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Abstract

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, 2003; 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. By emphasising this assessment methodology, first year students were predominantly intrinsically motivated, and maintained their level of deep approach to learning throughout the module, where previous literature had found decreases in deep approaches to learning when assessment took place.

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

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Abstract

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, 2003; 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. By emphasising this assessment methodology, first year students were predominantly intrinsically motivated, and maintained their level of deep approach to learning throughout the module, where previous literature had found decreases in deep approaches to learning when assessment took place.

Keywords: Assessment, Approaches to Learning, Motivation.

1. Introduction

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) (Entwistle and Tait, 1994).
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 (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.
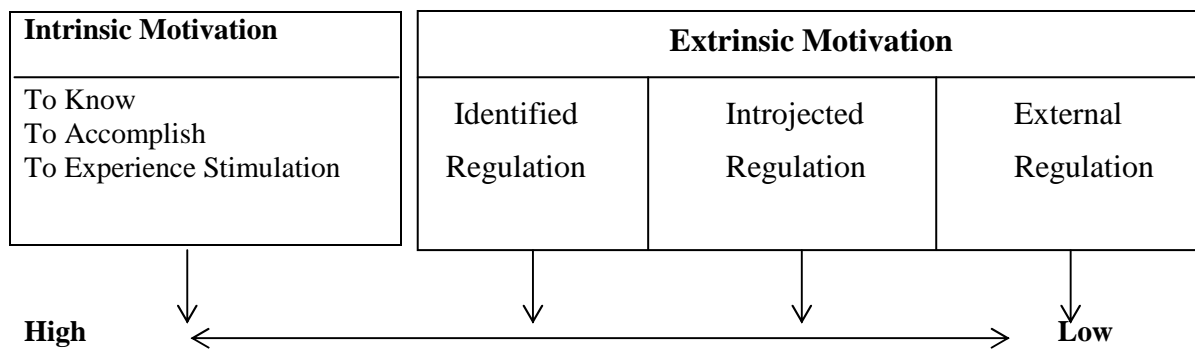
To Experience Stimulation. Stimulating experiences like pleasure, aesthetic experiences, and excitement derived from one's involvement in an activity are the stimulus for students motivated in this way.

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)

Intrinsic Motivation	**Extrinsic Motivation**		
To Know To Accomplish To Experience Stimulation	Identified Regulation	Introjected Regulation	External Regulation

High ←————————————————————————→ **Low**

Level of Internalisation

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.

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).

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; 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.

2. Methodology

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)).

Measures

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.

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.

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).

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.

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 methodprovided students with practice in the use of concept maps, discussion, and presentation of ideas - all skills required for the viva voce.

3. Results

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; η^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.

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 1: 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

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.

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 2: 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

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 $p < .006$. The results indicated that the hypothesised relationships existed as in previous research (Fazey, 1999).

Table 3: 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
Identified regulation	-.245	.148	.072	.374(**)
Introjected regulation	-.256	.115	.266	.289(*)
External regulation	.238	-.178	-.318(*)	.397(**)

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

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.

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.

Qualitative Categorisation

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 my 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."

4. 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.

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.

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.

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.

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.

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 program 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 program.

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