

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

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## **Abstract**

This paper reports on the effect of specific changes made to the learning environment in an introductory financial accounting subject that were designed to encourage accounting students to adopt deep learning approaches. Developing deep approaches to learning is claimed to enhance students' engagement with their subject material and result in improved analytical and conceptual thinking skills. Changes made to the learning environment included the use of group problem solving exercises, group presentations and group assignments. Results of the study indicate that accounting students' increased their deep learning approach, and reduced their surface learning approach, over the course of the subject. The changes in students' deep and surface learning approaches were independent of student age, academic ability and prior accounting education. The results of the paper suggest that accounting educators, through changes in the learning environment, can influence the learning approaches adopted by accounting students. The results should encourage further development of teaching methods designed to promote deep learning approaches in accounting students.

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## **1. Introduction**

A key concern for accounting educators, and educators in general, is the achievement of high quality learning outcomes for students. For accounting students, these outcomes may include strong technical skills and competencies (Booth, Luckett and Mladenovic, 1999) and the development of analytical and conceptual thinking skills (Davidson, 2002). However, accounting students have been criticised for not possessing the types of skills and abilities required of accounting graduates, and those skills needed in a rapidly changing accounting profession (The Bedford Committee, 1986; Arthur Andersen et al., 1989).

Criticisms of students include an approach to learning as memorisation; an inability to handle complex problems; and a lack of analytical, conceptual thinking and communication skills (Booth et al., 1999; Sharma, 1997). The learning approaches adopted by accounting students are a key factor influencing the quality of their learning outcomes (Booth et al., 1999; Davidson, 2002). Two common learning approaches employed by students are described as deep and surface learning. The achievement of 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. Prior research indicates that accounting students often adopt higher surface learning approaches and lower deep learning approaches compared to other university students (Booth et al., 1999; Eley, 1992; Gow, Kember and Cooper, 1994).

The Accounting Education Change Commission (AECC) (1990) has argued for changes in accounting education in order to address the perceived deficiencies in accounting graduates. A fundamental concern is for accounting education to establish a base for accounting graduates to develop life-long learning skills. This would involve accounting education moving away from procedural tasks and memorising of professional standards to a more conceptual and analytical form of learning (Beatie, 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 (Booth et al., 1999; Rebele et al., 1998). These teaching techniques are considered suitable for the development of the appropriate competencies in accounting graduates.

The purpose of this study is twofold. First, the study describes specific changes made to the learning environment of an introductory financial accounting subject that were designed to

encourage higher quality learning outcomes for accounting students, such as greater engagement with the subject and improved analytical and conceptual thinking skills. Second, the study assesses the effectiveness of the changed learning environment by examining the overall change in students' approaches to learning over the course of the subject. Therefore, consistent with calls by Rebele et al (1998), the study describes specific changes made to the learning environment and reports on whether the change had the desired effect.

The remainder of the paper is structured as follows: section 2 reviews the approaches to learning of accounting students; section 3 develops the research questions; section 4 describes the specific changes made to the learning environment and the research design employed in the study; section 5 reports and discusses the results; and section 6 provides some conclusions.

## **2. Approaches to learning of accounting students**

The approach that students' take to learning is an important factor influencing the quality of those students' learning outcomes. Two common approaches to learning adopted by students are deep and surface learning<sup>1</sup>. A deep approach 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 material and interprets knowledge in light of previous knowledge structures and experiences (Beattie et al., 1997; Biggs, 1987a; Biggs and Moore, 1993; Booth et al., 1999; Eley, 1992; Gow et al., 1994; Prosser and Trigwell, 1999; Ramsden, 1992; Sharma, 1997; Watkins and Hattie, 1985). A deep approach to learning is more likely to result in better retention and transfer of knowledge and may lead to quality learning outcomes such as a good understanding of the accounting discipline and critical thinking skills (Booth et al., 1999). Therefore, it is necessary to assist students in developing a deep approach to learning to achieve the appropriate skills in accounting students (Beattie et al., 1997).

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; Biggs and Moore, 1993; Booth et al., 1999; Eley, 1992; Gow et al., 1994; Prosser and Trigwell, 1999; Ramsden, 1992; Sharma, 1997). A surface approach

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<sup>1</sup> See Beattie et al (1997) for an in-depth review of the development of the approaches to learning paradigm.

results in a lack of engagement with the subject, the accumulation of unrelated pieces of information for assessment purposes, and temporary learning outcomes (Beattie et al., 1997; Biggs and Moore, 1993; Booth et al., 1999). Students are unlikely to experience high quality learning outcomes, or develop the appropriate skills and competencies, through a surface approach to learning.

While deep and surface approaches characterise the way that students engage with a task, they do not describe how students actually organise themselves around 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 (Beattie et al., 1997; Biggs, 1987a; Biggs, 1989; Biggs and Moore, 1993; Booth et al., 1999). Although students cannot simultaneously adopt both surface and deep approaches to a specific task, their approach may interact with the way the student organises 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) (Booth et al., 1999). The three approaches to learning, deep, surface, and achieving, describe the way in which students' approach learning tasks and how they organise their time to complete them.

Given the above, the approaches to learning adopted by accounting students is of interest to both accounting educators and the accounting profession. Eley (1992), in a wider study comparing the learning approaches of students across different subjects, 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 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 of a course, 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.

These studies present some concerning results regarding the approaches to learning used by accounting students. Accounting students appear to favour surface learning approaches over deep learning approaches, with the use of a deep approach possibly declining as a result of the

tertiary education experience. As indicated earlier, the use of a deep learning approach is considered desirable for accounting students to develop life-long learning skills and the appropriate skills and abilities suitable for the accounting profession. Therefore, consideration of ways to encourage students to adopt a deep approach to learning, and assessment of whether such changes affect students' approaches to learning, is of considerable importance to both accounting educators and the accounting profession.

### **3. Theory development**

#### **3.1 The learning environment and students' approaches to learning**

Although accounting students may exhibit lower deep and higher surface approaches to learning than in other disciplines, students' approaches to learning are not fixed. In fact, research indicates that students adapt their learning approach according to their perceptions of the learning environment (Beatie et al., 1997; Biggs, 1978; Biggs and Moore, 1993; Eley, 1992; Gow et al., 1994; Prosser and Trigwell, 1999; Ramsden, 1992; Sharma, 1997; Zeegers, 2001). In support of this argument, 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. This indicates that the learning environment clearly influences students' approaches to learning.

The learning environment or learning context consists of 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 that excessive workloads; the nature of assessment tasks; a didactic teaching style; and high staff/student ratios may influence the learning approaches that students adopt. 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 student learning. Importantly, these characteristics of the learning environment are amenable to change, and therefore provide a way for accounting educators to attempt to influence the learning approaches adopted by accounting students.

Accounting educators can change the learning environment in an attempt to encourage deep approaches to learning. Consistent with the need for change, the AECC (1990, p.309-10)

suggested that “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”. To this end, several studies have reported evidence on changes to accounting curriculum, particularly introductory accounting, in an effort to incorporate these suggestions (Rebele et al., 1998).

Although a wide variety of innovative instructional approaches have been implemented, little research exists that systematically examines the effects of those changes on students’ learning approaches or learning outcomes. Rebele et al (1998) argued that more research is needed to determine whether the changes to curriculum and/or the learning environment are having the desired effect. Although research has examined changes in accounting students’ approaches to learning over time (Gow et al., 1994) and across different subjects (Eley, 1992), little research examines whether specific changes in the learning environment influence students’ approaches to learning. This discussion leads to research question 1a:

Research Question 1a: Can modifications to the learning environment of an introductory accounting subject increase students’ reliance on deep approaches to learning and/or decrease students’ reliance on surface approaches to learning?

### **3.2 Other factors influencing students’ approaches to learning**

In Biggs’ model of student learning, the learning environment is only one factor influencing the approaches to learning adopted by students. Biggs (1987a; 1978; 1989; 1993) proposed that a student’s demographics, background, and previous educational experiences may also influence their learning approaches. Therefore, it is also important to consider variation in students’ background and experiences as possible constraints on the impact of the learning environment on their approaches to learning.

In this study, the effects of age, academic ability and prior accounting education on students’ approaches to learning are considered. Biggs (1987a; 1993) argued that the extent to which students have gained life experience may influence their learning approaches. In particular, as students get older their deep approach and achieving approach increase whereas their surface

approach decreases. Several studies have examined the effect of age on students' approaches to learning. Zeegers (2001), in a study examining changes in learning approaches for undergraduate science students, found that non-school leavers<sup>2</sup> used a higher deep approach and a lower surface approach compared to school leavers. Similarly, Sadler-Smith (1996), in a study of business undergraduates, found that mature<sup>3</sup> students adopted a higher deep and lower surface approach compared to non-mature students. Mature students generally are more committed to study, have clearer goals and motives, and use more elaborate study approaches (Zeegers, 2001). They also have a greater range of life and educational experiences that may influence their study approaches. Therefore, in the context of this study, these characteristics of older students, proxied by student age, are considered important factors that may influence how receptive students are to changes in the learning environment designed to encourage a deep approach to learning.

Biggs (1978; 1993) also argued that prior academic ability and general intelligence may influence students' approaches to learning. In particular, students with lower intelligence are more likely to adopt a surface approach, whereas the use of a deep approach may be encouraged across all students except those with very low academic ability. Little research to date has examined the influence of academic ability on students' learning approaches. Although not directly addressing the issue, both Trigwell and Prosser (1991) and Davidson (2002) did not find any evidence of a significant relationship between prior academic ability and either a deep or surface approach to learning. Although contrary to these results, students with higher intelligence may be more aware of the appropriate study approaches required to succeed in higher education. Learning is a demanding cognitive activity, therefore it is more likely that higher intelligence students can learn by themselves, whereas lower intelligence students may require more explicit guidance. In the context of this study, the general academic ability of students' may effect the extent to which they change their learning approach in response to changes in the learning environment.

Prior experience studying accounting may also influence students' approaches to learning. While past research has examined the effect of prior accounting knowledge on students' performance in university accounting courses (Farley and Ramsay, 1988; Rhode and Kavanagh, 1996), little research has examined the influence of prior accounting education on students' approaches to learning. In particular, students who have studied accounting at secondary school may adopt

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<sup>2</sup> Non-school leavers were students aged 20 and over.

similar learning approaches when studying accounting at university. Secondary accounting courses tend to focus upon procedural tasks such as book-keeping rather than conceptual and problem solving tasks<sup>4</sup>. Therefore, students with prior accounting experience in secondary education may be more inclined to adopt surface approaches to learning consistent with those experiences. Furthermore, such students may be less inclined to change towards deep learning approaches despite the different learning environment experienced at university. This and the previous discussion is summarised as research question 1b:

Research Question 1b: Are the changes (if any) in students' approaches to learning affected by students' ages, academic abilities and/or prior accounting education?

The framework for the study is summarised in Figure 1.

Insert figure 1 about here

## **4. Research Method**

### **4.1 Changing the learning environment**

In order to develop students' deep approaches to learning, changes were instituted to the tutorial program for a second semester, first year introduction to financial accounting subject<sup>5</sup> taken by accounting majors at Monash University, Clayton campus. The content of the subject consists of accounting for inventory, depreciation, and leases; the conceptual framework for financial reporting; financial statement analysis including financial stability, profitability and investment decisions; and consideration and evaluation of alternative measurement systems. The subject adopts a conceptual focus with the emphasis upon interpretation and evaluation of information rather than routine tasks such as recording of journal entries (although they are still an important part of the subject). Students enrolled in the subject attend two one-hour lectures and one one-and-a-half-hour tutorial per week over the course of the semester. Changes made to the learning environment concern only the tutorial program. The content and delivery of lectures was not changed, apart from the usual modifications to reflect changes in accounting standards, etc.

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<sup>3</sup> Mature students were aged 23 and over.

<sup>4</sup> While the variety of tasks involved in secondary accounting education courses were not examined systematically, observations of the content of various accounting courses by the authors provides some support for these claims.

The tutorials were designed to enhance students' lifelong learning skills in the areas of teamwork, oral and written communication, and problem solving. Specific tasks designed to address these skills included group problem solving exercises, group presentations, and group assignments. At the beginning of the semester students were assigned into a tutorial group consisting of four to six members. Students remained in the same groups for the duration of the semester. The tutorial programs for undergraduate accounting subjects are typified by tutors providing solutions to problems hopefully completed by students in the time between the lecture and the tutorial. In this subject this was the customary practice. Students in this environment typically worked at solutions to the set questions which usually mirrored what had been covered in lectures.

It was the aim of this project to design additional exercises that would require a constructivist approach to learning described in this paper as deep learning. 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. Students were encouraged to discuss and debate issues arising from the exercise amongst the group members. Students 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<sup>6</sup>. At the completion of the exercise, groups were required to discuss the issues and debate their answers with the rest of the tutorial class.

The exercises were designed to have students develop solutions to problems that required them to use what they had been taught in lectures and to build on these concepts to solve problems. An example of this approach related to inventory valuation. In lectures students were instructed as to the component parts of what should be included in the cost of inventory, what was meant by net realisable value and how inventory should be costed when prices vary. The task developed relating to this area of study required students to make decisions from a range of factual information as to what should be included in the cost of inventory and what value should be placed on the inventory on hand. The nature of the problem required students to use learning resources, such as lecture notes, textbooks and other group members, to resolve the issues presented in the task.

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<sup>5</sup> To enrol in this subject students must satisfactorily complete a compulsory first semester accounting principles subject.

<sup>6</sup> 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.

Each group was also required to prepare and present a problem to the tutorial class. All group members were required to participate in the group presentation. Problems usually consisted of both numerical and theoretical analysis. The presentation was performed using PowerPoint and the data projector provided in the tutorial room. At the end of the presentation, groups were required to answer questions from the class and the tutor. Students were provided with feedback from the tutor at the end of the tutorial concerning both the content and delivery of their presentation.

In addition to the group work and group presentation, each group was also responsible for completing two group assignments outside of class time. The first and larger assignment consisted of a case-study examining a range of financial reporting issues. The assignment asked students to make decisions relating to the preparation of end of period financial reports for a business that kept rudimentary records but for which issues relating to the determination of the final accounting numbers had not been resolved. Students were required to solve these problems by investigating the accounting rules developed in the lecturing program and to include justification for their analysis. Many of the issues discussed did not have absolute answers and value judgments were required. The justification was the result of the analysis based on previously learned rules. The second assignment consisted of a small financial statement analysis problem. The task involved students using a specified framework to identify, analyse and make a decision concerning the particular issues contained in the problem. Each group was also required to present a particular section of their second assignment to the tutorial group.

The group activities outlined above were also assessment tasks. As table 1 shows, 20% of the total marks for the subject were allocated to group activities. This is a substantial proportion of the total assessment and considered sufficient to affect students' motivation and effort on the subject (Feichtner and Davis, 1992). The assessment procedures supported the changes made to the learning environment, but were not altered substantively from prior years. Note that marking schemes for the assignments and examinations awarded marks for both the content and processes<sup>7</sup> students' utilised in completing the tasks.

Insert table 1 somewhere here

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<sup>7</sup> Students were awarded marks for using the appropriate methodology/structure in preparing their answers, which were used to proxy for the actual processes students' used to answer the questions.

## 4.2 Sample

To examine changes in students' approaches to learning a longitudinal study design was employed. Data was collected from first year accounting undergraduates at Monash University, Clayton campus, at the commencement of the subject and then again at the end of the teaching period<sup>8</sup>. 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. Surveys were administered to all students attending the relevant lecture. Details of the sample and response rates are provided in Table 2. Of the usable responses obtained from Trial 1 and Trial 2, a total of 158<sup>9</sup> students completed the questionnaire at both trials. Data for these students were used to examine the research questions.

insert Table 2 somewhere here

Although tests for non-response bias were not conducted due to a lack of information, the relatively high response rates across both trials provides some support that the sample is representative of the population of students undertaking the subject. Also, the survey was administered during typical lectures in the subject for both trials in an effort to capture 'normal' attendance behaviour (Booth et al., 1999).

## 4.3 Questionnaire

The survey instrument comprised the Study Process Questionnaire (SPQ) developed by Biggs (1987a). The SPQ comprised 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*. To determine students' approaches to learning scores, the 42 survey items were aggregated following the procedure in Biggs (1987b). Students' responses are initially aggregated into the motive and strategy subscales for each of the three learning approaches (range: 7 to 35). Of interest in this study are the overall approaches to learning adopted by students. Therefore, the matched motive and strategy subscales were further aggregated resulting in an overall surface, deep and achieving approach to learning score for each student (range: 14 to 70)<sup>10</sup>. The same procedure was used for each trial.

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<sup>8</sup> Ethics clearance was obtained prior to the collection of SPQ data and student identity numbers from students.

<sup>9</sup> 158 students answered all questions relating to the deep learning approach at both trials. 157 students answered all questions relating to the surface learning approach at both trials.

<sup>10</sup> See Biggs (1987) and Booth et al (1999) for further details regarding the calculation of learning approach scores.

The SPQ has been used extensively in prior research and has been shown to have satisfactory internal consistency, reliability and construct validity (Beatie et al., 1997; J. Biggs, 1987a; Booth et al., 1999; Davidson, 2002; Zeegers, 2001). As such, no further tests on the SPQ were conducted in this study. 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, 0.612 for the deep learning approach, and 0.499 for the achieving approach. All correlations were significant at the  $\alpha = 0.01$  level (two-tailed).

In order to examine changes in students' learning approaches between trials, students were also requested to provide their student identity number on the survey instrument. Consistent with university ethics policy, student numbers were not used to identify any individual students.

#### **4.4 Other variables**

Data was collected concerning students' ages, academic abilities and prior accounting education. Student identity numbers were used to collect information on students' ages and academic abilities from university student records.

Age was used to group students into school leaver (SL) and non-school leaver (NSL) categories. Prior studies using age as a proxy for school leaver status have categorised students as NSLs if they were aged 20 and over (Zeegers, 2001) or 23 and over (Sadler-Smith, 1996). In this study, consistent with Zeegers (2001), students were classified as NSLs if aged 20 and over. The use of 20 and over as the cut-off point better reflects the nature of the student population undertaking the subject, with most students at the Clayton campus entering first year university directly from secondary education. Student age data was available for all students who completed both trials.

Academic ability was proxied using students' tertiary entrance score. 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; Rhode 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. The sample was split at the mean with students reporting a tertiary entrance score above the mean categorised as HIGH

ABILITY and students below the mean categorised as LOW ABILITY<sup>11</sup>. Of the 158 students who completed both trials, 82 students had Victorian tertiary entrance scores available. Students may not have tertiary entrance score data available if they completed secondary education in another State or another country; completed secondary education prior to the introduction of the ENTER score; entered tertiary education as a mature-age student, or no data was recorded.

Prior accounting education was proxied by whether students had studied accounting in their final year at secondary school. Data was obtained from enrolments in the first semester compulsory accounting subject where students attended different streams according to whether they had studied accounting at secondary school. Students were classified as prior accounting education (PRIOR) or no prior accounting education (NO-PRIOR). Completion of accounting subjects at secondary school has been used to proxy prior accounting education in past research (Farley and Ramsay, 1988; Rhode and Kavanagh, 1996). Of the 158 students who completed both trials, 152 students had data available that indicated whether or not they had experienced prior accounting education.

## **5. Results and discussion**

Table 3 reports SPQ descriptive statistics for Trial 1 and Trial 2. The mean surface and deep learning approach scores are generally consistent with SPQ scores reported for accounting students in prior studies. Two recent studies by Davidson (2002) and Booth et al (1999) reported surface approach scores of 50.6 and 51.2<sup>12</sup>, and deep approach scores of 48.7 and 42.2<sup>11</sup>, respectively. The results reported in this study are similar to those reported by Booth et al (1999), particularly for the deep learning approach. Taken together, the results of this study and that of Booth et al (1999) provide evidence on the consistency of accounting students' approaches to learning scores across different universities in Australia. The differences in the deep learning approach scores reported here and in Booth et al (1999) to those reported in

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<sup>11</sup> It should be noted that although students are categorised as either 'high' or 'low' academic ability for the purposes of the study, students enrolled at Monash University, Clayton campus, require a tertiary entrance score of approximately 90 to obtain admission into the relevant degree. Therefore, the nature of student population in this study, and in particular those categorised as 'low' academic ability, may not be representative of accounting students in general. This is further supported by the mean tertiary entrance score of 93.81 (out of 100) used to categorise students into the high/low groups.

<sup>12</sup> Combined sample results.

Davidson (2002) may be due to the characteristics of students in different countries<sup>13</sup> (Davidson, 2002).

insert Table 3 somewhere here

### 5.1 Changes in learning approaches

Research question 1a concerns whether specific changes in the learning environment can change students' approaches to learning. To examine this question, a series of paired sample t-tests<sup>14</sup> were conducted to determine whether there were any significant changes in students' deep and surface<sup>15</sup> learning approaches between Trial 1 and Trial 2. Results of the tests are shown in Table 3. The mean surface approach score decreased from 47.54 to 46.16 with the change in the surface learning approach significant at  $\alpha = 0.05$ <sup>16</sup>. The mean deep approach score increased from 42.92 to 43.81 with the change in deep learning approach of 0.89 significant at  $\alpha = 0.05$ . The non-parametric tests support the parametric results for the significance of the change in the deep learning approach, however, the change in the surface approach is no longer significant at conventional levels ( $\alpha > 0.10$ )<sup>17</sup>.

Overall, the results provide some evidence in support of research question 1a<sup>18</sup>. The direction of the changes in the surface and deep SPQ scores are consistent with our objective, with students increasing their use of a deep learning approach and decreasing their use of a surface learning approach. Despite the mixed results from the non-parametric tests, the results provide some evidence on the effectiveness of the changes in the learning environment in changing students' approaches to learning.

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<sup>13</sup> Davidson's (2002) sample consisted of Canadian undergraduate accounting students. This study and Booth et al (1999) samples consisted of Australian undergraduate accounting students.

<sup>14</sup> Due to departures from normality as evidenced by skewness and kurtosis statistics, histograms and pp-plots, non-parametric Wilcoxon signed ranks tests were also performed. Results are provided in Table 3.

<sup>15</sup> 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.

<sup>16</sup> All t-tests were one-tailed consistent with the expected direction of the changes in students' approaches to learning.

<sup>17</sup> This result was not unexpected as the main departures from normality concerned the distribution of the surface SPQ scores.

<sup>18</sup> No claim is made that the changes to the learning environment caused the changes in students' approaches to learning. Without a control group, it is not possible to make a comparison of the learning approaches reported in this study to the learning approaches of students who were not subject to the changes in the learning environment.

The results provide a positive signal to accounting educators regarding the influence of the learning environment on students' approaches to learning. It appears that students' approaches to learning were, in part, influenced by the use of group-based problem solving exercises as part of the tutorial program. The use of these tools to encourage deep learning approaches is consistent with suggestions by the AECC (1990) regarding 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).

Despite evidence regarding accounting students' preference for surface learning approaches (Booth et al., 1999; Eley, 1992), and the reported decline in the use of deep approaches throughout university (Gow et al., 1994), the results reported in this study indicate that accounting educators can influence students' learning approaches by adopting specific changes in the learning environment directed towards the use of such approaches. The results are also consistent with evidence in accounting (Gow et al., 1994) and other disciplines (Busato, Prins, Elshout and Hamaker, 1998; Zeegers, 2001) that students' approaches to learning do change over time. However, unlike previous research that has examined changes in students' learning approach due to the 'normal' university learning environment, this study reports evidence concerning changes in students' learning approaches resulting from a specific change in the learning environment designed to encourage deep approaches to learning.

## **5.2 Changes in learning approaches for different groups**

Past research suggests that different groups of students may be more receptive to learning environments designed to encourage deep learning approaches. Research question 1b investigates whether factors such as age, academic ability and prior accounting education affect the extent to which specific changes in the learning environment can change students' approaches to learning. To examine this question, a series of repeated-measures analysis of variance (ANOVA) tests were conducted, with trial as a 2-level within-subjects factor, and age, academic ability, and prior accounting education as separate 2-level between-subjects factors.

Insert table 4 about here

### 5.2.1 School leavers and non-school leavers

Earlier results provided support for a statistically significant increase in the use of the deep learning approach from Trial 1 to Trial 2 for the full sample of students. Prior research suggests that NSL may be more inclined to change towards the use of deep learning approaches.

Descriptive statistics show that the increase in the deep approach was 1.15 for SL, and 0.37 for NSL, respectively (Table 4, Panel A). Interestingly, SL experienced a greater change in their deep SPQ scores than NSL. However, the ANOVA results show that the interaction of trial and age for the deep learning approach is not significant  $\{F(1,156)=0.575, p=0.45\}$ .

The greater increase in the deep learning approach for SL is somewhat contrary to expectations. However, although SL experienced a greater change in their use of a deep approach between trials, their overall use of a deep approach was still below that of NSL as both Trial 1 and Trial 2<sup>19</sup>. Zeegers (2001) also found that NSL exhibited higher deep learning approaches than SL. Therefore, it appears that the effect of the changes in the tutorial program on students' deep learning approach is not significantly different for SL and NSL. Whilst contrary to expectations, it is encouraging that both SL and NSL increased their use of deep learning approaches over the semester.

Results also showed that students reduced their use of a surface learning approach from Trial 1 to Trial 2 for the full sample of students. Descriptive statistics show that the decrease in the surface approach was 0.46 for SL, and 3.2 for NSL, respectively (Table 4, Panel A). NSL experienced a far greater reduction in their surface SPQ scores compared to SL. ANOVA results show that the interaction of trial and age for the surface learning approach is marginally significant  $\{F(1,155)=2.747, p=0.099\}$ . Further analysis shows a significant reduction in the surface learning approach for NSL ( $t=2.112, \alpha < 0.05$ ). However, the reduction in the surface learning approach for SL was not significant ( $t=0.502, \alpha > 0.10$ ). Therefore, the overall reduction in the surface learning approach for the full sample is mainly driven by the reduction in the surface learning approach for NSL.

This indicates that the changes in the learning environment appear to discourage the use of a surface learning approach, but that the effect of the tutorial program on students' use of a surface

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<sup>19</sup> The difference in deep learning approaches between SL and NSL was marginally significant at Trial 1 ( $t=-1.322, \alpha < 0.10$ ) and not significant at Trial 2 ( $t=-0.661, \alpha > 0.10$ ).

learning approach was far greater on NSL compared to SL. NSL have more experience in tertiary education and therefore may be more prepared to change their surface learning approach in response to different learning environments, or may be more aware of the most appropriate learning approaches to adopt in particular learning situations.

### **5.2.2 Academic ability**

Past research indicates that academic ability may influence the approaches to learning adopted by students. Descriptive statistics show that the increase in the deep approach was 1.94 for HIGH ABILITY students, and 1.4 for LOW ABILITY students, respectively (Table 4, Panel B). However, ANOVA results show that the interaction of trial and academic ability for the deep approach is not significant  $\{F(1,80)=0.113, p=0.738\}$ . For the surface approach, descriptive statistics show an increase in the surface approach of 2.36 for HIGH ABILITY students, and a decrease in the surface approach of 4.25 for LOW ABILITY students (Table 4, Panel B). Consistent with the opposing direction of the changes in the surface approach scores, the ANOVA results show a significant interaction of trial and academic ability for the surface learning approach  $\{F(1,80)=9.387, p=0.003\}$ . Further analysis shows a significant reduction in the surface learning approach for LOW ABILITY students ( $t=2.768, \alpha < 0.05$ ). However, the increase in the surface learning approach for HIGH ABILITY students was only marginally significant ( $t=1.579, \alpha < 0.10$ ).

The results concerning high and low academic ability students appear somewhat contrary to expectations. Although both high and low academic ability students increased their use of deep learning approaches, students with LOW ABILITY report higher deep learning approach scores than HIGH ABILITY students at both Trial 1 and Trial 2. In addition, although LOW ABILITY students reduced their use of surface learning approaches, HIGH ABILITY students actually increased their use of surface learning approaches over the semester. Although these results are unexpected, they should be treated with some caution. As indicated earlier, students enrolled in the subject are high academic achievers with relatively high tertiary entrance scores compared to the general university population. Therefore, a comparison of the learning approach scores for different levels of academic ability in this sample may not be particularly meaningful as none of the students would be considered of low academic ability in terms of the general student population.

### 5.2.3 Prior accounting education

Prior accounting education may influence the approach to learning adopted by students. Descriptive statistics show that the increase in the deep approach was 0.97 for PRIOR students, and 1.46 for NO-PRIOR students, respectively (Table 4, Panel C). However, ANOVA results show that the interaction of trial and prior accounting education for the deep approach is not significant  $\{F(1,150)=0.598, p=0.440\}$ . For the surface approach, descriptive statistics show that the decrease in the surface approach was 1.53 for PRIOR students, and 0.71 for NO-PRIOR students, respectively (Table 4, Panel C). Consistent with the results for the deep learning approach, the interaction of trial and prior accounting education for the surface learning approach was not significant  $\{F(1,150)=0.237, p=0.602\}$ .

Although there were no significant differences in the way PRIOR and NO-PRIOR students changed their learning approaches over the semester, there were differences in the overall deep and surface learning approaches adopted by the two groups of students. Specifically, PRIOR students utilised a deep learning approach more extensively and a surface-based learning approach less extensively than NO-PRIOR students. However, the differences in deep and surface SPQ scores at each trial were not significantly different between the two groups<sup>20</sup>. Experience of accounting education in secondary school does not appear to influence the extent to which accounting students change their learning approaches. However, the learning approaches adopted by accounting students do differ according to their prior accounting education, although no systematic differences in learning approaches between the two groups were evident.

## 6. Concluding comments

The purpose of this paper was to describe changes made to the learning environment of an introductory accounting subject and to determine whether these changes influenced the approaches to learning adopted by accounting students. The changes to the learning environment included the use of group-based problem solving exercises, group presentations and group assignments. These changes were designed to encourage students to adopt deep approaches to learning in an effort to develop their teamwork, communication and problem solving skills. The

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<sup>20</sup>Deep learning approach: Trial 1 ( $t=0.282, \alpha > 0.10$ ); Trial 2 ( $t=0.922, \alpha > 0.10$ ). Surface learning approach: Trial 1 ( $t=0.575, \alpha > 0.10$ ), Trial 2 ( $t=0.209, \alpha > 0.10$ ).

development of these types of skills is considered essential to the development of high quality learning outcomes and life-long learning skills in accounting students (Booth et al., 1999; AECC, 1990; Davidson, 2002; Sharma, 1997).

Results of the study provide some support for the ability of accounting educators to influence students' approaches to learning. Results show that first year accounting students increased their deep approach to learning and decreased their surface approach to learning over the course of the semester. It appears that the specific changes made to the learning environment were successful in changing the way accounting students approach their learning tasks. With a few minor exceptions, the effect of the learning environment on students' approaches to learning appears to be independent of student age, academic ability or prior accounting education. 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.

There are several limitations associated with this study. Although students changed their approaches to learning over the semester, we cannot determine whether this was due solely to the changes in the learning environment. Despite using a random sample of students, and examining the influence of other factors such as age, academic ability and prior accounting education, there may be other factors that contributed towards the change in students' learning approaches that were not controlled for in the study.

The results provide evidence of a statistically significant change in students' approaches to learning. Whilst statistical analyses can provide important information regarding the statistical significance of the change in students' approaches to learning, it does not necessarily translate into a meaningful change in the way students' approach their learning tasks. The SPQ assesses the overall approach that students take to learning, however, it is not clear whether students' perceived any useful change in the way they approached their learning tasks in the subject. More research is needed, perhaps using interviews of a small sample of students, to determine whether changes in the learning environment can have a practical effect on 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 (Booth et al., 1999; Davidson, 2002; Eley, 1992). Future research could examine whether changes in students' approaches to learning are related to improvements in their learning outcomes. In particular, future research could examine whether students improve their academic performance after adopting more deep approaches to study.

Despite these limitations, the study indicates that accounting educators can influence the approaches to learning adopted by accounting students. In particular, the results show that accounting educators can encourage deep learning approaches in accounting students by changing specific aspects of the learning environment. Consideration of other ways to encourage deep learning approaches, particularly through assessment tasks, may further encourage a deep approach to learning by accounting students, and contribute to higher quality learning outcomes such as life-long learning skills and improved analytical and conceptual thinking skills.

**Table 1**  
**Assessment structure**

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

**Table 2**  
**Summary of responses**

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

\*students who answered a majority of the SPQ questions

**Table 3**  
**SPQ descriptive statistics**

**Results for changes in deep and surface learning approaches between Trial 1 and Trial 2**

Learning approach	Trial 1 <sup>a</sup>	Trial 2 <sup>a</sup>	Change in learning approach <sup>b</sup>	t-statistic	Z-score
Surface (n = 157)	47.54 (7.45)	46.16 (9.43)	-1.38 (9.91)	-1.748*	-0.418
Deep (n = 158)	42.92 (7.21)	43.81 (7.6)	0.89 (6.15)	1.81*	-1.947*
Achieve (n = 158)	45.29 (7.66)	44.44 (8.03)			

a – mean (standard deviation)

b – mean (standard deviation) - Trial 2 minus Trial 1

\*significant at  $\alpha = 0.05$  (one-tailed)

**Table 4**  
**SPQ descriptive statistics for different groups**

**Panel A: School leavers vs non-school leavers**

<b>Approach</b>	<b>Group</b>	<b>Trial 1*</b>	<b>Trial 2*</b>
Deep	SL (n=104)	42.37 (7.52)	43.52 (7.5)
	NSL (n=54)	44 (6.51)	44.37 (7.84)
Surface	SL (n=104)	47.6 (7.63)	47.14 (9.05)
	NSL (n=53)	47.43 (7.16)	44.23 (9.94)

SL – school leavers (under 20), NSL – non-school leavers (20 and over)

**Panel B: High academic ability vs low academic ability**

<b>Approach</b>	<b>Group</b>	<b>Trial 1*</b>	<b>Trial 2*</b>
Deep	HIGH (n=45)	40.73 (7.74)	42.67 (8.22)
	LOW (n=37)	43.38 (7.76)	44.78 (7.29)
Surface	HIGH (n=45)	45.71 (7.51)	48.07 (8.62)
	LOW (n=37)	50.03 (5.41)	45.78 (8.17)

HIGH – high academic ability, LOW – low academic ability

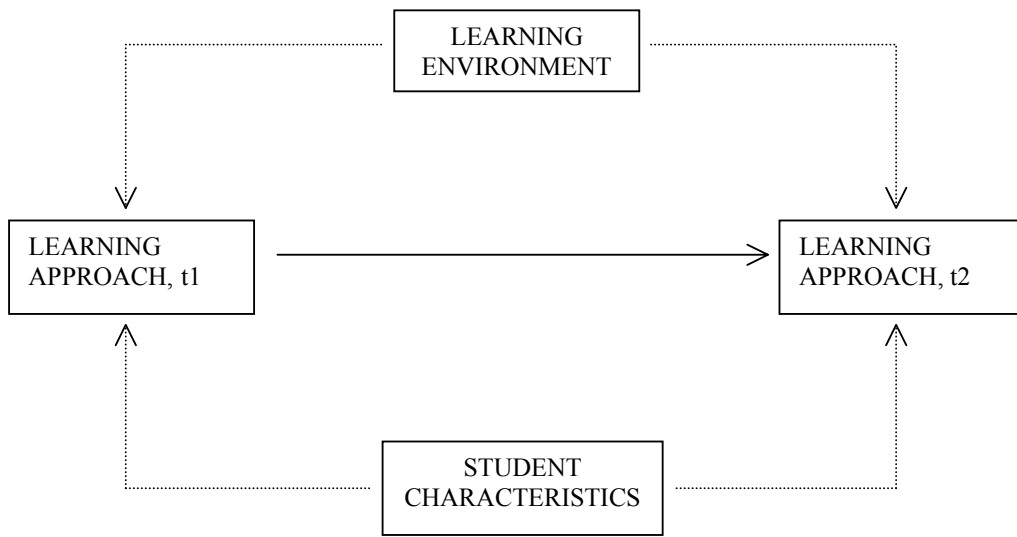
**Panel C: Prior accounting education vs no prior accounting education**

<b>Approach</b>	<b>Group</b>	<b>Trial 1*</b>	<b>Trial 2*</b>
Deep	PRIOR (81)	42.6 (7.99)	43.3 (8.22)
	NO-PRIOR (71)	43.03 (6.44)	44.49 (6.84)
Surface	PRIOR (81)	47.88 (6.70)	46.35 (9.06)
	NO-PRIOR (71)	46.85 (8.27)	46.14 (9.75)

PRIOR – prior accounting education, NO-PRIOR – no prior accounting education

\*mean (standard deviation)

**Figure 1**  
**Model of changes in students' approaches to learning**



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