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Abstract

Instructors place an emphasis on preparing students to graduate from college with good decision-making skills needed to be qualified managers. This is done for the purpose of enhancing students' performance in a real-world work environment. Researchers state that to prepare students to be successful as they go on to enter the work force, it is critical to provide them an education that encompasses higher-order cognitive skills, such as reasoning, problem identification, criteria specification, information search, integrating, interrelating, and problem solving. However, communicating information technology (IT) concepts at the graduate level can be a difficult and challenging task. This is especially true when instructors are faced with a heterogeneous class made of non-traditional students with varied backgrounds in IT.

The Laboratory for Innovative Technology and Engineering Education (LITEE) attempts to address these issues by developing and disseminating award-winning, innovative multimedia instructional materials that bring real-world issues into classrooms. This paper conducts a preliminary evaluation on the use of LITEE multimedia instructional materials in a graduate level IT course at a non-traditional institution. The results of this evaluation should help researchers and educators to assess the potential of LITEE multimedia instructional material in facilitating the utilization of higher-order cognitive skills.

Introduction

Interest and growth in higher education are top priorities for researchers and educators who serve the non-traditional, adult student population (Franklin, Peat, & Lewis, 2003). Universities, especially those offering postgraduate degrees, that cater

specifically to non-traditional students have come into existence to fulfill a growing demand that is not currently being met by traditional universities (Capogrossi, 2002). In addition to this trend and the void in catering to non-traditional students, it is becoming an increasingly difficult and challenging task to communicate information technology (IT) concepts at the graduate level (Mbarika, 2003). This is especially true since instructors are faced with a heterogeneous class made of non-traditional students with varied backgrounds in IT.

Instructors place an emphasis on preparing students to graduate from college with good decision-making skills needed to be qualified managers. Educators have, therefore, invested much to prepare students to be successful as they go on to enter the work force. This is done for the purpose of enhancing students' performance in a real-world work environment (King, 2000). The need for qualified personnel with good technical and analytical skills is well documented in job postings and academic literature. These technical skills usually include a good understanding of technical issues related to a given line of business, whether it is Accounting, Finance, Engineering, or IT. Communicating highly technical issues to managers in a way they can comprehend has been an issue of concern in both academia and the industry (Lim & Benbasat, 2000). Researchers state that in order to prepare students to be successful as they go on to enter the work force it is critical to provide them an education that encompasses higher-order cognitive skills such as reasoning, problem identification, criteria specification, information search, integrating, interrelating, and problem solving (Guzdial & Soloway, 2002; King, 2000).

Preparing graduate students for the workforce with an education that encompasses higher-order cognitive skills posits a major challenge to the instructor. Given that student learning is the primary purpose of teaching (Larkin-Hein & Zollman, 2000), it is worth investigating methodologies that can help instructors effectively communicate IT concepts to a heterogeneous graduate class made of technical and non-technical non-traditional students. One methodology that has been identified as helping instructors communicate difficult technical concepts, to traditional students, in the field of Information Technology and Engineering is the Laboratory for Innovative Technology and Engineering Education (LITEE[1]) multimedia instructional materials, specifically multimedia case studies (Mbarika, 1999; Mbarika, Sankar, Raju, & Raymond, 2001; Raju & Sankar, 1999).

Prior research indicates that there is a difference in the way traditional and non-traditional students learn (Miller, 2003). Therefore, it is important for educators to study non-traditional students to be able to understand what learning differences might exist and how to best accommodate for these varying learning styles. However, since interactive technologies, such as multimedia case studies, are transforming the techniques by which educators can meet the unique needs of non-traditional students, the utilization of multimedia case studies to communicate IT concepts to non-traditional students may prove to be valuable.

Whereas there is substantial literature on the use of multimedia case studies to promote interest and learning in traditional undergraduate (Mbarika, Sankar, & Raju, 2003; Mbarika et al., 2001; Raju & Sankar, 1999) and graduate classes (Mbarika, 2003), there is far less literature on the use of multimedia case studies in non-traditional graduate classes. Employing such a methodology in courses at a non-traditional institution would provide an opportunity to assess whether multimedia case studies enhance non-traditional graduate business students' higher-order cognitive skills. Thus, the purpose of this paper is to conduct a preliminary evaluation on the use of a LITEE multimedia case study in a graduate IT course at a non-traditional institution. The results of this evaluation should help researchers and educators to assess the potential of LITEE multimedia case studies as pedagogy to facilitate higher-order cognitive skills in graduate students at non-traditional institutions of higher learning. Students' perceptions to the multimedia case study will be measured subjectively using a validated instrument containing learning driven constructs. In addition, students' perceptions to the multimedia case study approach will be measured objectively using the results of pre and posttests, which are based on concepts discussed in the multimedia case study. Following this introduction, Section 2 defines multimedia and higher-order cognitive skills. Section 3 discusses the research methodology. Section 4 describes the case study administration process.

Definitions

Multimedia

The term multimedia generally refers to the combination of several media of communication such as text, graphics, video, animation, music, and sound effects (Gaytan & Slate, 2002/2003). When used in conjunction with computer technology, multimedia has been referred to by some as interactive media (Fetterman, 1997; Gaytan & Slate, 2002/2003). Gaytan & Slate cite four components essential to multimedia. The components include (a) a computer to coordinate sound, video, and

interactivity; (b) hyperlinks that connect the information; (c) navigational tools that browse the website or web page containing the connected information; and (d) methods to gather, process, and communicate information and ideas. Multimedia does not exist if one of these four components is missing, and depending upon which component is missing the product might be referred to by a different name. For example, the product might be referred to as (a) "mixed media" if the component that provides interactivity is missing; (b) a "bookshelf" if the it lacks links to connect the information; (c) a "movie" if it lacks navigational tools allowing the user to choose his or her course of action; and (d) "television" if it does not provide users the opportunity to create and contribute their own ideas (Gaytan & Slate, 2002/2003). Thus, multimedia, appropriately defined, is "the use of a computer to present and combine text, graphics, audio, and video with links and tools that let the user navigate, interact, create, and communicate" (Gaytan & Slate, 2002/2003).

Higher-Order Cognitive Skills

The development of students' higher-order cognitive skills (HOCS), namely, the abilities of critical thinking, decision-making, question asking, and problem solving has been emphasized as the superordinate goals in technical, scientific, and medical education (Zoller, 1994). HOCS is purposeful, outcome-directed thinking. Evidence of its existence is based on a body of scientific knowledge derived from research and other sources. The approach in the development of HOCS is broader than merely seeking a single solution to a problem. It involves identifying options or alternatives through the synthesis of data, and then selecting an option or alternative that best meets the desired outcome. In other words, the outcome directs and gives meaning to the task. HOCS relate to the perception that an individual has acquired an adequate portfolio of skills to make a decision within a specified period of time. It implies an improved ability to identify, integrate, evaluate, and interrelate concepts, and hence make the appropriate decision(s) in a given problem-solving situation (Hingorani & Sankar, 1998; Notar, Wilson, & Ross, 2002; Zoller, 2000, 2002). Most individuals are capable of learning how to perform critical thinking, given a long-term development process that is practiced, nurtured, and reinforced over time.

Given the impact of learning-driven constructs on improving a student's higher-order cognitive skills using multimedia case studies, our research question is as follows:

1)   What are the perceptions of graduate students at a non-traditional institution on the impact of learning-driven constructs and higher order cognitive skills when using multimedia case studies?

Case Study Administration

Instructional Material

The LITEE multimedia instructional material chosen was *AUCNET USA Case Study: Telecommunications Networks for On-Line Auto Auction* (Sankar & Raju, 2000). This case study describes the electronic commerce initiatives of a Japan based business-to-business (B2B) company, AUCNET Japan, which sells automobiles to dealers using a satellite network. The new CEO of the company, wishing to fulfill the vision of his recently deceased brother, the former CEO, creates a subsidiary in the US, AUCNET USA. The newly formed business venture, AUCNET USA, is faced with decreasing dealer participation and needs to reexamine its IT architecture. This decline in dealer participation is leading to pressure from investors backing the parent company. AUCNET USA must choose between competing network technologies – and the future of the company depends on the choice made. Many dealers have dropped out and the company must act soon.

The case study covers the concepts of Internet and satellite technology, electronic commerce, proprietary systems, competition, new and emerging technologies, cost of technologies, marketing issues, financial management, entrepreneurship, strategic planning, and cultural and global issues. In covering these concepts, the case study has two primary objectives:
1.   To provide material so that theory, practice, and design are brought together to solve real-world problems.
2.   To provide material that facilitates the development and improvement of students' higher-order cognitive skills.
Successful accomplishment of these objectives would indicate that the students perceived that the LITEE multimedia instructional material utilized was an effective methodology for enhancing higher-order cognitive skills of non-traditional students in a graduate IT course.

Research Participants

The participants in this study will be comprised of students enrolled in a graduate level IT course at a non-traditional institution.

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Notes