TEACHING AND ASSESSING CRITICAL THINKING: THE INTERACTION OF STUDENT APPROACHES TO LEARNING AND TEACHING APPROACHES

Thompson, R.[1], Irmer, B.[1], and Tang, T.[2]
[1] *School of Management, Queensland University of Technology, Australia*
[2] *School of Economics and Finance, Queensland University of Technology, Australia*

Abstract

This study explored the relationship among student approaches to learning and teaching methods on critical thinking in two business units. Key findings included differences in critical thinking scores between student approaches to learning and some evidence of an interaction between student approaches to learning and critical thinking teach method (immersion vs. infusion). Possible explanations for the results are examined and implications for developing critical thinking skills across a degree discussed. What is apparent is that as Universities move towards program-wide level assessment of critical thinking, further work is required in terms of the design of critical thinking teaching interventions and assessment at the unit, school, and degree level. The session will discuss the challenges in developing critical thinking programs in individual units and at the Faculty level.

Introduction

Over the past 25 years, learning and the learner have become of central importance in the teaching/learning interaction (e.g., Marton & Saljo, 1997; Biggs, 1999) and 'what the learner does' (or is likely to do) plays a significant role in conceptualising curriculum, assessment and teaching strategies. Teaching seen as the 'facilitation of student learning' leads to the redefinition of course objectives in terms of learning outcomes rather than of teaching inputs. For example, this change is reflected in the QUT Faculty of Business (2011 adoption of assurance of learning goals, which state that:

> "Students will develop the following capabilities relevant to a contemporary global and sustainable business environment, and have knowledge and skills pertinent to a particular discipline; be critical thinkers and effective problem solvers; be professional communicators in an intercultural context; be able to work effectively in a team environment; and have a social and ethical understanding."

Thus, Business graduates need to be technically competent, but also have the ability to think critically. Achieving these capability outcomes raises several issues, both within the context of a multi-discipline Faculty and the current literature on deep learning and critical thinking that questions the efficacy of many critical thinking programs (Smith, 2003; Willingham, 2007) while at the same time acknowledging the importance of higher order thinking skills in well rounded graduates (Berzins & Sofo, 2008).

Any effort to create a learning environment intended to progress the development of critical thinking and deep learning depends on some level of agreement on what critical thinking and deep learning means (Kuhn & Dean, 2004). Critical thinking can be viewed from several perspectives and all perspectives can potentially add value to the development of these capabilities. However, the differing perspectives contribute to the difficulty of framing the concept usefully. It is ill defined, difficult to teach, difficult to assess, difficult to apply

consistently, requires discipline specific factual knowledge to support, require general knowledge and skill to support (Berzins & Sofo, 2008; Braun, 2004; Halpren, 1998). The diversity of perspectives on critical thinking and analysis makes establishing a sensible deep learning and critical thinking goal at a faculty level more challenging, if we want well rounded business graduates. An assurance of learning goal that acknowledges the diversity and the implications for program level assessment is necessary however. In this study we examined critical thinking teaching strategies in a management and economics unit to provide more insight into the challenges of how to frame such a goal.

Ennis (1989) identified three general strategies for teaching critical thinking. First, the general approach in which critical thinking is taught in dedicated courses, separate from the teaching of disciplinary content. Second, the infusion approach in which critical thinking content is included in subject matter courses and is taught explicitly with disciplinary knowledge. Third, the immersion approach in which subject matter content is taught in a deep thought-provoking way, but critical thinking principles and skills are not explicitly taught. The two units in this study utilised different approaches. The management unit took an infusion approach while the economics unit took an immersion approach.

In addition to a direct focus on critical thinking, we examined the relationship between approaches to learning (deep, strategic and surface) and critical thinking. Approaches to learning describe the characteristic strategies learners use when confronted with a learning or assessment task (Entwistle, McCune & Walker, 2001). For example, a learner who adopts a deep learning approach seeks to find meaning in and understand the learning task, which requires them to engage in active conceptual analysis, and thus to deep levels of understanding. A learner who approaches a learning task using a surface approach seeks to complete the learning and/or assessment task with little personal engagement (Entwistle, et al., 2001). It would seem then that learners who adopt a deep learning approach may be more likely to invest in higher order thinking and students who adopt a surface approach less likely to engage in higher order thinking; a surface learner is less likely to invest the necessary cognitive effort and engage in the necessary cognitive processing to do well on critical thinking tasks.

These learning approaches are not fixed and unchanging, but rather dispositional tendencies overlaid by previous educational experiences and life circumstances (Biggs, 1999). Good curriculum management and good teaching can influence students to take a deep approach, while the converse can lead students to take a surface approach (Entwistle, et al., 2001). Research (indicates four key teaching and learning elements conducive to good student learning: student workload; assessment and learning objectives and outcomes; teaching method; and student choice/flexibility over choice of units (e.g., Biggs, 1999). Thus, we were interested if we could find evidence for an interaction between student approaches to learning and critical thinking strategy (immersion vs. Infusion).

In summary, we examined the interaction between student approaches to learning and critical thinking teaching strategies in two second year business units using different critical thinking teaching strategies.

METHOD

Undergraduate students in two second year units were surveyed regarding their approaches to learning (Entwistle, Tait, & McCune, 2001), preference for deep or surface features of learning environment (Entwistle et al., 2001a), conceptions of learning (Marton & Salijo,

1997), demographics, and an open-ended question asking students' their understanding of what critical thinking is. Surveys were distributed during the first and last lectures in both units. For time one, 116 useable surveys were returned in the Management unit, for a response rate of 38.4%, and 84 useable surveys were returned in the economics unit, for a response rate of 43.9%. Time 2 surveys were distributed in week 13, however, there were an inadequate number of responses in the Management unit to conduct valid analysis. When completing the survey students provided a unique identifier in order to link their responses with their performance on unit assessment. In order to ensure confidentiality of responses the matching of survey responses with assessment outcomes was conducted by an independent research assistant who was not involved in any capacity in either unit. Critical thinking in students' essays was evaluated using criterion referenced assessment sheets (available from authors).

RESULTS

The analyses began by clustering respondents based on their twelve approaches to studying scale scores to identify distinct profiles using k-means cluster analysis. The number of clusters specified was guided by two concerns: Theoretical interpretability and the need for cell-sizes (observations per cluster) that are large enough for generalisabilty. Initially, drawing on Entwistle et al.'s (2001a) propositions that "three or four factors typically emerge from item analyses which represent deep, surface, strategic, and apathetic approaches to studying" (p.34), a 3 and 4 four factor solutions were requested. Only the 4 cluster solution met the two criteria mentioned above.

The first group's profile had above average levels of both deep and strategic approach and low surface approach scores (n=64). This profile is in line with the Deep-Strategic approach. The second group, labelled strategic approach (n=42), consisted of students with high scores on all five strategic approach sub-scales, low scores on all surface approach scales and comparatively moderate scores on deep approach scales. The third group had a similar profile to the deep-strategic and strategic group in terms of deep (i.e., high) and surface (i.e. low) approach but was significantly lower on the strategic approach scales. Thus, this group was labelled apathetic (n=46), as their scores indicate a moderate interest in learning without a strategic performance (i.e. grades) outcome focus. The final group was consistent with a surface approach (n=48), with comparatively lower scores on strategic and deep approach scales and high scores on the surface approach scales.

To determine whether profile groups differed in terms of preferences for learning environments and ratings of critical thinking, univariate analyses of variance (ANOVA) was conducted. The results indicated that all outcome variables significantly differed across the profile groups (p<.001) for all groups, and pos-hoc comparisons revealed several interesting observations. Not surprisingly, the deep-strategic group preferred learning environments that supported understanding, and also outperformed the surface-apathetic groups on the critical thinking criteria of their essays. The strategic approach to studying group outperformed the surface-apathetic groups on the critical thinking criteria of their essays. There were no significant differences between the surface and apathetic groups on either critical thinking performance or preference for learning environments.

A 4 (approach to studying) x 2 (teaching approach) ANOVA was performed on critical thinking criteria. The means and standard deviations of critical thinking marks associated with each of the four learning approaches for both units are depicted in figure 1. As expected, a significant main effect was obtained for approaches to studying profile, $F(3, 192) = 4.43$, $p <$

.01, η^2 =.07, with the deep and strategic groups scoring higher on the critical thinking criteria than the surface and apathetic groups. There was also a significant main effect for teaching approach, with critical thinking scores higher in the economics unit (immersion) than in the management unit (infusion). While, the omnibus F-test for study profiles by unit interaction effect was not significant, $F(3, 192) = 1.51$, n.s., η^2 =.02, a visual inspection of the data indicated potential differences between the two units (see figure 1). In the management unit, there is a significant difference on critical thinking scores between the strategic and deep groups compared to the surface and strategic groups, $t(110) = 3.87$, $p < .001$, η^2 =.12, while in the economics unit this comparison was not significant, $t(58) = 1.58$, ns, η^2 =.04. The simple effect between management unit and the economic unit on critical thinking mark was significant for the apathetic, $t(41) = -2.28$, $p < .05$, η^2 =.11, and surface groups, $t(44) = -2.92$, $p < .01$, η^2 =.16, but not the strategic, $t(39) = -.66$, ns, η^2 =.01, and deep groups, $t(54) = -.23$, ns, η^2 =.00.
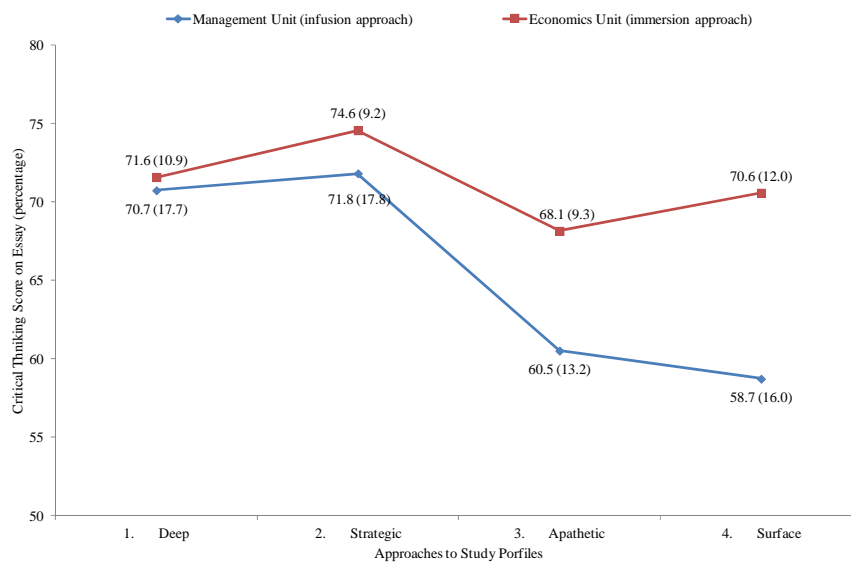
Note: Values in parentheses are standard deviations.

Figure 1. Observed pattern of means for critical thinking marks across units by approaches to study profiles

DISCUSSION

At this stage of data collection and analysis, it is possible to make a few tentative observations. In line with previous literature there appears to be a relationship between students approach to learning and their scores on critical thinking criteria on essays. This pattern was particularly apparent in the management unit (infusion approach), where the deep and strategic approaches were associated with higher performance on critical thinking and demonstration of conceptual understanding. However, this pattern was not replicated in the economics unit, which utilised an infusion approach.

We are currently investigating possible explanations for this result. Possible explanations for the results include differences in: 1). Critical thinking teaching approaches – immersion versus infusion approach; 2). Critical thinking assessment criteria; 3). Assessment task - the management essay task may be more suited to "deep learning" approach than the greater fact-orientation in the economics unit due to discipline requirements; and 4). Subject specificity – the nature of critical thinking varies from discipline to discipline.

We are currently examining the qualitative data in conjunction with comparing the task and criteria used in the units to better understand what may explain the different patterns across the two units. What is apparent is that as the Faculty of Business moves towards a program level assessment of critical thinking further work in this area is required. At the program level we are in a relatively early stage of development in terms of designing and evaluating teaching and learning strategies that would increase the likelihood of our students achieving these capability outcomes. Designing and implementing a Faculty level approach to develop critical thinking poses several challenging questions:

- How do we coordinate critical thinking capability building at a program (degree) level?
- How do we design such an approach to cater for learners that begin from different places and that can achieve high order thinking capabilities via different pathways?
- How do we recognise that different disciplines may require different types of thinking and level of epistemic reasoning?

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