Chapter 2.18
Evaluating Online Learning Applications:
Development of Quality–Related Models

Leping Liu
University of Nevada, Reno, USA

ABSTRACT

The purpose of this study was to explore the influence of the design-quality of current online K-12 learning applications on student learning via three learning-related variables (student enjoyment, motivation, and anxiety level when using those online applications). Nine hundred online K-12 applications (WebQuests, online drills, games, tests, and other applications) were evaluated in terms of four design factors (quality of information, design of information, quality of technology use, and design of technology use) in relation to the three learning-related variables. Three prediction models were generated and tested in this study. An intermediate effect was found between the design of online application and student learning, which may provide some insights for teachers when they integrate online applications into teaching and learning. The target audience of this paper may be school teachers, designers, or professionals who use online applications for education purposes.

INTRODUCTION

The Internet has been used in many ways to promote teaching and learning (Aviv & Golan, 1998; Barnard, 1997; Berge, 1997; Coombs & Rodd, 2001), from the use of Web-based resources to the employment of Web-based instruction (Berge, Collins & Dougherty, 2000; Bonk, Cummings, Hara, Fischler & Lee, 2000; Miller, & Miller, 2000; Fishman, 1997; Riel, 1992; Trentin, 2001). In the literature, one common use of the Web in K-12 teaching and learning appeared to be the

utilization of existing online learning applications, such as tutorials, drills, games, or video products that were developed and posted onto the Web by other educators or designers (Liu, 2001; Murphy, 2004; Shelly, Cashman, Gunter & Gunter, 2003). It is hard to imagine and estimate the number of learning applications available on the Web today: a Google search on "math game" could result in 691,735 items; and a random exploration on 10 links found that, on average, 25 to 35 online math games were under each link.

Unfortunately, the effectiveness of using those online learning applications on student learning achievement was ambiguous (Maddux, Ewing-Taylor & Johnson, 2002). In a study that consisted of 102 technology integration cases, Johnson and Liu (2000) found that the use of existing Web activity did not contribute significantly to either the success of the technology integration or to student learning-outcome. The issue is that if the use of those online applications could not effectively improve learning, such a tremendous amount of resources would be a huge waste, and sometimes may cause confusion.

Many studies have explored the possible causes of such unsatisfied use of the Web and suggested that a lack of design was one common weakness in educational applications such as online communication, online courses, and online instructional content or activity (Boer & Collis, 2001; Liu, 2003; Liu & Maddux, 2003; Schweizer, Whipp, & Hayslett, 2002). The purpose of this study is to explore the influence of the design-quality of current K-12 online learning applications on student learning.

In this chapter, the definitions and major types of K-12 online learning applications are introduced first. Next, variables examined in this study are identified, including four design-related variables (quality of information, the design of information, quality of technology use, and the design of technology use) that are derived from a technology integration model (Liu & Johnson, 2003a, 2003b; Liu & Velasques-Bryant, 2003)

and three learning-related variables (enjoyment, motivation, and anxiety) that have been found to have direct impact on learning achievement (Liu & Johnson, 1998; Liu, Maddux & Johnson, 2004). The four design-related variables then are used to evaluate the quality of 900 online K-12 learning applications in relation to the three learning-related variables. At the end, a set of quality-related models that illustrate the relationships are generated and tested.

ONLINE LEARNING APPLICATIONS

Definition

In the context of current study, the term *online learning application* can be defined as any entity of instructional contents or activities delivered through the Web that has the following features:

1.   Intends to teach a focused concept;
2.   Meets specific learning objectives;
3.   Provides a learner-centered context; and
4.   Is an individual piece that can be used and reused.

The concept of *learning application* in this chapter is very much similar to that of a widely discussed term—*learning object*—where a learning object is an object-oriented application (Barker, Winterstein & Wright, 2004; Dodero, Aedo & Diaz, 2002; Murphy, 2004). The author carefully chose not to use the term *learning object* because some learning applications examined in this study were not object-oriented, and could not concisely fit the definition of a learning object.

Types of Online Learning Applications

A learning application can present learning content, provide learning activity, contain simulation,

Related Content

Computer-Based Simulation in Blended Learning Curriculum for Hazardous Waste Site Worker Health and Safety Training
Cheryl West, Craig Slatin, Wayne Sanbornand Beverly Volicer (2011). *Online Courses and ICT in Education: Emerging Practices and Applications (pp. 230-241).*
www.irma-international.org/chapter/computer-based-simulation-blended-learning/50187

Western Governors University and Competency-Based Education
Douglas B. Johnstone (2005). *Encyclopedia of Distance Learning (pp. 2029-2035).*
www.irma-international.org/chapter/western-governors-university-competency-based/12387

Cultivating Greater Acceptance of Women in Technology: A Pilot Study
Mara H. Wasburn (2007). *International Journal of Information and Communication Technology Education (pp. 22-35).*
www.irma-international.org/article/cultivating-greater-acceptance-women-technology/2306

Mashup of E-Learning Services: Emerging Technologies and Practices
Neil Y. Yen, Timothy K. Shih, Qun Jin, Hui-Huang Hsuand Louis R. Chao (2012). *Intelligent Learning Systems and Advancements in Computer-Aided Instruction: Emerging Studies (pp. 194-213).*
www.irma-international.org/chapter/mashup-learning-services/61970

Educational Data Mining Applied to a Massive Course
Luis Naito Mendes Bezerraand Márcia Terra Silva (2020). *International Journal of Distance Education Technologies (pp. 17-30).*
www.irma-international.org/article/educational-data-mining-applied-to-a-massive-course/263759