Chapter 8
The Practice and Evaluation of Applying PBL to e-Learning via Screencasting: Implications for Computing Courses

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ABSTRACT
As the practice of e-learning continues to proliferate, online educators, especially in the computing disciplines, are facing special challenges. This chapter represents an effort in moving the existing problem-based learning (PBL) paradigm to e-learning through the use of screencasts. In the form of an empirical case study, the chapter provides empirical evidence and indicative support for the successful application and evaluation of PBL methods in a highly technical computing course that has traditionally been taught in a face-to-face setting. This chapter makes a unique contribution to the e-learning research with respect to the applicability of PBL methods in the online environment and the exciting possibilities for screencasting as an instructional technology. It also offers implications for creating e-learning courses that can prepare students to develop lifelong problem solving skills and become more motivated and responsible learners in today’s networked society.

INTRODUCTION
With the wide acceptance of Web-based course delivery as a legitimate alternative to face-to-face instruction (Bernard et al., 2009), e-learning is growing at a stunning rate, especially in the higher education arena. E-learning is defined as “the delivery of education (all activities relevant to instructing, teaching, and learning) through various electronic media” (Koohang & Harman, 2005, p. 77) and is also called distance education, Web-based instruction, or online learning (Mehlenbacher et al., 2010). The escalation in e-learning is evidenced by the rise in dedicated
virtual universities and the growth of online courses within the United States in particular and around the world in general. The 2011 Sloan Survey of Online Education in the United States reveals that the number of students taking at least one online course in fall 2010 has surpassed 6.1 million; online enrollment accounted for nearly one-third of the total enrollment in higher education (The Sloan Consortium, 2011). It becomes vital for today’s educators to understand effective online instructional methods, as well as how to exploit technology in ways that can take advantage of its power.

As e-learning continues to thrive in modern educational institutions, the literature begins to abound with guidelines, principles, and models for facilitating online learning in various disciplines such as mathematics (Yates & Beaudrie, 2009), psychology (Dell, Low, & Wilker, 2010), health science (Chapman et al., 2011), and MBA (Peters, Shmerling, & Karren, 2011). However, close examination reveals that there is very little pedagogic evidence supporting the online delivery of computing courses, such as with Web development or application programming. Ironically, these courses are usually offered by CS, IT and Engineering departments and aim to train computer professionals who will be designing, implementing or inventing future technological solutions for e-learning.

Statement of the Problem

Web development courses have traditionally been taught in a face-to-face mode; when they are conducted in a fully online setting, there are a number of special challenges and issues: As the course content is technical in nature, learning is most effective when the instructors can demonstrate specific techniques in an interactive teaching environment and when the students are engaged in hands-on exercises and solving relevant problems. However, it is difficult to re-create such classroom experiences in the cyberspace. Many early models for computer-based training tended to emphasize delivery of information rather than online learning (Laurillard, 1993); and using online education systems simply for posting static materials or making information available on the Internet is inadequate for the instruction of technical content. Therefore, a common problem faced by most educators, especially in the computing disciplines, is how to provide a learning experience that is effective for students to develop knowledge in an e-learning environment.

Research Questions

This study aims to incorporate the existing problem-based learning (PBL) paradigm into the design and delivery of a highly technical online computing course and facilitate it through a relatively new instructional technology – screencasting.

More specifically the study intends to address the following two research questions:

1. How and to what extent does the online delivery of a highly technical computing course incorporate PBL methods?
2. How do students benefit from a PBL-based online computing course facilitated through screencasting?

The rest of this chapter is organized as follows: The chapter begins with an introduction to cognitive constructivism and an explanation on why PBL, a constructivist application, is appropriate for e-learning. Next, the chapter presents an empirical case study and provides practical implications and specific techniques for applying PBL methods via screencasting in the context of a Web development course. The chapter further reports findings from the summative evaluation. The chapter concludes with a short summary highlighting the contribution of the work and directions for future explorations.