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# Adaptation, Implementation, and Assessment of Multimedia Instructional Materials to Communicate Technical Issues to Business Students<sup>1</sup>

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## ABSTRACT

In this paper we examine the use of multimedia case studies in helping information systems educators communicate difficult technology concepts to students, develop higher-order cognitive skills within students, and bring real-world issues to the classroom. We conducted our assessment using qualitative and quantitative techniques.

## Keywords

Multimedia case studies, IS education tools

## INTRODUCTION

Modern-day employers want employees to be effective problem solvers, decision makers, team players and adept at working with Information Systems/Technology (IS/IT) professionals. Teaching IS/IT concepts to non-technical students in business schools pose a major challenge to the instructor. Given that student learning is the primary purpose of teaching (Larkin-Hein and Zollman, 2000), it is worth investigating methodologies that can help improve student learning. One methodology that has been identified as helping instructors communicate difficult technology concepts, in the field of Engineering, is multimedia case studies (Raju and Sankar, 1999; Mbarika, et al., 2003, Mbarika, 1999).

This project examines whether multimedia instructional materials packaged in the form of published case studies on CD-ROM can improve students' higher-order cognitive skills and bring real-world issues to the classroom. These materials were originally designed for an engineering audience (undergraduate students) but have many concepts that are taught in IS/IT classes using traditional textbook approach. The course we are using for this project is an introductory information technology course taught at a major southeastern university. This course covers contemporary topics in information systems; a survey of information system analysis and design; introduction to data communications; decision support and expert systems; and computer hardware and software.

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The following are examples of two multimedia case studies that fit within topics covered in our introductory IS/IT course. These case studies have a mix of multimedia elements such as video, audio, animations, graphics, and various interactive simulations:

1. Crist Power Plant Case Study: In this case study, students work with an expert system to refine their decision, choosing among multiple alternatives for maintaining a turbine-generator at a power plant. The students assume the role of plant manager in solving the \$2 million problem.
2. Powertel Case Study: A wireless cellular phone company facing the choices to resolve a problem either to install a new tower in a nearby hill or to add equipment to the existing tower on top of the Sheraton hotel. This case study covers the basics of Wireless technology, including all many technical key terms and management strategies.

The table below summarizes the differences between the previous introductory Information Technology course and the current modified course we will be assessing. Here we use a scenario to teach the topic on “Decision Support Systems (DSS) and Expert Systems (ES).”

Table 1: Scenario to teach a given topic in the current versus Proposed ISDS 3100 course.

<b>Criteria for comparison</b>	<b>Previous Introductory IS course</b>	<b>Current Introductory IS course</b>
Required Course Material	A traditional textbook covering DSS and ES concepts.	CRIST multimedia case study packaged in a CD that includes hands-on practice exercises using DSS and ES software. Competency materials discussing issues in DSS and ES concepts also included on CD.
Activities involved	Students read the DSS and ES chapter in textbook before the given class, and then the topic is discussed in class in a lecture format.	Students are asked to work in groups of 4 or 5. The groups are given different decision alternatives on the turbine generator problems faced by CRIST. They are asked to use the DSS and ES software (included on the case CD) to come up with a decision. They later present their findings in front of the class.
Reference material	Students only have their textbook for reference. Even when asked to use library and other resource, the reality is that undergraduate students (at least at our university) may not do so.	Links to external web sites and other helpful resources are included on the CD. The student, when connected to the Internet can just click on those links to get to such reference materials.
Course Delivery Mechanism	Lecture only; discussing engineering and business theories.	Lecture, team work; connection of business and engineering theories to practice; involvement of outside expert from industry to address issues from the case studies.

## Criteria used to assess impact of the multimedia case studies

The criterion used to evaluate this project is based on previous well tested and validated criteria. Previous research on the impact of multimedia instructional materials to improve student learning have been measured using the *Higher-Order Cognitive Skills* factor (Hingorani et al., 1998), and *Learning-Driven* (Goodhue and Thompson, 1995; Hingorani et al., 1998) and *Content-Driven* factors (Goodhue and Thompson, 1995).

The *learning-driven factor* explains how the multimedia instructional materials were used as a tool to challenge the end user in learning difficult management and engineering topics, in connecting theories and practice, in improving students' understanding of basic concepts, and in providing the students a platform on which to learn from one another. The *content-driven factor* constitutes the technical quality of the multimedia instructional material, how easy it is to use and locate information contained on the instructional material, and how the design of the instructional material helped to make it easier and more feasible to complete assigned tasks in a timely manner. The factor, *higher-order cognitive skills*, relates to the perception that an individual has acquired an adequate portfolio of skills that could be used to make decisions within a specified period of time. It implies an improved ability to identify, integrate, and evaluate concepts within the multimedia case study, and thus make the appropriate decision in a given problem-solving situation.

## ASSESSMENT METHODS

Student learning is measured using both qualitative and quantitative instruments.

Qualitative data is collected through:

- ✓ Student weekly journal entries about their learning experiences while using the multimedia case studies.
- ✓ Observation while students engage in their learning using the two approaches in class. Observation instruments will be developed and validated based on the aforementioned criteria: *Higher-Order Cognitive Skills* factor, *Learning-Driven* factors and *Content-Driven* factors.

Quantitative data is collected using:

- ✓ Questionnaire instruments on *Higher-Order Cognitive Skills* factor, *Learning-Driven* factors and *Content-Driven* factors to measure student perceived learning and attitudes.
- ✓ Student performance on projects, quizzes and examinations to measure student actual learning.

To control for extraneous factors, a background questionnaire and a learning style questionnaire is administered at the start of implementation in each class. The background questionnaire will tap into students' prior grades in related courses and knowledge of the topic under study, major language of use, overall GPA. The learning style questionnaire measures student preferred mode of learning and study strategies.

## PRELIMINARY RESULTS

Work on this multiyear-year NSF project started in the summer of 2003. Although it is still at its early stages, we have implemented one of the LITEE case studies in our introductory data communications classes. We modified the aforementioned POWERTEL case study which was originally developed for an engineering audience but has many wireless communications concepts covered in our data communications class such as cellular technology, frequency re-use, and many other concepts about the wireless telecommunications industry. Given that we have never previously used this case study at LSU, we administered a previously validated survey to measure students' perceived learning outcomes and results show perceived improvements in the students' higher order cognitive skills. Results from this assessment will be presented at the conference. Further, feedback on how to improve our assessment methods will be solicited from the conference participants.

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