 2006). This emphasises the importance of the staff clearly communicating from the start of the course to their students their expectations concerning learning outcomes and the methods for assessing these outcomes.

In the Chapter 5 study, the effect of highly-aligned teaching that fostered a deep approach to learning also affected the students' initially-held levels of motivational orientation. Changes in teachers' approaches to teaching and personal epistemologies as a result of an academic development course (see Chapter 6) is another example of how characteristics at the presage stage were impacted by situational factors in the process of

learning, with, in this case, increases in conceptual changes in teaching and personal epistemologies that support justification of knowledge.

Biggs (1989) also makes observations about the process stage, emphasising the motivation context, learner activity, interaction between the teacher and learner, and the need for a structured knowledge base. If we are to enable our students to achieve "graduateness" (Biggs, 1999) the learning climate needs to foster in them a deep approach to learning and higher order thinking, which is maintained through intrinsic motivation (Entwistle, 1998).

Ramsden (1993), Biggs (1999), and Trigwell and Prosser (1999) all specialise in the challenges of designing learning, and focus on the approaches to teaching that are adopted to achieve students' deep approach to learning. The impact of the process stage was shown again in the study that investigated the constructive alignment of teaching methodologies, and the extent to which that alignment fostered a deep approach to learning. The lecturers who demonstrated a highly-aligned method of teaching that promoted higher order learning had students who scored higher on the intrinsic motivation factors and also on the deep approach to learning scale. These students entered the learning situation with a range of previous experiences and knowledge, as well as different psychological dispositions towards their learning. By creating a learning climate that promoted a deep approach to study in a way that enabled the learning outcomes, assessment, and teaching methodologies to complement each other, the students were encouraged to adopt a deep approach to their learning, and understood the need to do this.

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In the final research chapter, where teaching approaches are examined from a slightly different aspect, using the approaches to teaching inventory to investigate the amount of information transmission and conceptual change in individual teaching methodologies, it was found that students' beliefs about their learning as a result of their lecturers' teaching approach. The staff that showed high levels of conceptual change in their teaching approach, whether or not they also had high scores for information transmission, had students who believed learning was about justifying knowledge. The relationship between the personal epistemologies of the teacher and their approach to teaching was explored further in this study. Those lecturers who had a strong belief in justification of knowledge, i.e. that knowledge should be challenged in order to affirm it, also showed a strong tendency to teach in a way that encouraged conceptual change and student-centeredness in their class.

This final study also looked at how we can develop new lecturers' teaching skills, and it was encouraging to see that, as a result of even just a short course, their personal epistemologies and approaches to teaching could be influenced. By exploring initial personal beliefs about teaching and learning in HE, levels of beliefs in justification of knowledge and approaching teaching in a conceptual change/student-centred manner increased. These are important changes, as it is these approaches and beliefs that have been seen to foster a deep approach in students' learning. Chapter 6 demonstrates that an effective way to promote this development in academics is to adopt a model of reflective practice that asks staff to consider theoretical underpinnings like constructive alignment, approaches to learning, and so on, in their personal context.

Again, this series of results show the impact that factors in the learning context during the process stage have on the approaches, motivations, and beliefs of both students and teachers. In a report commissioned for the Australian Government (2008), the main finding for school education could be simply expressed as, "good learning stems from good teachers." Therefore, it is vital that educational systems recognise this need for investment in developing their teachers' teaching knowledge and skills, so that these teachers can become experts in providing high-quality teaching opportunities for students.

These findings can be linked to the theoretical underpinnings discussed in the literature review in Chapter 1. Bain (1993) talks about two models of teaching and learning, and although no one model is the ideal, it is the characteristics of the second model that are seen as the most effective from the perspective of this research. The second model emphasises application, social context, and assessment as part of learning and links to work by Bransford et al. (2000), who discusses learning with understanding to promote conceptual change, and to the higher order of learning that Perry (1970) presents in his hierarchical model.

Whilst the 'baggage' that students and teachers bring with them to the learning context such as prior experience, knowledge, and personal beliefs (White & Frederickson, 1998; Lehrere & Chazan, 1998)) has a strong impact on perceptions of the challenges of that teaching/learning context (Kember & Gow, 1994; Solomonides and Swannell, 1995; Willis, 1993), it is the actual interaction of teacher and learner during the process stage that is more influential (Pintrich, 1992).

7.4 Product

This research did not focus on the product of the learning experiences in any great detail. The rationale behind this is that the usual method used to measure success/achievement is the overall mark given/degree classification. This kind of summative classification does not effectively measure the extent of the learning that has taken place. A student could have a very positive learning experience which is not assessed by the method used. The first study into the impact of the viva voce examination did look at the results gained from the students. This study found that students who were in the high deep approach category at the beginning of the module achieved higher scores than those in the low group. Subsequent studies also found that students who adopted a deep approach scored significantly higher in this module than they did in their other subjects during the same semester. Other researchers have studied the impact of teachers' actions and students' intentions on student achievements. White and Frederickson (1998) and Lehrere and Chazan (1998) found that acknowledgment by the teacher of learner characteristics at the beginning of a learning episode, (for example, prior experience and knowledge), enhanced the students' perception of their learning experience. Fazey (1999), in her research, found that higher scores on surface approach were predictive of a lower degree result, but that other variables, including deep and strategic approaches, did not provide any predictive power. Trigwell and Prosser (1991) demonstrated a highly significant correlation between a deep approach and qualitative outcomes. Richardson (1995) discovered surface approach was predictive of poor academic performance

The products that can be focussed on from these studies are the changes in psychological characteristics of both the teachers and learners as a result of the impact of the process stages of learning. It is encouraging to witness the maintenance of a deep approach to learning and an increase in intrinsic motivation in students, as a result of a constructively-aligned module that explicitly required a demonstration of a deep understanding through a viva voce assessment methodology. This is a product that has to be considered as positive, considering earlier research (Newstead, 1998; Kayle & Fazey, 2006) demonstrated a decrease in deep approaches to learning over time, and especially at points of assessment. The impact of the induction course for beginning lecturers also must be viewed as an advance in creating effective learning environments. That teachers' approaches to teaching can be developed in a short time, and that these approaches then impact on their students, is encouraging for educational developers in HE.

7.5 Limitations of Research

Research in the social sciences by its nature will always struggle to devise research methodologies without limitations. In any study that looks at human behaviour, it is only possible to strive to get a view of reactions to a particular intervention for that particular timeframe, which means that generalising can be problematic. This body of work tried to control for the variability of human nature with an awareness of extraneous variables, and by collecting large numbers of data from a variety of situations so that the results could be seen to reflect a wider population.

7.5.1 Critique of methodology.

The framework that was outlined in Chapter 2 was that of a constructivism epistemology. This approach is fitting for this type of research, where the investigator is interested in deriving meaning from experiences of teachers and learners in HE. All of the studies in this thesis involved the participants in an active part in the teaching and learning processes, and allowed them opportunities to comment on these experiences. The concept of constructivism also fits with the teaching concept being promoted, in that it focuses on conceptual change rather than information transmission.

Interpretivism was adopted as a main theoretical perspective to explain the methodology choices, as it relates strongly to constructivism. This perspective was ideal for the researcher, as social research data requires interpretation in order to relate it to behaviour. This was achieved through the prime investigator's interpretation of the data, and at times a second researcher was used to verify these assumptions. The participants in the studies were also asked to provide further information about their perceptions through open-ended questions. The opportunities to collect these comments from the participants were not consistent enough however for this qualitative part of the process to be considered as fully interpretivistic. Therefore, at times when the participant's responses were limited, the research relied on a more critical enquiry foundation to address the hypotheses in a more clinical manner.

The bases of the methodology were experimental, and where possible, pre and post data was collected on either side of the teaching and learning intervention; for example, administering questionnaires before and after the module that required students to complete a viva voce to demonstrate their understanding of the subject. This technique

was not used at all times within the work, as at times access to students was not always possible. The methods that were utilised included questionnaires, interviews, statistical analyses, each one chosen for validity, reliability and achieving the required number of responses. These methods were effective as a whole, but did mean that the majority of the data provided was quantitative. Ideally, the researcher would have also have collected a complimentary amount of qualitative data to support each statistical finding.

When questionnaires are used in research there is always the concern whether the type of global approach will provide a useful insight into the questions being addressed. Problems that are muted relate to the fact that these questionnaires are not specific enough to the participants completing them. For example, they use general teaching and learning statements rather than ones related directly to the subject studied, they ask questions across the span of a complete module, and by doing so do not allow for a breakdown of different tasks or situations within the module, they are written for a particular nationality, such as the theories of intelligence scale, which was written for an American population, and so the language can be ambiguous or misleading for those from other countries. Therefore, while it can be said confidently that the data collected provides information about academics' and students' responses to teaching and learning in the HE context, it is difficult to state that the information is directly linked to the psychological factors in the modules of concern. This problem was controlled for by examining the language in each of the questionnaires to check for suitability in the UK, and by emphasising in the instructions that the questionnaires should be answered in relation to the module they were studying. Again, the number of participants used in each study helps to reduce these issues, in that mean results help to control for data outliers in

results. Whilst this would have strengthened the methodology, it would not guarantee that answers were directly linked to the areas of interest within the studies. The use of qualitative data in the form of open-ended questions allowed for the researcher to check the validity of the data, by comparing comments about teaching and learning with the quantitative data. The author was comfortable with the alignment between these two sets of data, and thus was confident to progress with the data collected from the questionnaires.

Bandura (1997) warns that measurement of psychological factors can only reliably predict behaviour at the task level, and the more generalised the measure is across a number of unspecified situations, the less reliable it is in predicting behaviour in a particular circumstance. This was considered in the design of the methods, by collecting data from a large number of participants from a variety of settings, all undergoing the same intervention, in order to allow the researcher to generalise the findings to a larger population in the HE field.

7.5.2 Critique of the approaches to learning model.

This thesis focuses upon the model of approaches to learning: deep, surface, and strategic (Entwistle and Tait, 1994), with the belief that a deep approach to learning is beneficial, as students adopting this approach display superior learning (Prosser and Trigwell, 1999). Despite the pedigree of this framework, there are still criticisms of the model. In order to gain confirmation of the structure of the concept of approaches, the inventory used to measure the framework has undergone many revisions; these revisions mirror the thinking in reference to the model that has occurred in conjunction with the

developments. In order to keep in line with the development of ideas, this research adopted the most recent tools available at the time of each data collection. However, there are still concerns, as the inventory was designed to focus on students' predispositions to adopt a particular process when learning, rather than their actual behaviour or intentions immediately prior to learning (Biggs, 1993). Therefore, it measures global rather than specific intentions. The inventory has been further criticised, as the majority of the deep approach statements relate to cognitive activity, whereas the surface approach statements include a large proportion of affective responses, and the strategic approaches statements address, predominantly, behaviours involved in studying. These differences should be viewed with caution, when using this inventory to measure approaches to study.

The other problem with the model is that it classifies strategic as a separate category. For example, a student who reports rote learning behaviour will be seen as adopting a surface approach, when in reality it may be a strategy to achieve, or a step in the process of understanding, and thus a pre-requisite for deep learning. This is a major issue in the model, as first, the instrument used to measure approaches to learning does not allow students to expand on why those intentions are present; is it part of a longer process, or a strategy to achieve? Second, the model itself is limited in envisaging it possible to classify learning approaches into categories. Although the preferred approach is a deep approach to lead to higher level understanding, due to the pressures that learners face, the reality is that most students have to be strategic in their behaviour, recognising when a deeper approach is necessary in order to achieve, and when memory and reproduction is required, as either an end point in learning the material, or as a step in the learning process. Again, the qualitative data collected in this research helps to explore the

true intentions of the students, and it is encouraging to see that those students who reported high scores on the deep approach to learning in fact did provide statements about relating ideas, and gaining understanding, whereas those who were high in the surface approach, recorded comments about remembering and knowing facts. This additional data in conjunction with the RASI data gave the author increased confidence in accepting the approaches to learning model. However, it must be noted that although this thesis focuses on this particular learning concept, the author acknowledges that it is only one approach, and further investigation to answer these research questions from differing perspectives is warranted.

7.6 Future Research

This body of research demonstrates only a small aspect of a complex pattern of teaching and learning in HE. There are still many avenues that need exploration. In relation to these particular studies, it would be of interest to conduct more qualitative research using focus groups and interviews to investigate students' intentions for their learning, and to examine the perceptions students have of the ways in which they are taught and assessed.

The evaluation of training courses for teaching staff is essential, and it is of interest to academic developers in order to monitor how permanent the initial effects of induction courses are in the long term. It would be of interest to those who are responsible for lecturer development to examine the departmental climate that new staff operates in, to investigate whether these developments in approaches to teaching are nurtured, or if practice is detrimentally affected by a lack of support, professional

pressures, or a different value system. As with students, contextual factors will affect the teachers' approaches to their own learning.

The impact of teachers' approaches to teaching on students' learning behaviour is an enormous question that deserves further research. For educational developers to be most effective, they have to understand what elements of teaching impact on students, in order to develop their training and support programmes. Quality assurance matters should continually focus on the teaching and assessment methodology in relation to the learners' approach to learning, as well as the outcome of the teaching so that academic development can be updated.

7.7 Implications

This research examined interaction effects of teachers' and students' behaviour in the HE learning experience. Learning is complex, and there are no single answers, but understanding factors that contribute to how we learn is the basis for designing and facilitating effective learning situations. This stresses the importance of treating students as individuals, recognising their attributes as they enter a learning environment, how they may react to the process of learning, and their changing needs. These factors all contribute to the intention of the student, which as discussed in Chapter 1, has a major influence on learning behaviour. Knowing the impact these psychological factors have on individuals' learning is vital to educators, so that they can create a learning climate that takes into consideration these differences in their students, but fosters their approaches to higher levels of learning and intrinsic motivation. Learning must be student-centred to make it adaptable to each learner, and teachers must learn what it means to be student-

centred and how to teach in a student-centred way. Therefore it is necessary to encourage practitioners in HE to reflect on their current teaching practice to further devlop their teaching methodologies. Recommended practice in HE stems from Bransford's (2000) four conditions of learning, where he reiterates the need to develop teaching practices that are assessment driven, knowledge rich, community valued, and student-centred. Designing learning that incorporates these conditions in a constructively aligned methodology, and fostering a deep approach to learning whilst allowing opportunities for practice and variation, must be what HE educators strive for, if they want to provide the most effective learning environment for their students. Teachers need to understand not only why this is important, but also be shown techniques as to how to do it effectively.

However, this goal of using the understanding of what constitutes effective teaching and learning in HE is redundant, unless policies are instigated that demand rigorous training in to the scholarship and application of these practices. It is only in the last 40 years that universities have given formal, purposeful attention to the development of academics as teachers (Gosling and Mason, 2006), and it is only in the last 10 years that policies have begun to emerge that recognise the need for this type of training to be compulsory for all teachers in HE. Past practices of allowing successful researchers to become university lecturers, without any training in how to teach, has to be altered. With governmental support for the work of the Higher Education Academy (Governing Body for Teaching & Learning in HE), progress is being made to move UK HE towards a more robust teacher education scheme for its teaching staff.

Teaching staff need to recognise how important it is to apply their academic skills to their professional responsibilities in a scholarly fashion. They will not do this in a

research-focused environment, unless the community in which they are operating demonstrates Bransford's (2000) "community-valued" condition for learning. According to Gosling and Mason (2006), creating an effective HE system is a shared responsibility for all those who work in HE. Amongst his "Top 10 Responsibilities" for teaching in HE in the UK, he includes: encouraging innovation in teaching and learning; improving the quality of teaching; providing professional development, including initial schemes for new staff and training for postgraduates who teach; promoting scholarship of teaching and learning; research into teaching and learning; evaluation of teaching and learning. Universities must be committed to helping new staff to acquire an evidence-based depth of knowledge about the learning process and a problem-solving approach that enables them to continually develop their skills as teachers. The continued development and evaluation of academically-focused (rather than merely skill-based) training schemes for new (and existing) lecturers must be put high on the agenda for all HE institutions, governing bodies, and the government.

Re-emphasising Ramsden (2003) an aim of HE from the first chapter , of what graduates should be able to, that is "...tackle issues logically and effectively, critically analyse content; examine evidence to support theories and consider their alternatives; develop complex, abstract concepts that link to the subject matter; write in an academic fashion; and solve problems by applying the concepts that they have acquired" (p20), we should expect teachers in HE to apply these graduate skills (and more) to their professional practice and development. As with undergraduate students in HE, they will require the facilitative context in which to flourish - one which values high quality teaching and provides the necessary academically challenging support for their learning.

7.8 The Wider Context

The research in this thesis has focused on issues concerned with teaching and learning in HE. The question that should be addressed finally is whether this work can be applied in a wider context. A criticism of social research in general is about the dangers of generalising findings outside of the settings of the data collection, and so discussing the wider context must be viewed with this caution. However, the author does see that the findings in these studies can be used as a foundation for further research and practice in a wider context. Returning to the literature review in the first chapter, in which the thesis was introduced through a review of the classical theories of learning, these findings can be considered across a broader educational setting. The concept that assessment drives learning is not unique to HE, but in fact is relevant to all forms of learning, formal or informal. Therefore whether the goal is to develop a better understanding or develop a skill, how the learner will demonstrate this learning will affect how they approach the task. Therefore, assessment should be a crucial part of all the learning design of the educator, with consideration of what the learning objectives are, and how these can be best demonstrated. This links to constructive alignment, showing the strength of ensuring all the factors involved in the learning support the learning process itself, and provide guidance for the learner to reach their goal.

The second area that is transferable to a wider context is that of developing educators. The evidence from this work shows that teachers' beliefs have an impact on their approach to teaching. Therefore, any programme that is developed to educate trainers must consider how to encourage reflection of personal epistemologies in line with recommended practice. This process requires the trainee to spend time reviewing

their current belief system and practices, comparing these epistemologies to others and the current best practice, before reflecting upon how to implement any changes into their practice that the individual feels are warranted. Working with staff to critically reflect on their position and practices leads to a more permanent change in behaviour as it is internalised.

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Appendix I – The Academic Motivation Scale – AMS

Appendix II – Revised Approaches to Study Inventory – (RASI)

Appendix III – Approaches to Study Skills Inventory for Students

Appendix IV – Theories of Intelligence Scale (TIS)

Appendix V – Approaches to Teaching Inventory – (ATI)

Appendix VI– Assessment Experience Questionnaire (AEQ)

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Please refer to the original text to see this material.

Appendix VII – Disciplinary Epistemological Beliefs Questionnaire –

Appendix VIII – Qualitative Questions (Pre)

Appendix IX – Qualitative Questions (Post)

Appendix X – Qualitative Questions (Responses – Chapter 3)