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A comparison of the learning approaches of accounting and science students at an Irish university

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One of the major challenges facing accounting education is the creation of a learning environment that promotes high-quality learning. Comparative research across disciplines offers educators the opportunity to gain a better understanding of the influence of contextual and personal variables on students' learning approaches. Using the Approaches and Study Skills Inventory for Students (ASSIST), this study examines the learning approaches of 329 first-year accounting students and 275 first-year science students at an Irish university. The analysis reveals that the accounting students are more strategic than the science students, while the science students are more inclined to adopt a deep approach than the accounting students. There was no significant difference in the scores of the two groups on the surface scale. An examination of the variation in the learning environments of the accounting and science students identifies the teaching approach, the level of continuous assessment, students' motivations for choosing their degree programme, and their prior learning experiences as possible factors contributing to the differences in the approaches to learning adopted by both groups. The article concludes by considering the implications of these findings for educators, and suggests avenues for further research.

Keywords: learning approaches; ASSIST; accounting students; science students; learning environment

Introduction

The rate of change in the business environment, particularly in the areas of regulation, technology and globalisation, results in continuous alterations in the role and activities of professional accountants (Deppe et al. 1991; Albrecht and Sack 2000). To prepare students to become the professional accountants of the future who can survive and thrive in such a dynamic context, it is essential that accounting education develops appropriate competencies among today's students (Hassall et al. 2001; Meagher 2001; ICAI 2008). In particular, it is important that accounting students acquire the capabilities to be lifelong,

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independent learners so that they can adapt to unanticipated changes that will occur in the future (IFAC 2003). Fostering such capabilities requires educators to create learning environments which will encourage students to, among other things, think for themselves and develop a personalised understanding of new material, and be able to analyse information, solve problems and relate new knowledge to prior knowledge and apply it in emerging situations. Consulting the higher education learning literature, it is clear that the development of such competencies is predicated on, and aligned to, encouraging students to adopt deep approaches, as opposed to surface approaches, to learning in their study activities. While there is an increasing body of research measuring the learning approaches of accounting students in different settings, Booth, Luckett, and Maldenovic (1999) have called for more studies to compare the learning of accounting students with that of those in other disciplines so that the impact of variation in disciplinary learning environments can be identified. They argue that accounting education may be enhanced by considering aspects of other learning environments that are aligned to deep approaches to learning. This study answers that research call, as it specifically measures and compares the learning approaches of accounting students and science students.

The remainder of the article is structured as follows. The next section describes the student learning paradigm and considers prior studies which have measured the learning approaches of accounting and science students. The section following that then describes the methods of data collection used in the study. The results of the study are then presented and discussed, and the article finishes by considering the implications of the findings for future research.

Literature review

Student learning paradigm

The student learning paradigm focuses on exploring learning from the perspective of students. Early work in the area was prompted by the desire to understand why some students learned better than others, and it was felt that previous input–output models of learning in higher education were inadequate (Entwistle and Ramsden 1983; Marton and Booth 1997). A key concept to emerge from the early research was that of learning approaches. Initially, two approaches were consistently identified: deep and surface (Marton and Saljo 1976a,b). A deep approach is characterised by a personal interest in learning. Students adopting this approach set out with the intention of understanding the material; they interact critically with the arguments put forward, relate them to their prior knowledge and experience and evaluate the extent to which conclusions are justified by the evidence presented. Consequently, deep learning is more likely to result in better retention and transfer of knowledge and lead to higher-quality learning outcomes (Ramsden 1992). In contrast, a surface approach is characterised by a lack of personal engagement in the learning

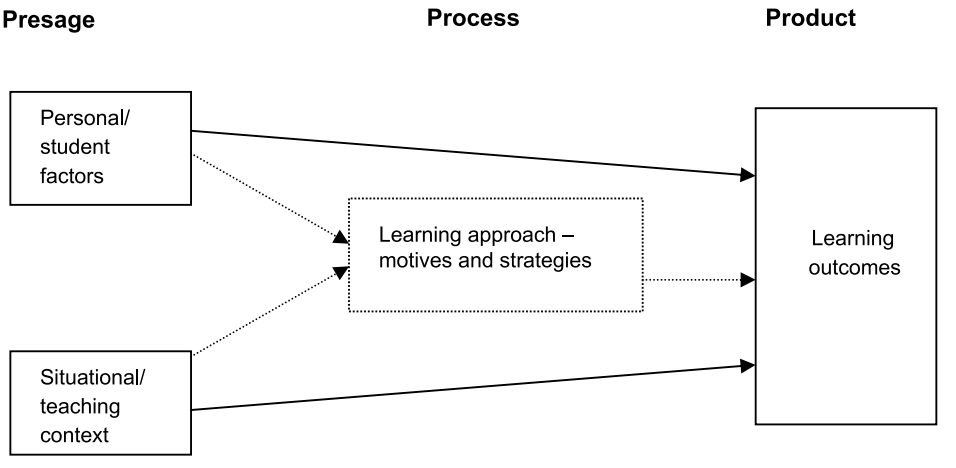

Figure 1. Biggs' 3P model of student learning.
Source: Adapted from Biggs 1999, 18.

process. As such, students focus on rote-learning the material in an unrelated manner and they are constrained by the specific task. Surface approaches to learning are likely to lead to lower-quality learning outcomes (Marton and Saljo 1976a,b). Subsequent research drew attention to the pervasive influence of assessment on student learning and identified an additional approach: strategic (Ramsden 1979; Entwistle and Ramsden 1983). This approach describes the intentions and activities of students who are primarily focused on achieving the highest possible grades. These students are concerned with both the academic content and the requirements of the assessment system. Their interest in content is driven by assessment demands and they use whatever learning strategy will maximise their chances of academic success (Watkins 2000).

As has been indicated above, there are relationships between the learning approach adopted and the quality of the learning outcome achieved, in that deep approaches to learning as opposed to surface approaches are associated with high-quality outcomes. Thus, the focus of the research moved to identifying the factors that encourage students to adopt different approaches, as the student learning paradigm recognises that learning approaches are not intrinsic characteristics of students but rather reflect students' responses to a wide range of personal variables (motivation, prior learning experiences, conceptions of learning, etc.) and learning environment variables (teaching, syllabus, assessment, etc.) (Ramsden 1987). This context-dependent, relational view of learning is appropriately depicted in Biggs' 3P model, as shown in Figure 1.

Learning approaches of accounting students

A number of studies conducted in different countries have measured accounting students' approaches to learning. Bowen, Masters, and Ramsden (1987),

in an Australian study of seven disciplines, found that first-year accounting students adopted a surface approach to learning. In a later Australian study, Sharma (1997) found that second-year accounting students were unsure of their approach to learning, were highly syllabus-bound and had a fear of failure. At two Australian universities, Booth, Luckett, and Maldenovic (1999) explored the relationship between accounting students' learning approaches and their learning outcomes. They found that students favoured a surface approach over a deep approach. They also reported a significant negative relationship between the surface approach and academic performance, but there was no relationship for the deep approach. In a study examining the relationship between gender, motivational differences and learning approaches of students taking accounting units as part of an open learning programme, De Lange and Mavondo (2004) found that different learning strategies may be adopted by male and female students. Other recent work in Australia has explored different ways to foster deep approaches to learning among accounting students. For example, English, Luckett, and Maldenovic (2004) found that an intervention concerning writing skills in an introductory accounting course had a positive impact on student learning, and Hall, Ramsey, and Raven (2004) reported an increase in deep learning and a reduction in surface learning among accounting students following the introduction of group learning activities.

Chan et al. (1989) reported that Hong Kong students had a tendency to rote learn and to focus on the bare fundamentals. In a later Hong Kong study, Gow, Kember, and Cooper (1994) found that a deep approach to learning was more predominant in the first year of higher education than in later years. In the UK, Duff (1999) reported that age was positively related to a preference for a deep approach among accounting students and that females were more likely to adopt a surface approach than males. In a later study seeking to understand academic performance among accounting and economics students, Duff identified two clusters of students. The effective learners had high scores on deep and low on surface, while ineffective learners displayed the opposite pattern (Duff 2004). Davidson (2002), in a Canadian study, found that the students' scores were higher on the surface scale than their scores on the deep scale. He also considered the association between students' learning approaches and their performance in the module. The only significant association identified was between the use of a deep approach and students' performance in complex examination questions.

In an Irish context, Byrne, Flood, and Willis (1999) reported that first-year accounting students showed no strong preference for any particular approach. In a later study, significant positive relationships between both the deep and the strategic approaches and students' performance were found (Byrne, Flood, and Willis 2002). Further, the study revealed a highly significant negative correlation between the surface approach and performance. In a recent inter-institutional study, Byrne, Flood, and Willis (2009) found that accounting

students at an Irish university showed significantly higher scores on the strategic approach as compared with either the deep or the surface approach; however, their scores on both the strategic and the surface scales were significantly lower than those of accounting students at the US university which was included in the study. The study considered the impact of course delivery, assessment and class size in light of the variation in approaches to learning of the students at the two universities. In a study at two US universities, Elias (2005) found that the accounting students were more likely than other business majors to use deep as opposed to surface approaches to learning, and that deep approaches to learning were positively correlated with expected course grades.

On the whole, in our view, these prior studies indicate that accounting students show no strong preference for any particular approach. While some researchers would argue that the accumulated body of research indicates that accounting students favour a surface approach, it is the absence of a preference for a deep approach which is particularly worrying, given the high-quality learning outcomes desired by higher education and the accounting profession. Thus, there is an obvious need to continue this stream of research and to continue to seek to identify factors which foster particular approaches. Moreover, it is clear that comparative studies would aid this research agenda, yet, to date, there has been little comparison of the learning of accounting students with that of those in other disciplines (Booth, Luckett, and Maldenovic 1999). Hence, the objective of this study is to measure and compare the learning approaches of accounting students and science students.

Learning approaches of science students

The concept of learning approaches appears to have received less recent attention in the science education literature compared with the accounting literature. In an early study, Laurillard (1979) qualitatively explored science students' approaches to a range of learning tasks they were addressing as part of their coursework. She found that clear distinctions in the approaches of students could be identified and were akin to the variations between deep and surface approaches reported by Marton and Saljo (1976a,b). She reiterated the context-dependent nature of students' learning approaches and highlighted the fact that 'students cannot be characterised in terms of a dichotomised description of learning', as each student could adopt different approaches to different tasks (Laurillard 1979, 408). Chin and Brown (2000) sought to explore the characteristics of both deep and surface approaches adopted by science students. They reported that science students adopting a deep approach to learning made their ideas known more readily that those adopting surface approaches, gave more elaborate explanations in response to questions, asked questions which focused on explanations and causes and constantly sought to resolve discrepancies in knowledge. In contrast, students adopting a surface approach to a task often gave explanations that were mere reformulations of

the questions posed to them, and they asked questions that were more focused on factual or procedural information.

Watters and Watters (2007) report that the approaches to learning of biological science students at a metropolitan university in Australia were 'by and large of a surface nature' and students are simply motivated to pass examinations and view learning as the accumulation of knowledge which then requires memorisation. Similarly, in a longitudinal study, Zeegers (2001) found that science students consistently utilised surface learning strategies, and he contended that this was related to the students' perceptions of the importance of assimilating and memorising factual information in the study of science. In an Irish study, Kelly (2005) also reported that as science students progressed through their first year of study, they reported an increasing use of surface learning approaches. Minasian-Batmanian, Lingard, and Prosser (2006) outline that 83% of students reported using surface approaches to learning within a biochemistry module, but despite this, it was found that the number of students holding more advanced, cohesive conceptions of biochemistry had doubled by the end of the module.

In light of the comparative nature of the current research, the recent study of Nelson Laird et al. (2008), which examined the effects of disciplines on deep approaches to learning of over 80,000 senior students at more than 500 universities in the United States, is interesting. They report that many students across all disciplinary areas engage in deep approaches to learning, but students in soft fields (including accounting) use deep approaches to a greater degree than those in hard fields (including science).

Research method

Research objective

As already indicated, the objective of this study is to develop a better understanding of the learning approaches of accounting students by comparing their approaches with those of students in another discipline. Science was chosen as the comparative discipline in this study for two reasons. First, it was considered that, in many respects, there is considerable overlap in the desired learning outcomes in accounting and science. Both disciplines require students to develop an understanding of a fast-changing knowledge base, and also a wide range of competencies, such as problem-solving and analytical skills, which will foster lifelong learning (IFAC 2003; Watters and Watters 2007). Nonetheless, the learning environments of the two disciplines are quite distinctive at the university at which this study was conducted, as science students spend considerable time working on experiments in laboratories, whereas accounting students have little opportunity for the practical real-life application of their knowledge and skills. The similarities and differences in the nature of accounting and science education offer an interesting basis for comparison. Second, in Ireland in recent years, accounting and science have experienced

contrasting fortunes in terms of attracting students to higher education. Whereas accounting is an area in high demand, enticing high-quality school leavers, science has generally experienced a shortage of high-calibre applicants as interest in science careers has dwindled among school leavers.

Research instrument and data collection

The Approaches and Study Skills Inventory for Students (ASSIST 1998) was used to collect the data in this study. The ASSIST measures students' approaches to learning on three main scales – deep, strategic and surface – and it is the latest version of the Approaches to Studying Inventory (ASI), which has perhaps been the most popular learning-approaches instrument over the years (Richardson 1994). The instrument contains 52 statements, and respondents indicate their agreement with each statement using a five-point Likert scale where 1 = disagree and 5 = agree. The statements are combined into 13 subscales, which are then further grouped into the three main scales.

To derive the mean scores for the three approaches to learning, the scores for the 13 subscales of the ASSIST were computed by summing the individual students' responses to each statement within the scale. Then, the scores for the main scales were calculated by combining the scores of the relevant subscales. As there are four subscales in the deep and surface approach and five subscales in the strategic scale, each scale was divided by the number of constituent subscales to standardise the scores, thereby facilitating comparison between the three approaches. This resulted in a maximum score for each scale of 20. The ASSIST was previously validated for use with accounting and science students in Ireland (Byrne, Flood, and Willis 2004; Kelly 2005), but Cronbach alpha values were computed to assess the internal reliability of the data in the current study. The alpha values for the main scales range from 0.80 to 0.87, and those for the subscales range from 0.55 to 0.76. These values are satisfactory and comparable to those reported in other studies (e.g. Byrne et al. 1999; Byrne and Flood 2005; Tait, Entwistle, and McCune 1998).

The data for the study were gathered from three cohorts of first-year students at an Irish university. Completed questionnaires were received from 329 accounting students (population = 440), giving a response rate of 75%, whereas completed questionnaires were received from 275 science students (population = 400), yielding a response rate of 69%.

Findings

Results

The scores for both the accounting and the science students on the three main scales and related subscales are shown in Table 1. Before exploring the variation in the approaches between the two groups of students, it is interesting to examine the preferences regarding learning approaches within each group. As

outlined in the literature review, prior studies concerning accounting students have reported mixed results, with many indicating that accounting students often score highest on the surface-learning scale. However, in this study, as in prior Irish studies, the preference for a surface approach is not found. Instead, the accounting students favour a strategic approach over either a deep or surface approach and, using the Wilcoxon Signed Rank test, this preference is significant at the 1% level (Table 2). In examining the scores of the science students, there are no significant differences between the scores on the three main scales; thus, it is interesting to note that a preference for a surface approach as reported in the prior literature is not found.

On examining the differences between the groups, the science students have a significantly higher score on the deep scale compared with the accounting students (see Table 1), which is in contrast to the findings of Nelson Laird et al. (2008), where students in soft fields made more use of deep approaches than those in hard fields. In the current study, when the constituent subscale scores are compared, it is clear that while both groups report similar scores on the seeking meaning and use of evidence subscales, the science students report

Table 1. Mean scores of main scales and subscales.

	Accounting	Science	Difference in mean scores
Deep	**12.52**	**13.11**	**–0.59****
Seeking meaning	13.33	13.42	–0.09
Relating ideas	12.15	12.73	–0.58*
Use of evidence	13.49	13.66	–0.17
Related motive			
Interest in ideas	11.14	12.61	–1.47**
Strategic	**13.32**	**12.87**	**0.45***
Organised study	11.52	11.43	0.09
Time management	11.64	11.24	0.40
Alertness to assessment demands	14.84	14.25	0.59*
Related motives			
Achieving	13.66	12.97	0.69*
Monitoring effectiveness	14.96	14.59	0.37*
Surface	**12.58**	**12.85**	**–0.27**
Lack of purpose	10.00	9.88	0.12
Unrelated memorising	11.90	12.58	–0.68*
Syllabus boundness	14.85	14.77	0.08
Related motive			
Fear of failure	13.75	14.03	–0.28

*significant at 5% level; **significant at 1% level

Table 2. Differences in mean scores within a group.

	Accounting		Science	
	Z-value	*Diff. in mean*	*Z-value*	*Diff. in mean*
Deep–Strategic	–5.27	–0.80**	–1.48	0.24
Deep–Surface	–0.01	–0.06	–0.79	0.26
Strategic–Surface	–2.96	0.74**	–0.42	0.02

*significant at 5% level; ** significant at 1% level

a significantly higher score on the relating ideas and interest in ideas subscales. As already mentioned, the strategic approach is the preferred approach of the accounting students, and their mean score on the scale is significantly higher than that of the science students, with the subscales of alertness to assessment, achieving and monitoring effectiveness showing similar significant differences. While the difference between the scores of both groups on the surface scale is not significant, it is interesting to note that the science students report a significantly higher score for unrelated memorising, which supports the evidence of Zeegers (2001) referred to earlier and his contention that science students appear to place considerable significance on remembering factual scientific information.

Discussion

While the accounting faculty at the university in this study may feel some sense of satisfaction that their students do not exhibit a preference for a surface approach, the accounting students' preference for the strategic approach and their significantly lower score (at the 1% level) on the deep scale compared with the science students needs to be examined. In an attempt to understand these variations, differences in the learning environments of the two disciplines and their potential impact on students' perceptions and their learning approaches are investigated.

At the outset, it must be acknowledged that both groups of students in the current study attend the same university and thus encounter a similar educational ethos and share the same wider university facilities. Nonetheless, in examining aspects of the learning environment of the science students, a number of obvious differences to the learning environment experienced by the accounting students can be noted. First, there is considerable variation in the class size of both cohorts and in the opportunities available to students to meaningfully engage in activities with teaching staff. The accounting students take the majority of their lectures in groups of over 100, whereas the science students are frequently taught in smaller groups. The smaller class size makes it easier for the science students to interact with lecturers and to feel comfortable in asking questions and reaffirm their understanding of material. Addi-

tionally, in the science faculty, lecturers or researchers commonly give the tutorial sessions associated with the various modules, whereas accounting students usually have tutors who are studying on a taught master's programme, having only recently completed their own undergraduate studies. Furthermore, science students are also required to participate in practical laboratory sessions each week, thereby increasing their opportunity to develop an in-depth understanding of the course material. Additionally, as the experiments in the laboratories are linked to the materials being presented in lectures, this may encourage students to relate ideas across the syllabus and thereby may help explain why science students have significantly higher scores on the relating ideas subscale than accounting students. Another variation in the learning environments of the two disciplines is the fact that the majority of the science students have experienced some form of problem-based learning, unlike the accounting students, who have typically only encountered traditional modes of lecture delivery. It is reasonable to suggest that the combined classroom and laboratory experiences of the science students are more likely to foster deep approaches to learning than the classroom only experiences of the accounting students.

When examining the assessment strategies adopted in both the science and the accounting departments, it is evident that the science students are required to complete considerably more continuous assessment than the accounting students, who are predominantly assessed by terminal examinations. Prior research indicates that continuous assessment is more likely to encourage deep approaches to learning than examinations (Tang 1992). This may help explain why the science students in this study report significantly higher scores on the deep scale. The dominance of examinations for the accounting students may also explain why these students had significantly higher scores on some of the strategic subscales compared with the science students. In particular, the accounting students may have a strong need to constantly seek cues on what might be asked in examinations, which may account for their higher score on the alertness to assessment demands scale.

Finally, differences in the scores of both groups on the strategic and deep scales may be attributed to variations in students' motives for choosing their disciplinary area. A recent Irish study has shown that accounting students are predominantly motivated to pursue an accounting degree for extrinsic reasons, and that they are strategic in orientation (Byrne and Flood 2005). More specifically, the students seek academic achievement so that they can progress to well-paid careers in accounting (Byrne and Flood 2005). The higher scores reported by the accounting students on the strategic subscales of achieving and monitoring effectiveness are thus aligned to their intentions to succeed. In contrast, Kelly (2005) found that Irish science students reported that an intrinsic interest in their subject area was their principal motivation for selecting a science degree. This may help explain the science students' significantly higher score on the interest in ideas subscale within the deep scale.

Implications and conclusions

This comparative study has identified variations in the learning context of accounting and science students at an Irish university that may contribute to differences in students' approaches to learning. In particular, the study has highlighted aspects of the science learning environment which seem to be more conducive to the adoption of deep approaches. The analysis suggests that within accounting there is a need to reconsider the over-reliance on terminal examinations within the assessment strategy, as well as the dependence on large lectures as the mode of teaching.

The results of this study show that accounting students favour a strategic approach; they are focused on achieving and they adopt the learning strategies they consider will earn them the best marks. Thus, if these students are to be encouraged to adopt deep approaches to learning, the assessment techniques employed must be designed to reward such approaches. Where examinations are used within the assessment strategy, it is critical that students are required to demonstrate their understanding of material in order to gain high grades. Students should not be able to do well simply by reproducing memorised class notes. To achieve this, educators will have to invest considerable time and effort in designing challenging unseen examination problems. Additionally, the introduction of more continuous assessment (i.e. case studies, essays, presentations) should help accounting educators devise tasks that encourage students to develop as effective learners. Also, giving students more freedom and autonomy in their learning and more choice within the assessment system allows students to develop as independent learners, thereby stimulating the utilisation of more appropriate learning strategies (Entwistle and Ramsden 1983).

The prevalence of large lectures in accounting must be addressed. Resources need to be invested which allow accounting academics to engage in small-group teaching. Smaller classes would not only enhance student engagement, they would also facilitate a more student-centred approach to teaching. In such an environment, the lecturer is better able to actively challenge students' understanding, to encourage students to engage in discussions and to cultivate a personal interest in their studies. Further, with reduced student numbers it is easier to implement student-centred approaches to teaching, such as problem-based learning. Indeed, as stated earlier, it is possible that the use of problem-based learning in science may help to explain why the science students in this study have significantly higher scores on the deep scale than the accounting students. The emerging literature on fostering deep approaches to learning in accounting (e.g. English, Luckett, and Maldenovic 2004; Hall, Ramsey, and Raven 2004) may inform changes in the teaching and learning environment at the Irish university.

Finally, although the above discussion offers accounting educators some ideas on how to improve the quality of their students' learning, it is important

to be aware of the limitations of this study. First, as the data were collected from only one institution, the generalisability of the findings is limited. Second, the ASSIST measures the broad learning approaches of students; to capture individual differences in learning, a combination of qualitative and quantitative research is advisable. Finally, this study only examined some of the differences prevalent in the two learning environments that were likely to contribute to variations in the students' approaches to learning. It is possible that factors not considered in this study, such as prior learning experiences and intellectual ability, may also have contributed to the learning differences identified. Despite these limitations, this study has contributed to the student learning literature in accounting by using a comparative approach to give accounting academics an enhanced appreciation of variables in the learning environment of another discipline that appear to be more aligned with deep approaches to learning.

Notes on contributors

Marann Byrne is an associate professor at Dublin City University (DCU) Business School. Her teaching specialism is financial accounting and her research addresses a wide range of issues pertaining to accounting education at both second and third level.

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Orla Lyons was part of this research team when she was a postgraduate student at DCU Business School. On completion of her postgraduate studies she went on to train as a chartered accountant.

Pauline Willis is a lecturer at DCU Business School. Her teaching specialism is taxation and her research focuses on students' perceptions of accounting and approaches to learning accounting at both second and third level.

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