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Changing the learning environment to promote deep learning approaches in first-year accounting students

ABSTRACT

Developing deep approaches to learning is claimed to enhance students' engagement with their subject material and result in improved analytical and conceptual thinking skills. Numerous calls have been made for accounting educators to adopt strategies that produce such results. This paper reports on changes to the learning environment centring on the introduction of group learning activities that were designed to improve the quality of students' learning outcomes. The impact of changes in the learning environment on students' approaches to learning, as measured by the Study Process Questionnaire (SPQ) (Biggs, 1987b), was then assessed. Results indicate that across the semester, accounting students exhibited a small but statistically significant increase in their deep learning approach, and a small but statistically significant reduction in their surface learning approach. The results suggest that accounting educators, through changes in the learning environment, may be able to influence the learning approaches adopted by accounting students.

KEY WORDS: approaches to learning, study process questionnaire, deep, surface

INTRODUCTION

There have been numerous calls for changes in accounting education in order to address the perceived deficiencies in accounting graduates (for example, Accounting Education Change Commission (AECC) 1990, Mathews Report, 1988). A fundamental concern is for accounting education to establish a base for accounting graduates to develop life-long learning skills. In particular, in Australia, the accounting profession requires that accounting educators incorporate activities into the learning environment that develop life-long learning skills, analytical thinking, and the ability to work in teams. To achieve this, accounting education should move away from procedural tasks and memorising of professional standards to a more conceptual and analytical form of learning (Beattie, Collins and McInnes, 1997; Davidson, 2002). Methods and techniques used to facilitate this type of learning include case studies, group-based learning, cooperative learning approaches, and specific tasks designed to address communication and presentation skills (Rebele, Apostolou, Buckless, Hassell, Paquette, and Stout, 1998; Booth, Luckett and Mladenovic, 1999). These teaching techniques are considered suitable for the development of the appropriate competencies in accounting graduates.

The learning approaches adopted by accounting students may be a key factor influencing the quality of their learning outcomes (Booth et al., 1999; Davidson, 2002). The concepts underlying student approaches to learning were developed in the 1970s and 1980s and are now firmly established in the higher education literature (Beattie et al., 1997). Student approaches to learning tend to be dichotomised into deep and surface approaches. High-quality learning outcomes, such as analytical and conceptual thinking skills, may not be achieved unless students are encouraged to adopt deep approaches to learning. Sharma (1997, p.128) states that “in terms of competencies needed to become a successful professional accountant, fostering a deep approach to learning is

critical". Prior research indicates that accounting students seem to adopt higher surface learning approaches and lower deep learning approaches compared to other university students (Eley, 1992; Gow, Kember and Cooper, 1994; Booth et al., 1999). Therefore, consideration of ways to encourage accounting students to adopt a deep approach to learning is of considerable importance to both accounting educators and the accounting profession.

The purpose of this study is twofold. First, the study describes the changes made to the learning environment of a second semester, introductory financial accounting subject. These changes focused on the use of group-based problem solving activities. The aim of these changes was to generate higher quality learning outcomes, such as greater engagement with the subject, and improved analytical and conceptual thinking skills. Second, the study uses the Study Process Questionnaire (SPQ) (Biggs, 1987b) to assess any changes in students' deep and surface approaches to learning across the semester in which the subject was taught. Therefore, consistent with calls by Rebele et al. (1998), the study describes specific changes made to the learning environment and reports on the observed effects of these changes.

The remainder of the paper is structured as follows: the next section reviews the approaches to learning literature, and in particular, its application to accounting students. Next, the specific changes made to the learning environment are outlined. This is followed by the presentation of the research question and the research design employed in the study. The following sections report and discuss the results of the study. The final section provides some conclusions.

APPROACHES TO LEARNING OF ACCOUNTING STUDENTS

Research related to student approaches to learning has been drawn from a wide range of sources. These sources include the Lancaster group (Entwistle and Wilson, 1970; Entwistle, Thompson and Wilson, 1974), the Australian group (Biggs, 1978; 1987a), the Swedish group (Marton and Saljo, 1976a, 1976b), and the Richmond group (Pask, 1976). Some researchers have adopted quantitative methods based on psychometric techniques (Biggs 1987a, Entwistle and Wilson, 1970), whereas others used more qualitative methods, for example, the phenomenographical approach (Lucas, 2001). While these strands of the literature were initially independent of each other, the research shared many themes and concepts. In the 1980s, researchers worked together to establish greater consistency in the language and approaches used. This research has identified two main ways that students approach learning: the *surface approach* and the *deep approach.*

A *surface approach* to learning is characterised by an intention to acquire only sufficient knowledge to complete the task or pass the subject. As such, the student relies on memorisation and reproduction of material and does not seek further connections, meaning, or the implications of what is learned (Biggs, 1987a; Eley, 1992; Ramsden, 1992; Biggs and Moore, 1993; Gow et al., 1994; Sharma, 1997; Booth et al., 1999; Prosser and Trigwell, 1999). A surface approach is externally focused and tends to result in a lack of engagement with the subject, the accumulation of unrelated pieces of information for assessment purposes, and temporary learning outcomes (Biggs and Moore, 1993; Beattie et al., 1997; Booth et al., 1999). Students are unlikely to experience high-quality learning outcomes, or develop appropriate skills and competencies, through a surface approach to learning.

A *deep approach* to learning is characterised by a personal commitment to learning and an interest in the subject. The student approaches learning with the intention to understand and seek meaning, and, consequently, searches for relationships among the material and interprets knowledge in light of previous knowledge structures and experiences (Watkins and Hattie, 1985; Biggs, 1987a; Eley, 1992; Ramsden, 1992; Biggs and Moore, 1993; Gow et al., 1994; Beattie et al., 1997; Sharma, 1997; Booth et al., 1999; Prosser and Trigwell, 1999). A deep approach to learning is more likely to result in better retention and transfer of knowledge (Ramsden, 1992) and may lead to quality learning outcomes, such as a good understanding of the discipline and critical thinking skills (Booth et al., 1999).

The approaches-to-learning literature has operationalised aspects of the learning process in several ways. Entwistle and Ramsden (1983) developed the Approaches to Studying Inventory (ASI), while Biggs (1987b) developed the Study Process Questionnaire (SPQ). The development of the Biggs version of the students' approaches to learning literature is briefly outlined below. Using the SPQ, three approaches to learning (surface, deep and achieving) were identified.[1] The study process or approach to learning is defined by Biggs as a combination of students' motives (why?) and the strategies (how?) they use in learning (Biggs 1987a). Biggs hypothesised that effective learning requires congruence between the motive and strategy adopted. For example, if a student's motive is to develop an interest and competence in a subject area, then employing a rote-learning strategy is unlikely to lead to effective learning outcomes. Biggs (1987a) elaborates on this model by demonstrating that students are able to choose deliberately the approaches that are most likely to result in the desired learning outcome, a concept referred to as metalearning.

The essential difference between a surface approach and a deep approach is in the student's intentions, or motives, for studying. Under the deep motive, the student's intention is to seek meaning, whereas under the surface motive, the student's intention is to acquire only sufficient knowledge to complete the task. As such, a student cannot, simultaneously, adopt a surface motive and a deep motive in his/her study. In contrast, a surface strategy and a deep strategy are not incompatible. A student adopting a deep strategy will use memorisation/reproduction *and* seek further connections and relationships to prior knowledge, whereas a student adopting a surface strategy relies on memorisation and reproduction *only*. In the context of the SPQ, Birkett and Mladenovic (2002) argue that there is a mismatch between the theoretical framework and empirical measurement of the *strategy* aspect of the deep approach to learning. The quantitative measure of the strategy aspect of the deep approach to learning, using the SPQ, only measures higher cognitive levels (from comprehend to reflect), with the lower cognitive levels (memorise to describe) measured in the strategy aspect of the surface approach to learning. However, the theoretical construct of the deep approach to learning encompasses the entire range of cognitive levels (from memorise to reflect), not only those at the higher end. Thus, the SPQ treats low and high cognitive levels as dichotomous, whereas the theory describes them as a continuum.

The approaches-to-learning paradigm has been applied to accounting education only relatively recently. Eley (1992) compared the learning approaches of students across different subjects at the same University and found that second-year accounting students adopted a lower deep approach and a higher surface approach compared to biochemistry, chemistry, and English literature students. Similarly, Booth et al. (1999) found that second- and third-year accounting students across two Australian universities adopted lower deep and higher surface approaches compared to the reported 'norms' for Australian arts, education, and science students. In a

longitudinal study, Gow et al. (1994) reported that accounting students' use of a deep approach declined from the first year to the second year, and then increased to the end of the third year. However, the use of a deep approach at the end of the third year was still below the first-year level. More recent studies show similar results (Pilcher, 2003). The results of these studies suggest that accounting students appear to favour surface learning approaches over deep learning approaches. If correct, this is likely to be of concern to accounting educators.

A critical issue is whether students' approaches to learning are static and inherent in individuals or whether approaches to learning are influenced by the learning context, including teaching methods, curriculum and assessment. Early theoretical research took the view that approaches to learning were inherent in individuals and thus fixed (Beattie et al., 1997). This view was altered by research in the 1980s where it was acknowledged that students' approaches to learning were context specific. The Biggs (1978) model indicated that presage factors, both personal and institutional, affected the choice of students' approach to learning. Biggs (1987a) model recognised that context and task, as perceived by the students, influenced the approach to learning used. Biggs' notion of congruence in the students' choices of motive and strategy, and his concept of metalearning, requires that students are aware of their motives and have control over their strategy selection and implementation.

Ramsden (1992) presents a model of Student Learning in Context that identifies the students' orientation to study and the context of learning as key variables affecting the choice of students' approaches to learning. These theoretical models lead to the conclusion that "the learning context is the mechanism through which teachers can affect students' motives, perceptions and approaches they use in learning" (Birkett and Mladenovic, 2002, p.14).

Empirical research has also addressed the issue of whether students' approaches to learning can change. A substantial body of empirical research indicates that students adapt their learning approach according to their perceptions of the learning environment (Biggs, 1978; Ramsden, 1992; Biggs and Moore, 1993; Prosser and Trigwell, 1999; Lucas, 2001, Zeegers, 2001). In reference to accounting education, Eley (1992) found that students' approaches to learning differed across different subjects within the same course. In particular, results showed that the same students adopted lower deep and higher surface approaches in accounting compared to business law.

The learning environment or learning context consists of the assessment methods, curriculum, teaching methods and the atmosphere of the institution (Ramsden, 1992). Although educators do not have control over students' past learning experiences or their personal characteristics, they do have control over the learning environment. Gow et al. (1994) suggested factors that could result in students adopting surface approaches to learning in accounting include: excessive workloads; the nature of assessment tasks; a didactic teaching style; and low staff/student ratios. Similarly, Sharma (1997) found that the structure of the course and lectures; enthusiasm of lecturers and tutors; generation of a personal learning context; provision of student feedback; and the provision of direction to students, are crucial elements affecting students' choice of their approaches to learning in accounting education. Importantly, these characteristics of the learning environment are amenable to change, and therefore provide a way for accounting educators to influence the learning approaches adopted by accounting students. The next section describes the specific changes made to the learning environment of a second semester, introductory financial accounting subject that emerged in response to concerns regarding the way that our accounting students were approaching their learning tasks.

CHANGING THE LEARNING ENVIRONMENT

The authors are involved in teaching a second semester, first-year introductory financial accounting subject that can only be taken after completing an introductory Accounting Principles unit. The content of the subject consists of issues relating to the recording and reporting of assets, liabilities, revenues, expenses and equity; the conceptual framework for financial reporting; financial statement analysis including financial stability, profitability and share investment decisions; and consideration and evaluation of alternative accounting measurement systems. Students attend two one-hour lectures and a one and a half hour tutorial per week. Staff teaching the subject had attempted to adopt a conceptual focus with emphasis on analytical thinking and evaluation of information rather than performing routine tasks. However, it was perceived by teaching staff that there was a lack of engagement on the part of the students, which contributed to the adoption of a mechanical and superficial (surface learning) approach.

Consistent with Gordon and Debus (2002), it was decided to make limited changes to the learning environment that focused on the tutorial program. Lectures continued largely unchanged. Previously, the tutorial program involved tutors providing solutions to accounting problems that had been completed by students prior to the tutorial. The tutorial program was redesigned to include group problem-solving exercises, group presentations, and group assignments. The focus on group work and the use of case studies was intended to increase students' engagement with the material, develop critical thinking and problem solving skills, and to promote the use of deep approaches to learning by students. The changes made to the learning environment were consistent with recommendations by the AECC (1990, pp. 309-10):

> "students must be active participants in the learning process, not passive recipients of information. They should identify and solve unstructured

> problems that require use of multiple information sources. Learning by doing should be emphasized. Working in groups should be encouraged. Creative use of technology is essential. Accounting classes should not focus only on accounting knowledge. Teaching methods that expand and reinforce basic communication, intellectual, and interpersonal skills should be used".

Similarly, accounting educators recommend the use of case studies, group-based learning, cooperative learning approaches, and specific tasks designed to address communication and presentation skills (Rebele et al., 1998, Booth et al., 1999).

The changes made to the tutorial program were designed to change the teaching style by making tutorials more student and less teacher centred (Gow et al., 1994). In addition, it was hoped that the emphasis on group work would pass more of the responsibility for learning back to the students. The research evidence suggests that, appropriately implemented, group work is associated with adoption of deep approaches to learning (Ramsden, 1992; Tempone and Martin, 1999; Gordon and Debus, 2002). The specific changes to the tutorial program are now outlined.

At the beginning of the semester, students in each tutorial were assigned to a group of four to five members and remained in this group during the semester. The revised tutorial program required each group to work on three different types of group activities, each of which was designed to lead to high quality learning outcomes and promote deep approaches to learning.

The first activity involved all groups working each week in tutorials on problem-solving exercises. Consistent with the conceptual nature of the subject, the exercises focused on the identification and resolution of particular accounting issues concerning the topic of that week's tutorial. Group members were encouraged to discuss and debate issues arising from the exercises. Group members were also encouraged to use the computer equipment provided in the tutorial room to access additional resources, including the subject website and other information via the

Internet. For example, in the tutorial concerning investment decisions, students were encouraged to locate the annual reports of companies on the Internet to identify their specific accounting policies and other relevant financial information. Following completion of the exercises, groups were required to discuss the issues, prepare a written answer and debate their answers with the other groups in the tutorial class.

The second group activity was a group presentation. Each group was required once during the semester to prepare and present the solution to a problem to the tutorial class. All group members were required to participate in the group presentation. Problems set usually consisted of both numerical and theoretical analysis. Each presentation required the use of PowerPoint and the data projector provided in the tutorial room. At the end of the presentation, groups were required to answer questions from the tutor and other groups in the tutorial. The tutor provided each group with feedback on the content and delivery of the presentation (Sharma, 1997).

In addition to the in-tutorial group exercises and group presentation, each group was also responsible for completing two group assignments outside class time. The first and larger assignment consisted of a case study examining a range of financial reporting issues. The assignment required students to make decisions relating to the preparation of end-of-period financial reports for a business in which issues relating to the determination of the final accounting numbers had not been resolved. Groups were required to solve these problems by investigating the relevant accounting principles and standards, applying these to the facts, and providing written justification for their proposed treatment. Many of the issues discussed did not have definitive answers and judgments were required. The second assignment consisted of a small financial statement analysis problem. The task involved the use of a specified framework to identify, analyse and make a decision about the particular issues in the problem. Each group was

also required to present a particular section of the second assignment to the tutorial class. Some of the changes to the learning environment are similar to those outlines in Catanach, Croll and Grinaker (2000); however, they employ a business activity model with students organised into professional service teams.

Group activities two and three were also assessment tasks. As Table 1 shows, 20% of the total marks for the subject was allocated to group activities. This is a substantial proportion of the total assessment and sufficient to affect students' motivation and effort in the subject (Feichtner and Davis, 1992). The total number of tasks that were assessed did not increase as a result of the changes to the learning environment outlined above. However, the nature of the assessments did change with a shift from individual to group-based assessment and (marginally) from examination-based to continuous assessment.

<Insert Table 1 here>

Excessive workloads are identified by Gow et al., (1994) as a possible reason for accounting students adopting surface approaches to learning. The changes made to the learning environment did not attempt to address all the factors suggested by Gow et al., (1994) and Sharma (1997) as possible reasons for accounting students adopting surface approaches to learning.

RESEARCH METHOD

Having agreed on these changes to the learning environment, the authors then decided to evaluate the possible effects of these changes on students' approaches to learning. Prior evidence on the success of intervention strategies aimed at encouraging deep approaches to learning is mixed. Ramsden, Beswick and Bowden, (1986) showed that an intervention strategy aimed at increasing

students' deep approaches to learning actually had the opposite effect, with students decreasing their deep approach to learning and increasing their surface approach to learning. Biggs and Rihn (1984) present more encouraging results, with students involved in a learning-skills program increasing their deep approach and reducing their surface approach. However, as the authors note, the students were highly selected and highly motivated, the ideal candidates for such an intervention.

These results suggest that it may be relatively easy to induce a surface approach to learning, but much more difficult to develop a deep approach to learning. Possible reasons for this include the difficulty of overcoming entrenched notions of learning and studying on the part of students and the difficulty associated with students responding to their *perceived* learning environment, not the learning environment envisaged by the teacher. As such, interventions designed to alter the learning environment may have unpredictable effects on student approaches to learning (Ramsden, 1992; Richardson, 2000).

Although a wide variety of innovative instructional approaches have been implemented, research that examines the possible effects of those changes on students' learning approaches or learning outcomes is sparse. Rebele et al. (1998) argue that more research is needed to ascertain the effect of changes to the curriculum and/or the learning environment. Although research has examined changes in accounting students' approaches to learning over time (Gow et al., 1994) and across different subjects (Eley, 1992), there is little research on whether specific changes in the learning environment influence accounting students' approaches to learning. Thus, the research question to be addressed in this study is:

> Are modifications to the learning environment of a second semester introductory accounting subject associated with increases in students' reliance on deep approaches to learning and/or decreases in students' reliance on surface approaches to learning?

Sample

To examine changes in students' approaches to learning a longitudinal study design was employed. Data were collected from first-year accounting undergraduates studying at university, at the commencement of the subject and then again at the end of the teaching period. A survey was administered to students during a lecture in the first week (Trial 1), and the last week (Trial 2), of second semester, 2001, with approximately 12 weeks between Trials. Surveys were administered to all students attending the relevant lecture. Details of the sample and response rates at each trial are provided in Table 2. Of the usable responses obtained from Trial 1 and Trial 2, a total of 158 of the 427 students completed the questionnaire at both trials, resulting in an overall response rate of 37%. Data for these 158 students were used to examine the research question.

Tests for non-response bias were conducted following the procedure in Ramsden et al. (1986). Students who completed only Trial 1 were compared to students who completed both Trial 1 and Trial 2. Variables used for comparison were age, tertiary entrance score, final mark for the prior accounting subject, final mark for this subject, and gender. Results from *t*-tests and a Mann-Whitney *U*-Test revealed no significant differences between the groups on these variables. These results provide some support that the sample is representative of the population of students undertaking the subject. Also, similar to Booth et al. (1999), the survey for both trials was administered during typical lectures in an effort to capture 'normal' attendance behaviour.

<insert Table 2 here>

Data Collection

The survey instrument consisted of the SPQ developed by Biggs (1987b). The SPQ comprises 42 items and was answered using a fully anchored 5-point scale ranging from (1) *never or only rarely true of me* to (5) *always or almost always true of me*. Students' responses to the SPQ were aggregated following the procedure in Biggs (1987b). Responses were initially aggregated into the motive and strategy subscales for the surface and deep learning approaches (range: 7 to 35). The matched motive and strategy subscales were further aggregated resulting in an overall surface and deep approach to learning score for each student (range: 14 to 70).[2] The same procedure was used for each trial.

The SPQ has been used extensively in prior research and has been shown to have satisfactory reliability and construct validity (Biggs, 1987a; Beattie et al., 1997; Booth et al., 1999; Zeegers, 2001; Davidson, 2002). The reliability of the SPQ in this study was assessed using Cronbach's (1951) alpha, with values calculated for each learning approach scale (surface and deep) at each trial. Results show values ranging from a low of 0.752 for the surface approach scale at Trial 1 to a high of 0.834 for the surface approach scale at Trial 2. The reliability values in this study are similar to those reported in previous studies (for example, see Biggs (1987a) and Zeegers (2001)). Furthermore, all reliability statistics are above the benchmark of 0.70 suggested by Nunally (1978) as demonstrating sufficient reliability.

Test-retest reliability was assessed by calculating the correlation coefficient between SPQ scores across the two trials. Correlations were 0.389 for the surface learning approach and 0.612 for the deep learning approach, with all correlations statistically significant ($p < 0.01$, two-tailed).

In order to employ a repeated-measures design, students were also requested to provide their student identity numbers on the survey instrument. Consistent with university ethics policy, reported results do not identify individual students.

The Biggs (1987a) model indicates that presage factors, both personal and institutional, affect the student's choice of approaches to learning. The personal factors identified by Biggs include prior knowledge, ability and personality. In order to control, as far as possible, for the effects of personal factors, data were also collected on students' age, gender, and proxies for general academic ability and prior accounting performance. Age and gender information was obtained from university student records using students' identity numbers. General academic ability was proxied using students' tertiary entrance score[3] and was also obtained from student records. Prior accounting performance information was proxied using students' overall mark (out of 100) for a first-semester accounting principles subject, which is the prerequisite for enrolment in the subject examined in this paper. The marks were obtained from records held by the authors.

RESULTS

Table 3 reports SPQ descriptive statistics for Trial 1 and Trial 2. The mean scores for the surface approach (47.61, 46.24) and deep learning approach (42.89, 43.79) are reasonably consistent with SPQ scores reported for accounting students in prior studies. Recent studies by Davidson (2002) in Canada and Booth et al. (1999) in Australia, report surface approach scores of 50.6 and 51.2, and deep approach scores of 48.7 and 42.2, respectively. Our results are similar to those reported by Booth et al. (1999), particularly for the deep learning approach. This provides some evidence on the consistency of accounting students approaches to learning scores across different universities in Australia.

<insert Table 3 here>

Changes in Learning Approaches

The research question is whether specific changes in the learning environment are associated with an increase in deep and/or a reduction in surface approach to learning. To examine this question, a multivariate analysis of variance (MANOVA) was used to determine whether, collectively, there were changes in students' approaches to learning scores between Trial 1 and Trial 2.[4] To conduct this analysis, two variables were created, ΔSURFACE and ΔDEEP. ΔSURFACE (ΔDEEP) was calculated as Trial 2 surface (deep) SPQ score minus Trial 1 surface (deep) SPQ score. The results of the MANOVA, reported in Table 4, Panel A, show that the multivariate main effect for Trial was statistically significant {$F(2,156)=4.483$, $p<0.05$} indicating that, overall, there was a statistically significant change in students' approaches to learning between Trial 1 and Trial 2.

<insert Table 4 here>

In order to examine separately changes in students' deep and surface learning approaches between Trial 1 and Trial 2, two univariate paired sample *t*-tests were conducted. Results of the tests, reported in Table 3, show that the mean deep approach score increased from 42.89 to 43.79 across the semester. The increase in the deep approach score of 0.91 is small[5], but statistically significant ($p < 0.05$). The mean surface approach score decreased from 47.61 to 46.24 across the semester. The decrease in the surface learning approach score of -1.37 is small, but statistically significant ($p < 0.05$). The results of the univariate tests reveal a statistically significant change in both the deep and surface approach to learning scores between Trial 1 and Trial 2. Thus, the

significant mulitivariate main effect for Trial is due to both an increase in the deep approach to learning and a decrease in the surface approach to learning.

Changes in students' motive and strategy subscale scores were also examined to understand whether the changes in students' approaches to learning scores were due to changes in their motives and/or strategies for studying. Table 3 reports the mean motive and strategy subscale scores for the deep and surface learning approaches at Trial 1 and Trial 2. For the deep approach, both the mean motive and strategy subscale scores increased from Trial 1 to Trial 2, consistent with the overall increase in students' deep approach to learning. However, only the mean increase of 0.61 for the deep-strategy subscale was statistically significant ($p < 0.05$). For the surface approach, both the mean motive and strategy subscale scores decreased from Trial 1 to Trial 2, consistent with the overall decrease in students' surface approach to learning. However, only the mean decrease of –0.93 for the surface-motive subscale was statistically significant ($p < 0.05$). The implications of these results are considered in the discussion section.

Robustness Tests

Past research suggests that some groups of students may be more receptive than others to learning environments designed to change approaches to learning. In models of student learning, the learning environment is only one factor influencing the approaches to learning adopted by students. Other factors, such as students' demographics, background, and previous educational experiences, may also influence their learning approaches (Biggs, 1987a; Ramsden, 1992). Therefore, it is important to consider variation in background and experiences of different groups of students as possible influences on the impact of the learning environment on their approaches to learning. In this study, the effects of age, gender, general academic ability and prior accounting

performance are considered in order to examine the effect of other factors on students' approaches to learning. Biggs (1987a) argued that older students are more likely to adopt deep learning approaches and less likely to utilise surface approaches to learning. Similarly, Biggs (1978) and Biggs and Moore (1993) argue that prior academic ability and general intelligence may influence students' approaches to learning. In addition, recent studies in the accounting literature have reported significant differences in learning approach scores between males and females (Booth et al., 1999).

A multivariate analysis of covariance (MANCOVA) was conducted to examine the effect of these factors. ΔSURFACE and ΔDEEP were entered as dependent variables, with age, general academic ability, prior accounting performance, and gender entered as independent variables.[6] As shown in Table 4, Panel B, the within-subjects effect of Trial is marginally significant {F(2,76)=2.741, p<0.10}. The reduction in the statistical significance of the Trial effect may be attributable to the reduced sample size available for this test (n=82 versus n=158 for the full sample results). Analysis of the results for the between-subject factors shows a statistically significant effect for general academic ability {F(2,76)=4.374, p<0.05} and a marginally significant effect for age {F(2,76)=3.086, p<0.10}.

Univariate tests using an analysis of covariance (ANCOVA) were conducted to further analyse the effect of general academic ability and age on changes in the approaches to learning scores. With ΔSURFACE as the dependent variable, results from two separate ANCOVAs reveals statistically significant effects for general academic ability {F(1,80)=7.736, p<0.01}[7] and for age {F(1,80)=6.103, p<0.05}.[8] With ΔDEEP as the dependent variable, results from two separate ANCOVAs reveals that the effects of general academic ability {F(1,80)=0.028, p>0.10} and age {F(1,80)=0.006, p>0.10} are not statistically significant. Thus, the effects of general

academic ability and age on changes in approaches to learning scores relate to the surface approach only.

The number of students with responses to the full set of independent variables is small (n=82) relative to the full data set (n=158). This is due to only 82 students having ENTER scores available, the proxy for general academic ability. Given the reduced sample size for these tests, it was considered desirable to perform the robustness tests using a much larger proportion of the full sample of students. As such, the tests were re-run excluding general academic ability. 149 students had data available for the variables of age, gender and prior accounting performance. The results of this analysis are shown in Table 4, Panel C.

The within-subjects effect of Trial is statistically significant {$F(2,144)=4.968$, $p<0.01$}. Consistent with the results shown in Table 4, Panel B, the effects of prior accounting performance and gender are not statistically significant ($p>0.10$). The marginally significant result for age reported in Panel B is now insignificant. Therefore, the results of the robustness tests indicate that, with the exception of general academic ability, the overall change in students' approaches to learning scores are not influenced by the age, prior accounting performance or gender of students.

Contrary to prior research, in the complete sample, age was not related to students' choice of learning approach. However, the student cohort studying this subject consists largely of students admitted to university immediately following completion of secondary school. This is supported by the mean age of the sample of 19.43 years. In addition, the standard deviation of 1.21 indicates that there was comparatively little variation in age across the sample.

Overall, the results show that, collectively, students changed their approaches to learning between Trial 1 and Trial 2. Consistent with the aims of the changes to the learning environment, the overall change in students' approach to learning scores was due to a small, but statistically significant, increase in students' deep approach scores and small, but statistically significant, decrease in their surface approach scores. These results were independent of students' age, gender, general academic ability (except for the surface approach) and prior accounting performance. The results of these tests provide some assurance that the changes in students' approaches to learning were not driven by students' demographics, background or prior educational experiences.

DISCUSSION

Results of the study show that the introduction of three types of group activity (weekly group problem solving exercises, group presentations and two group assignments) as part of a first-year undergraduate accounting subject were associated with an increase in students' deep approach to learning and a decrease in students' surface approach to learning. This provides a positive signal to accounting educators about the possible effects of changes to the learning environment on students' approaches to learning. The changes to the learning environment to encourage deep approaches to learning are consistent with suggestions by the AECC (1990) about the use of group work and unstructured problem solving exercises, and with suggestions that the learning environment is a critical factor influencing the approach students take to learning (Gow et al., 1994; Sharma, 1997, Lucas, 2001). Despite this positive signal, we cannot conclude that the changes in the learning environment caused the changes in students' approaches to learning. Nevertheless, there was an observed, but slight, change in students' approaches to learning at the same time as group problem-solving activities were introduced into the tutorial program.

Prior results showed that accounting students' use of surface approaches to learning was higher than students from other disciplines (Eley, 1992; Booth et al., 1999), and their use of deep approaches to learning declined throughout university (Gow et al., 1994). The seemingly small increase in deep, and small decrease in surface, scores should be interpreted in light of prior results showing the opposite trend for accounting students across the period of their instruction. Results reported in this study indicate that accounting educators can influence students' learning approaches by adopting specific changes in the learning environment. The results are also consistent with evidence in accounting (Gow et al., 1994) and other disciplines (Busato et al., 1998; Zeegers, 2001) that students' approaches to learning do change over time. However, unlike previous research that has examined changes in students' learning approaches in the 'normal' university learning environment, this study reports evidence on changes in students' learning approaches surrounding specific changes in the learning environment designed to encourage deep approaches to learning.

As indicated in table 3, the increase in students' deep approach to learning appears primarily to be due to an increase in their use of deep strategies, which might include things such as reading widely, searching for relationships, and integrating with previous knowledge, rather than any increase in their intrinsic interest in the subject. In contrast, the decrease in students' surface approach appears primarily to be due to a decrease in their motive to meet subject requirements minimally, rather than a reduction in their use of surface strategies, such as memorization and reproduction.

The results reveal that students increased their use of deep strategies but did not significantly reduce their use of surface strategies. This may appear contrary to expectations as it may be expected that the changes in the learning environment may reduce students' reliance on surface

strategies. However, the results appear consistent with the arguments of Birkett and Mladenovic (2002), as students need not reduce their use of lower-level strategies (for example, rote learning, paraphrasing) when adopting a deep approach. Further, in some learning contexts, lower level strategies (as measured by the surface strategy score in the SPQ) are required in order to progress to higher levels of understanding. In accounting, students first must learn terminology, basic concepts and procedures before being able to apply knowledge to novel problems and reflect/evaluate on the appropriateness of various treatments and methods. The results of this study appear to indicate that the changes in the tutorial program were associated with an increase in students' use of deep strategies, without changing their use of lower-level learning strategies as measured by the SPQ surface strategy score. Emphasis was placed in tutorial exercises and assignments on linking problems to prior knowledge and integrating aspects of the subject. For example, in the topics on financial statement analysis, students were required to consider the effects of different accounting policy choices (for example, capitalisation of leases), which were discussed earlier in the semester, on their interpretations and conclusions regarding the financial structure of entities being studied. However, at the same time, students were still required to learn ratio formulas and procedures necessary to conduct the analysis. Thus, successful completion of these tasks required students to use strategies measured by the surface *and* deep strategy scales of the SPQ, which appears to be reflected in the changes in students' strategy subscale scores.

Results for the motive subscales showed a decrease in students' surface-motive subscale scores, however, the change in students' deep-motive subscale scores was not statistically significant. Therefore, although the changes in the subject did not improve students' intrinsic interest in the material, it appears to have changed their perceptions of their motives for studying the subject to

the extent that they were no longer merely to ‘get through’. Overall, it appears that the changes in the subject were more successful at encouraging students to adopt deep strategies in their study compared to generating an intrinsic interest in the subject. Increasing students’ intrinsic interest may take longer than a semester and may require specific changes designed to generate personal interest and meaning for the students.

CONCLUDING COMMENTS

The purpose of this paper was to describe changes made to the learning environment of a first-year accounting subject and to assess the impact these changes may have had on the approaches to learning adopted by accounting students. Results of the study provide some support for the ability of accounting educators to influence students’ approaches to learning. Results show statistically significant, but small, increases in accounting students’ deep approach to learning and statistically significant, but small, decreases in their surface approach to learning during the semester. With one exception, the effect of the learning environment on students’ approaches to learning appears to be independent of student age, gender, academic ability or prior accounting performance. Overall, the study provides some preliminary evidence on the ability of accounting educators to change accounting students’ approaches to learning through specific changes to the learning environment.

A limitation of this study is that despite examining the influence of factors, such as age, gender, academic ability and prior accounting performance, there may be other factors that contributed to the change in students’ learning approaches that were not included in the study. A further limitation is that effects of individual teachers on results have not been assessed.

The results provide evidence of a statistically significant change in students' approaches to learning. Further research is needed to determine whether students perceived any useful change in the way they approached their learning tasks in the subject. Qualitative research, perhaps using in-depth interviews with accounting students, may be needed to determine how changes in the learning environment affect the way students approach their learning tasks.

Also, the study did not examine whether the changes in students' approaches to learning were related to improvements in their academic performance. Prior research using accounting students has presented mixed evidence concerning the relationship between deep learning approaches and academic performance (Eley, 1992; Booth et al., 1999; Davidson, 2002). Future research could examine whether students improve their academic performance after adopting deep approaches to study.

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Table 1
Assessment structure

Assessment item	% of final mark	Total
Group assessment		
Group assignment – case study	10	
Group assignment – analysis problem	5	
Group presentation	5	20
Individual assessment		
Tutorial participation	5	
Mid-semester examination – multiple choice and short-answer questions	10	
Final examination – extended answer problems	65	80
		100

Table 2
Summary of responses

	Trial 1	**Trial 2**
No. students enrolled	427	427
No. surveys returned	296 (69.32%)	224 (52.46%)
No. usable responses*	292 (68.38%)	218 (51.05%)

*students who answered all the Study Process Questionnaire (SPQ) items

Table 3
SPQ descriptive statistics
Results for changes in deep and surface SPQ scores between Trial 1 and Trial 2 (n=158)

Learning approach	Trial 1[a]	Trial 2[a]	Change in learning approach[b]	t-statistic[c]
Deep				
Overall	42.89	43.79	0.91	1.847*
	(7.19)	(7.59)	(6.16)	
Motive	21.66	21.96	0.29	0.942
	(4.35)	(4.55)	(3.88)	
Strategy	21.22	21.84	0.61	2.018**
	(3.91)	(3.83)	(3.82)	
Surface				
Overall	47.61	46.24	-1.37	-1.740*
	(7.47)	(9.45)	(9.88)	
Motive	24.66	23.73	-0.93	-1.750*
	(4.91)	(5.83)	(6.68)	
Strategy	22.95	22.51	-0.44	-1.217
	(3.56)	(4.53)	(4.51)	

a – mean (standard deviation)
b – mean (standard deviation) - Trial 2 minus Trial 1
c – paired-sample tests
* $p < 0.05$ (one-tailed)
**$p < 0.01$ (one-tailed)

Table 4
Multivariate analyses of variance for learning approach scores[a]

Panel A: Overall change in learning approach scores by Trial (n=158)

Source of variance	Pillai's Trace[b]	d.f	F	p
Trial	0.054	2, 156	4.483	0.013

Panel B: Overall change in learning approach scores by Trial, with age, academic ability, accounting performance, and gender as between subject factors (n=82)

Source of variance	Pillai's Trace[b]	d.f	F	p
Within subjects				
Trial	0.067	2, 76	2.741	0.071
Between subjects				
Age	0.075	2, 76	3.086	0.051
Academic ability	0.103	2, 76	4.374	0.016
Prior accounting performance	0.017	2, 76	0.673	0.513
Gender[c]	0.001	2, 76	0.041	0.960

Panel C: Overall change in learning approach scores by Trial, with age, prior accounting performance and gender as between subject factors (n=149)

Source of variance	Pillai's Trace[b]	d.f	F	p
Within subjects				
Trial	0.065	2, 144	4.968	0.008
Between subjects				
Age	0.001	2, 144	0.037	0.964
Prior accounting performance	0.009	2, 144	0.685	0.506
Gender[c]	0.000	2, 144	0.007	0.993

a ΔSURFACE and ΔDEEP entered as dependent variables.
b Pillai's Trace test statistic is reported. Other test criteria provided qualitatively similar results.
c For Panel B there are 53 females and 29 males, with a Box's M Statistic of 9.902 {F(3, 94327)=3.200, p>0.01}. For Panel C there are 97 females and 52 males, with a Box's M Statistic of 7.046 {F(3, 302626) = 2.309, p>0.01}. Both tests indicate that the assumption of equality of variance-covariance matrices across groups is not violated. As such, for the results in Panel B and Panel C, unequal cell sizes should not impact the sensitivity of the statistical tests of group differences (Hair et al. 1998)

[1] While the deep and surface approaches to learning characterise the way that students engage with a task, they do not describe how students organise themselves to complete the task. Biggs (1987a) proposed the achieving approach to learning, which describes how students organise time and space to obtain the highest grades, whether or not the material is interesting. This learning approach is based on competition and ego enhancement (Biggs, 1987a; 1989; Biggs and Moore, 1993; Beattie et al., 1997; Booth et al., 1999). Students' approach (deep versus surface) may interact with the way students organise their time to complete the task. For example, a student may rote-learn in an organised way (surface and achieving approaches) or search for meaning in an organised way (deep and achieving approaches) (Biggs, 1987a). The achieving approach has received relatively little attention in Biggs recent work (Birkett and Mladenovic, 2002).

[2] The tutorial program was designed to enhance students' deep approach to learning and to discourage a surface approach to learning. Consequently, the study only examines changes in deep and surface learning approaches, not the achieving approach. See Biggs (1987b) and Booth et al. (1999) for further details regarding the calculation of learning approach scores.

[3] After completion of their final year of secondary education in the State of Victoria, students are awarded a score out of 100 representing their percentile rank relative to other students applying to enter tertiary education from secondary school in that State. Tertiary entrance scores have been used to proxy academic ability in prior studies (Farley and Ramsay 1988; Rohde and Kavanagh 1996). Also, most students undertaking the subject enter university directly from secondary school therefore their tertiary entrance score is a timely measure of their academic ability. Of the available sample, only 82 had an ENTER score available.

[4] There is a statistically significant correlation between ΔSURFACE and ΔDEEP ($r = 0.286$, $p < 0.01$). As such, a multivariate analysis of variance (MANOVA) is required to control the overall Type I error rate.

[5] The effect size was calculated as (Trial 2 mean – Trial 1 mean)/Trial 1 SD (Cohen 1977). This produces an effect size of 0.125 and -0.183 for the overall deep approach and overall surface approach, respectively. Both effect sizes are between 0.10 and 0.39 and thus are considered small.

[6] The continuous between-subject factors of age, general academic ability, and prior accounting performance were modelled as covariates, with gender modelled as a 2-level between-subjects factor.

[7] To further understand the significant between-subjects effect of general academic ability, the sample was split at the mean of general academic ability, with students reporting a tertiary entrance score above the mean categorised as "high ability" and students below the mean categorised as "low ability". Results of paired sample t-tests reveals a marginally significant increase in the surface approach score of 2.36 for high ability students (t=1.579, $p < 0.10$), and a significant decrease in the surface approach of 4.25 for low ability students (t=2.768, $p < 0.05$). Thus, the statistically significant between-subjects effect of general academic ability is due to those students with higher general academic ability increasing their surface approach score, with those of lower general academic ability decreasing their surface approach score. This appears somewhat contrary to expectations as Biggs (1978) and Biggs and Moore (1993) argued that students of lower academic ability are more likely to adopt a surface approach. However, a comparison of the learning approach scores for different levels of academic ability in this sample may not be particularly useful as none of the students would be considered of low academic ability in terms of the general student population.

[8] To further understand the significant between-subjects effect of age, the sample was split at the mean age (18.87 years) and paired sample t-tests performed. Results show a decrease in the surface approach score of 4.05 (t=1.337, $p > 0.10$) for younger students and an increase in the surface approach of 0.34 for older students (t=0.299, $p > 0.10$). However, the change in surface approach scores is not statistically significant for either group of students.