Chapter 5
Online Discussion in Engineering Education:
Student Responses and Learning Outcomes

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EXECUTIVE SUMMARY

A ubiquitous and widely used feature of online learning environments is the asynchronous discussion board. This chapter presents a case study of the introduction and evaluation of student use of an online discussion in an engineering management study unit. We introduced an assessable assignment task based on student use of an online discussion, in response to falling student unit evaluation results after we initially moved the unit to wholly online delivery mode. Both quantitative and qualitative unit evaluation data suggest that students perceive value in the online discussion activities. A regression analysis based on discussion usage data suggests that students derived significant learning outcome benefit toward their final unit grade from making reflective postings in the online discussion.

BACKGROUND

Dialogue is considered to be an essential element of human learning, particularly for distance education (Gorsky & Caspi, 2005). It includes interactions between students and teachers, exchanges between students, interactions between students and others not directly involved in their learning processes and dialogue with oneself in the form of reflective thought (Webb, Jones, Barker, & van Schaik, 2004). With the advent of online technologies in teaching and learning, particularly in distance education, the use of online discussion forums is now a widespread medium for learning dialogue. Online discussion can be synchronous through the use of real-time chat tools, but many examples of online discussions documented in the literature present the use of asynchronous discussion. That is, where students post new and follow-up messages to an electronic bulletin-board at the times that suit them, and not necessarily at the same time that other

DOI: 10.4018/978-1-61520-863-0.ch005

students are accessing the discussion system. The claimed benefits of online asynchronous discussion forums include:

- The time between postings for reflective thought that might lead to more considered responses than those possible in face-to-face situations (Garrison, Anderson, & Archer, 1999);
- For off-campus students, two-way communication can be enhanced, reducing student isolation and making possible dialogue with other students (Kirkwood & Price, 2005);
- The convenience of choice of place and time to learners (Cotton & Yorke, 2006);
- The creation of a sense of community (Davies & Graff, 2005);
- The development of skills for working in virtual teams (Conaway, Easton, & Schmidt, 2005);
- Increased student completion rates from increased peer interaction and support (Wozniak, 2005); and
- Increased student control, ability for students to express their own ideas without interruption, the possibility to learn from the collectively created content, the creation of a permanent record of one's thoughts, the creation of a reusable instructional tool that models expected answers and discussion use, and they create a valuable archive of material for investigation and research (Hara, Bonk, & Angeli, 2000).

Although there is wide agreement that participation in online asynchronous discussions can enhance student learning, and significant work has been done characterizing, and theorizing on the nature of student communications in online discussions, it has also been identified that there is a need to investigate the impact on student course performance of participation in online discussions (Hara et al., 2000). Stacey & Rice (2002) conducted a combined quantitative and qualitative analysis of the online discussion postings of education students studying by distance education in Australia. It was found that those students achieving the highest final unit grade also had the highest frequency of posting, and that lower achieving students were less active online. Although, the authors do not claim these findings as conclusive evidence of the effect of online participation on learning outcomes (as measured by marked assessment activities) (Stacey & Rice, 2002). In a quantitative analysis of two online discussions in the UK involving 543 computing students, it was found that both the number of student accesses of the system and the number of student postings to the system were significant predictors of variance in final mark (in one case) and variance in final grade (in the other) (Webb et al., 2004). Davies & Graff (2005) conducted a quantitative analysis of online discussion usage involving 122 UK business students based on what percentage of all online system accesses related to usage of the online communication system. It was found that students achieving high or medium passing grades were significantly more active in the discussion area than students achieving a low passing grade, and in turn, students achieving a low passing grade were significantly more active than students who failed (Davies & Graff, 2005).

It is noted that although the literature suggests a correlation between increased interaction and increased learning, there is limited research to understand the impact of different types of postings on learning outcomes (as measured by unit final grade) (Conaway et al., 2005). Simply encouraging students to get more involved in online discussions may not necessarily lead to better learning outcomes – there is a need to understand what are the 'salient factors' in online interaction that might enhance learning (Davies & Graff, 2005). One debated factor is whether student participation in online discussions should be optional or mandatory. It has been noted that some learning theories suggest that user motives