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# INFORMATION SYSTEMS IN ENTERPRISES: A MULTI-MEDIA CASE STUDY APPROACH

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## Abstract

*The objective of the workshop on information systems in enterprises is to develop a highly interactive learning environment for MIS and Operations Management faculty members so that they can bring theory and practice together in the classrooms. The goal of the workshop is to provide hands-on training to faculty members about award-winning instructional materials that are supplemented by multimedia materials. These materials have been produced as part of a National Science Foundation grant to improve undergraduate education and have proven to improve the higher-level cognitive skills of students.*

***Objectives to be Achieved when the instructional materials are used in your classrooms. The students would :***

- Receive basic training in MIS skills
- Integrate business skills with technical knowledge
- Enhance the decision-making skills
- Use principles of risk and cost management to solve problems
- Enhance teamwork among members thereby increasing productivity

## ***Methodology***

- Uses the textbook, "Information Systems in Enterprises: A Case Study Approach with CD-ROM Supplements" during the workshop.
- Uses award-winning methodology that won the *Curriculum Innovation Award* from the American Society of Mechanical Engineers International.
- Based on multimedia materials that won the Premier Award for Excellence in Engineering Education Courseware.
- Brings in real-world problems and issues to the training session using interactive CD-ROMs.
- Encourages active role-playing by students.
- Uses problem-based learning approach that leads to improvement of analytical and teaming skills.
- Highlights integration of research into solving problems related to MIS and business issues.
- Provides participants use of world-wide-web resources in analyzing management issues.
- Incorporates videos, photographs, and charts bring the real-world into the classroom.
- Increases the learning interest of the participants.
- Improves self-reported learning.
- Stimulates and challenges the participants.
- Provides opportunity to learn from each other.
- Funded by the National Science Foundation. These instructional materials are being adapted at Illinois Institute of Technology, MIT, University of Virginia, University of Pittsburgh, and Auburn University.

### ***Testimonials of Students Who Used the Materials in a Course***

- The most important lesson that I learned from this course is how to apply the theory that is taught in preceding MIS courses and apply that theory to actual business problems.
- I learned that I have to play more than just an MIS role once I have a job.
- The main lesson was integrating business processes with technology.
- I got a taste of the different groups working together in real-world situations and seeing what each function influences the other functions.
- I think I have gotten an overall picture of how teams need to work together in an enterprise.
- It is very easy to make mistakes in any field, but when you are already aware of some, it is very easy not to make them again.
- I feel that this has been an excellent educational adventure wrapping up my final semester here.
- I learned how critical it is to get all the needed information to analyze not only cases, but also every day decision.
- It was a wonderful experience something new and which highlighted the confidence in taking and discussing issues.
- This training provided me an opportunity to integrate the ingredients pertaining to technical, managerial, financial, and credibility issues in decision-making.

### **Introduction**

This workshop is based on a textbook that was developed over the past four years as part of an innovative curriculum development effort funded by the National Science Foundation, DUE # 9752353 and 9950514. The materials are targeted for use in an undergraduate or graduate course in MIS, Information Technologies (IT), Operations Management, and Computer Information Systems programs. It provides students an opportunity to participate in decision-making scenarios involving technical and non-technical issues in companies by working with case studies. The objective is to “celebrate information technology” by showing how the decisions of the information technology personnel and managers in the case studies impact the bottom-line of the company which, in turn, influences the growth of the economy. The students could apply the theories they had learned to solve a real-world engineering problem. The material has been designed to satisfy the criteria for developing the students' ability to use techniques, skills, and modern IT tools necessary in business. In one of the case studies, we have incorporated an expert system software so that the students are provided a hands-on experience on working on a real-world problem. In addition, chapters on entrepreneurship, telecommunications, and operating systems provide valuable knowledge that students could use in the future. Using this book in your classroom could fulfill the requirements for the ISCC-11 course that have been proposed by the ISCC'99 group.<sup>1</sup>

The case studies and associated materials have been chosen so as to show that: (a) IT personnel make decisions on a continuing basis and their decisions have a major impact on the performance of companies, (b) the decisions made by IT personnel when they practice their profession have important entrepreneurial considerations and they need to champion their project, and (d) the decisions have to include consideration of technical and non-technical issues. Therefore, the focus of this workshop is to emphasize these educational objectives and illustrate them with case studies. Our intention is to show examples of how practice, theory, and IT issues can be integrated in a MIS/IT curriculum.

### **Target Audience and Innovative Features of Book**

This textbook is designed for students taking an advanced course in IT or MIS. The textbook provides all the technical material that is needed to examine the case study and could be used by students without prior knowledge of IT and business fundamentals. This workshop is especially designed to improve the education of IT/MIS students through active learning methods. The materials in the workshop are based on field-research conducted with companies. The three most important contributions of this textbook to IT/MIS education are:

- (1) The case study and videos bring theory, practice, and IT issues together to the classroom and critically examine decision-making scenarios in industry. These case studies have been tested in business and engineering classrooms and have been improved substantially based on student feedback and responses. References to the textbooks that have been developed are provided (Raju and Sankar, 2000; Sankar and Raju, 2001). Figures 1 and 2 provide a summary of two case studies, Crist Power Plant and AUCNET USA. (These are not included due to the high resolution required for color charts.)

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<sup>1</sup>An Information Systems-Centric Curriculum '99 Program Guidelines, July 1999, for educating the next generation of information systems specialists, in collaboration with industry, [www.iscc.unomaha.edu](http://www.iscc.unomaha.edu).

- (2) There are many possible solutions to the case study and different groups of students may recommend several options. This provides variety and stimulates the thinking skills of both the instructor and students. Students get involved in playing the roles of the IT personnel and managers in the case study and identify with the material in the case study. This leads to active problem solving where students become passionate in defending their option. It also provides an opportunity for students to apply theories and practices they have learned in other classes and internships to bear on the analysis of the case study.
- (3) The instructor's manual provides a possible solution to the problem posed in the case study and provides step-by-step instructions to the instructor in administering the case study in the classroom. We provide guidelines to instructors on how the case studies could be effectively tailored for use in their curriculum. In addition, we provide videos that help explain the problem and solutions easily. It also provides forms that could be used in evaluation, suggestions on conducting the case studies, multiple-choice and essay questions and answers, and possible solutions to the problems provided in the textbook.

## **Evaluation of the Benefits of a Course Taught Using the Material in this Textbook**

The case studies used in this textbook have been used with about 800 business and 800 engineering students at Auburn University during the past four years. An external evaluation team composed of Drs. Gerald Halpin and Glennelle Halpin, Professors in the Educational Foundations, Leadership, and Technology at Auburn University, evaluated the course where these case studies were used (Halpin and Halpin, 1999).

The students in the case study class reported greater use of mapping, outlining, and planning; solving problems, reaching decisions, and making critical evaluations; and using other students within the class as a resource and support systems. The student journals, which were completed for each case study, demonstrated the use and development of higher order thinking skills - one of the course's primary objectives. Specifically, the students' comments in the journals indicated that they were engaging in sophisticated and complex levels of cognitive activity - defining, analyzing, evaluating reflecting, and assessing. The students not only employed these skills, but also applied these same skills to assess their own thinking processes and gained self-insights. The student comments in the journals also indicated that they were making the necessary connections between the theories they studied and the practice they would assume. Perceived skill development, self-reported learning, and ability to learn from fellow students (all yielding medians of 3.9 or above) were highly rated by the students.

The students commented: "It brings a practical situation in to train us to think in a professional manner." One student noted that this case study possessed "more alternatives with each having strengths, making the decision-making process more of a learning experience." Others found the case study "informative" and "well organized." One student commented the following: "The strengths were the fact it allowed us to look at a real business and put this information learned in class to use." Another student noted that the "case study helped relate textbook materials to real world situations." And yet another student stated that the case study was "a real world example of class work." From other surveys given on other case studies, this connection of theory and real-world practice tends to be the major theme emphasized by students as a strength of the case study method of instruction.

The students commented that skills in researching, critical thinking, and business planning all developed as a result of the involvement in the case studies. These comments seem consistent with the high median rating for self-reported learning. For example, one student noted that he gained "experience in researching" as did another student who stated "the research provided insight into the company's current position." Another students stated that the case study "allows for students to improve their critical thinking skills."

Another theme which occurred in the response to the case study's strengths (approximately 1/5 of the responses) was the students' enhanced understanding and interest in technology. For instance, one student stated that the "strengths were the technology aspects" and another student appreciated "the opportunity to mix the technological side of the class with the business principles that we have learned in other classes." Still another student stated that the case study "strengthened knowledge of different technologies." Finally, students described the case study itself as "informative," "interesting," and "easy to comprehend."

Drs. Halpin and Halpin conclude, "The data from the various aspects of the evaluation indicated that the case study method of instruction is a worthwhile and beneficial method of instruction for teaching an engineering design course. The students in the case study course indicated their favorable responses to this particular teaching approach, and comparative data also suggested that the approach is particularly worthwhile and beneficial to the students. The case study method of instruction appeared to combine theory with practice as well as encourage the use of higher-order thinking skills within the students - the two primary goals of this particular class."

## **Research Performed to Study Impact of Multimedia Instructional Materials**

Research has been conducted to study the impact of multimedia educational materials on perceived skill development (Mbarika et al., 2001). An experiment was conducted in which 39 students worked on a case study using both paper-based and multimedia based technologies. An exploratory factor analysis design employing a structural equation model was utilized to analyze the data. The findings from this study suggest a strong indirect relationship between multimedia and perceived skill development with learning-driven constructs (challenging, learning interest, self-reported learning, and learned from others). The study concludes that it is critical to consider these factors in developing multi-media instructional materials.

Further research was performed to identify how students belonging to different gender (male and female) and majors (engineering versus non-engineering) perceived improvement to their higher-order cognitive skills and the factors that were responsible for their rating. These research activities are summarized below.

### ***Research on the Impact of Multimedia Instructional Materials on Female Students***

Past research has shown that female students tend to have more negative attitudes toward technology than male students. These negative attitudes may explain the decreasing number of females in technical careers. Past studies have shown that a change in the instructional materials might foster a change in the attitude of female students. Multimedia instructional materials have been suggested as a possible solution. Therefore, this research investigates the perceptions of female versus male students regarding the improvement of their higher-level cognitive skills when they participated in a multimedia case study that used an expert system to model a complex engineering and technical problem.

Two questionnaires measured their perceptions on the improvements achieved on learning and content constructs. A structural equations model was developed to test the research hypotheses, with female students being the experimental group and male students as the control group. The major findings were: no significant relationship between gender and higher order cognitive skills improvement was revealed, female students perceived better higher-order skills improvement compared to male students, both groups perceived an improvement in the learning-driven factor, and female students valued learning-driven factors more highly than male students. These results show that multimedia instructional materials were found to be very helpful in teaching engineering and technical decisions. In particular, they were more effective for female students since they challenged the participants, provided self-learning opportunities, and made it possible to learn from others.

### ***Research on the Impact of Multimedia Instructional Materials on Majors (Engineering Versus Business)***

This research investigates the perceptions of business versus engineering students on improvements in their higher-level cognitive skills when they participated in a multimedia based case study that depicted a complex engineering and technical problem (Mbarika et al., 2001). The case study provided the students with an opportunity to analyze the sensitivity of their recommendations to management using Expert Choice Software (Saaty, 1994). The research questions were:

- Is there a direct relationship between the student major (Business versus Engineering) and higher order cognitive skills improvement?
- Is there an indirect relationship between the student major (Business versus Engineering) and higher order cognitive skills improvement with any intervening variables?
- Two questionnaires solicited the perception of the students and a structural equation model was developed in order to use the information gathered to answer the research questions. The results show that the business students perceived a greater improvement in higher-order skills compared to engineering students. The results show that multimedia instructional materials were more effective for the students if the materials challenged the participants, provided self-learning opportunities, made it possible to learn from others, and enhanced learning interest.

### ***Research on the Impact of Multimedia Instructional Materials on Ethnic Background***

Students ( $N = 23$  whites) in the Concepts of Engineering Design course at Auburn University were given two separate evaluation forms, one at the completion of each case study, during Fall 1998 by the evaluators. In addition, students ( $N = 17$  African American) in a class at Alabama A & M university were given the same evaluation forms at the completion of the Della Steam Plant case study in Spring 1999. The medians for constructs at both Universities are provided in Tables 2 and 3. A study of the data shows that the African American students responded very favorably to the multimedia case study methodology.

**Table 2. Medians for Constructs in Questionnaire I with Different University Students**

University	Interesting and exciting	Important and valuable	Instructionally helpful	Relevant and useful
Auburn	3.3	3.5	3.8	4.0
Alabama A&M	4.0	4.2	4.3	4.5

**Table 3. Medians for Constructs in Questionnaire II with Different University Students**

University	Perceived skill development	Self-reported learning	Intrinsic learning and motivation	Learn from fellow students
Auburn	3.8	4.0	4.0	4.0
Alabama A&M	3.8	4.0	3.7	4.5

### **Summary of the Past Research Studies**

The above studies show that non-engineering, female, and African-American students perceived the multimedia instructional materials to be more effective than the White students, even though all of them rated most of the constructs to be above 3 on a scale of 1 (low) to 5 (high) showing that they enjoyed the use of the multimedia materials. All of them perceived that the methodology provides better opportunities for active learning and improvement of higher-level cognitive skills. The major limitations of these studies are that the sample size was small and the results were based on perceptions rather than on objective measures that quantify the improvement in learning of the students.

### **Support Material for Instructors**

We offer a wealth of supplementary material in a CD-ROM that helps the instructors teach the material in this textbook. They are:

- (1) Instructor's Manual: The manual contains chapter overviews, teaching suggestions, team assignment questions, possible answers to case study discussion, and a test bank of multiple-choice, short-answer, and essay questions.
- (2) Videos: Videos supplement the presentation of the case studies so that the students can understand the problem fairly well. This material could be played in class when the case studies are assigned.
- (3) Powerpoint presentation package: This package has most of the charts and photos from the textbook so that an instructor can use them in making the presentations in class.
- (4) Suggestions for teaching: Suggestions to instructors is provided based on past research results. Forms that could be used to grade the course are also provided.
- (5) Multiple-Choice and Essay Q&A: The questions at the end of each chapter are answered and multiple choice questions have been created to help the instructor create exams and tests.

### **Conclusions**

This workshop provides an opportunity for MIS and OM faculty members for a hands-on workshop where they will work with innovative educational materials that have shown to improve the higher-level cognitive skills of students. Use of these materials in a MIS undergraduate course at Auburn University has elicited very positive comments.

### **Acknowledgements**

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## References

- Halpin, G., Halpin, G., and Good, J. "An Evaluation of the Crist Case Study in ME-260, Winter 2000 Engineering Design Class," Internal Report, May 2000.
- Mbarika, V., Sankar, C.S., Raju, P.K., and Raymond, J., "Impact of Task-Technology Fit on Perceived Skill Development when Assessing Multimedia Instructional Materials," *Journal of Educational Technology Systems*, 29(1): 67-87, 2000-2001.
- Raju, P.K. and Sankar, C.S., "Teaching Real-World Issues through Case Studies," *Journal of Engineering Education*, 88(4): 501-508, October 1999.
- Saaty, T.L. *The Fundamentals Of Decision Making And Priority Theory With The Analytic Hierarchy Process*, McGraw-Hill, New York, NY, 1994.
- Sankar, C.S. and Raju, P.K., *Information Systems in Enterprises: A Case Study Approach*, Tavenner Publishers, 2001, ISBN: 1-930208-16-2..
- Sankar, C.S., and Raju, P.K, *Crist Power Plant Case Study*, Tavenner Publishers, 2000, ISBN: 1-930208-02-2.
- Sankar, C.S., and Raju, P.K., *AUCNET USA Case Study*, Tavenner Publishers, 2000, ISBN: 1-930208-04-9.
- Sankar, C.S., and Raju, P.K., *Chick-fil-A Case Study*, Tavenner Publishers, 2000, ISBN: 1-930208-05-7.