Enhancing E-Learning with Interactive Multimedia

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ABSTRACT

Nowadays, multimedia-based e-Learning systems have become widely available. Many systems, however, provide little interactivity to learners. E-Learners do not have much control over learning content and process to meet their individual needs. Therefore, we face challenges of how to integrate instructional material in different media and how to provide flexible process control in an e-Learning environment to enable personalized knowledge construction and improve learning effectiveness. In this study, we propose that an e-Learning system with interactive multimedia can help learners better understand learning content and achieve learning performance comparable to that of classroom learning. The results from an empirical study show significant evidence in support of our proposition. It explores an important issue towards building effective multimedia-based e-Learning environments.

Keywords: e-learning; multimedia instructions; interactivity; content-based structural support

INTRODUCTION

Globalization requires new methods of delivering education and training, partly to enhance traditional methods of knowledge acquisition and to impart new skills and tools (Adam, Averbuch, Slonim, Wegner and Yesha, 1997). Traditional classroom learning doesn’t seem to fit well with the notion of lifelong learning, since it requires the physical presence of instructors and students. It is instructor-centric because instructors control the class content (e.g., topic, course material and discussion) and pace (Baloian, Pino and Hoppe, 2000). With the increasing use of networked computers and advancements in telecommunication technology, learning methods and infrastructures are becoming more portable and flexible in order to enable anywhere, just-in-time and self-centered learning.

As an emerging solution, e-Learning has been crucial to meet this new challenge. In this paper, the term e-Learning refers to any type of learning that uses electronic instructional material delivered via the...
Internet. In the past decade, a dramatic shift to e-Learning has been occurring in the world of open and distance learning. With the latest advancement in multimedia technology, more and more e-Learning systems use multimedia content to take advantage of its rich information cues. In many systems, however, multimedia content is presented in a static, passive and unstructured manner without close association among material in various media. Learners have little flexible control over learning content and process to meet their individual needs. As a result, it is less likely to engage e-Learners (Hammond, McKendree, Reader, Trapp and Scott, 1995; Hiltz and Wellman, 1997). Therefore, we face challenges of how to integrate multimedia instructions, and how to increase interactivity and flexibility in an e-Learning environment.

In this paper, we develop an interactive multimedia-based e-Learning system called Learning By Asking (LBA). LBA features synchronized multimedia instructions and high learner-content interactivity. The difference in learning performance and learner satisfaction between an LBA group and a traditional classroom group has been examined through an empirical study. The results show that students using the LBA system achieved significantly higher learning performance than those in the traditional classroom, while levels of learner satisfaction of the two groups were equivalent.

The paper is organized as follows. First, we describe features and benefits of e-Learning. Then, multimedia use in distance learning is reviewed, followed by an introduction of the prototype e-Learning system (LBA) used in this study. Next, the experimental design and data analysis are demonstrated. Finally, we discuss the findings and conclude the paper.

E-LEARNING

A considerable amount of research has been conducted on e-Learning. In contrast with traditional classroom learning, e-Learning brings distinct benefits to learners (Beam and Cameron, 1998; Hiltz and Wellman, 1997; McCloskey, Antonucci and Schug, 1998):

- **Time and location flexibility**
  E-Learning eliminates the barriers of time and distance by offering just-in-time, on-the-job learning. It has potential to reach a global audience.

- **Cost and time savings**
  In e-Learning, learners do not have to travel to a specific location. It is reported that the companies using online training can expect an average of 50% in time savings and 40% to 60% in cost savings compared with conventional training (Khirallah, 2000).

- **Self-paced learning**
  E-Learning fosters self-directed and self-paced learning by enabling learner-centric activities.

- **Collaborative learning environment**
  E-Learning links each learner with physically dispersed experts and other learners, together to form an online collaborative learning community (Alavi and Leidner, 2001). By electronic means, an e-Learning environment encourages learners to ask questions that they may not be able to ask in a conventional classroom, and to share different ideas with others more easily through online discussion forums.

- **Unlimited use of learning material**
  E-Learning allows unlimited access and retrieval of electronic learning material. People can review information/knowledge stored in centralized knowledge re-
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