An Experientially-Oriented Lab Course Within a Management Information Systems Curriculum

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INTRODUCTION

One reason for providing a technology laboratory on a University campus for undergraduate students in an MIS/CIS curriculum is to provide opportunities for exploration and innovation. Another is to provide an environment for learning through experiences, an experiential approach, versus the more typical classroom environment. However, many students do not take advantage of such unstructured environments. This paper describes an experiential course that was developed to promote self-directed learning, encourage students to take risks, and integrate knowledge learned in other MIS/CIS courses all within the environment of a lab. The development of the lab and historic development of the course is first provided. Next, the objectives and logistics are discussed followed by examples of experiential projects used. Finally, evaluation of student learning and the challenges faced by faculty providing such experiential lab courses are discussed.

HISTORY

The Management Information Systems major evolved over several decades until it was formally established on our campus in the late 1980's. One goal for the MIS faculty involved in its development was to provide hands-on instruction and project work throughout a curriculum designed to develop students who can build information systems. However, it became apparent that the established curriculum, even while generally meeting the DPMA Information Systems model curriculum [1], could not meet all the learning needs or interests of every MIS student. Many students, through questions and requests for special courses on a given topic, provided evidence that other opportunities for learning and exploring needed to be provided. A student-oriented research lab was established to provide such an opportunity [2].

The Information Systems Research Lab (ISRL) was designed to provide a variety of resources that could not be found in the typical public campus lab. Hardware resources change with changing technology but have included: a RISC 6000 for introduction to the UNIX operating system, an isolated network of computers for experimentation with networking administration software, a high resolution color scanner, a high resolution color printer, several Macintosh computers, and several high-end Pentium PCs running various operating systems. Software resources are constantly updated to provide new versions for evaluation, experimentation, and use by faculty and students. Software and hardware purchase decisions are oriented to support the changing needs of faculty and student research and development projects. From the MIS faculty perspective, the lab is viewed as a unique resource for MIS students and supports the pedagogical approach of hands-on learning through project-based applications.

The lab was established from funding through a variety of sources. The majority of funding came, and has come, from the department housing the major, the Management Department, and the College of Business Administration itself. For the first several years work-study students who primarily monitored lab use staffed the lab. A lab advisory board was established bringing together faculty from all of the college departments. The purpose of the board was to increase faculty involvement in the lab. Through this advisory board, faculty/student research projects were discussed, encouraged, and brought into the lab. Several senior level undergraduate MIS courses focused on developing systems for clients were able to pursue unique projects due to the available lab resources.

At the end of two years, however, the faculty members were somewhat dismayed at the lack of student participation in the lab. Further, work-study resources were dwindling and staffing became a major concern. In this light, it was decided to use an established course, typically reserved for research interests on the part of students, to further encourage student participation. Students would, in effect, be given credit for their participation in the lab. Participation included monitoring the lab five hours per week during the semester. For this participation, students would be given one hour of course credit. At the end of the term, students were required to write a paper that would indicate how their knowledge had grown over the term. Students would be allowed to take the course a maximum of three semesters.

This approach did increase student presence in the lab. However, most students failed to take advantage of the available resources. Self-directed learning was difficult for the majority. While the MIS faculty members had hoped to maintain a hands-off approach, the quality of the papers at term end provided evidence that at least some direction was needed. For those few stu-

dents who did challenge themselves in the lab, the faculty did not want to stifle their innovation and desire for individual pursuits. The MIS faculty proposed a new direction for the course and formally established a new course called Information Center Operations to promote opportunities in the lab. This course would be managed similar to the management of an information center for a large organization. Operations and projects found in an information center would be supported and used in the course. These operations include: problem-solving for end-user development projects, guiding organizational software and hardware purchases, evaluating and researching new technologies, and the training and education of end-users.

INFORMATION CENTER OPERATIONS

The course, Information Center Operations, was developed to provide experiential learning opportunities, both structured and unstructured, for students interested in the field of management information systems. Students manage and work within the Information Systems Research Lab (ISRL) which provides an atmosphere similar to an information center in other organizations. Students provide support services to other students and faculty needing help with hardware and software found in the lab. As members of the class, students are referred to as ISRL Student Assistants. These students have a variety of administrative, project, and educational responsibilities mirroring those of an information center support staff. We formally state the objectives of this class as follows:

Objectives

1. Increase student knowledge of information center operations.
2. Provide experiential learning activities in an Information Center.
3. Provide students opportunities to work closely with faculty on research projects.
4. Increase student knowledge about state-of-the-art hardware and software through workshops, training sessions, classroom discussion, and other experiential activities.
5. Provide students the opportunity to explore and use advanced hardware and software.
6. Increase student knowledge concerning end-user documentation and training requirements.
7. Provide students with the experience of managing information center services and planning for the purchase and use of information technology resources.
8. Integrate knowledge gained by students in the required MIS curriculum through the management and operations of an information center.
9. Improve the professional skills expected of MIS majors by prospective employers.

Students are required to work five hours per week in the lab plus meet for one fifty-minute work session. These work sessions are used two different ways. First, the class discusses the issues associated with managing a lab. These issues have included:

- Increasing lab access without compromising an effective work environment
- Managing demand for scarce but highly used resources
- Managing conflicts between faculty member and student requests for lab resources
- Prioritizing hardware and software acquisitions through lab funding
- Communicating effectively the problems and concerns associated with lab management to all persons working in and associated with the lab
- Balancing ethical considerations for an information center staff against various demands placed on the staff.

The second purpose of the weekly work session is to explore more fully topics of interest to the students. Topics such as multimedia computing, Novell software, the World Wide Web, DOS configuration and autoexec files, and OS/2 and UNIX operating systems are a few of the topics that have been presented by various individuals with expertise in the particular topic area.

EXPERIENTIAL STUDENT PROJECTS

Each term a variety of projects are designed for the students participating in the course. There are numerous projects that would be appropriate for students in this type of a course, limited only by the creativity and knowledge of the supervising faculty. Each project is reviewed for the level at which it supports the stated objectives of the course. To date, projects have not been difficult to find. Determining the right mix of projects that promote new learning and still allow for individual innovation, however, has not been as easy. What follows is a description of just a few of the projects that have been used successfully in this environment.

Development of End-User Documentation

As new hardware and software become available in the lab, students are assigned the task of writing short "How To" papers. The purpose of each paper is to provide answers to commonly experienced (or expected) questions in the lab. These papers then serve as documentation for new students entering the lab each term. Papers such as: How to use the scanner, How to record sound, How to login to the Network, and How to direct output to various printers are examples of such documentation. This particular project builds upon student written communication skills and exposes them to issues associated with training of end-users. Approval from the faculty member supervising the course is required before documents are made available to users.

Presentations (In-class and to others)

Students taking this course have given presentations on different topics to different audiences. This required learning about the topic to be presented, developing appropriate materials, writing a script for the presentation, and finally, presenting the topic to the audience. For example, a group of students developed a presentation on multimedia computing resources in the lab for the required MIS course in the business core. As part of this presentation, the students developed a handout for the classes with information about multi-media computing. They developed a script to follow for the presentation, implemented the script through multi-media presentation software, and presented the topic. Ten different sections of the core information systems course were provided this presentation.

Other presentations have included training sessions for classes needing to use the lab hardware to meet course requirements. For

example, a marketing class required use of the color scanner. The ISRL student assistants held training sessions for those students. Finally, as some students acquire specialized knowledge over the semesters they take this lab course, they may provide training sessions and presentations during the weekly work sessions. This presentation requirement helps build upon the communication skills of the students, allowing them to share their technical expertise with others, and providing a valuable resource to the college.

Problem Solving

Debugging and problem solving are skills necessary for the MIS major. To build these skills requires practice. Whenever possible, debugging and problem solving opportunities are developed for the students. This is done informally through questions coming into the lab as well as in a formal manner. Students have been given real end-user developed systems and asked to analyze the system and debug problems found. Another method has been the implementation of problem solving contests. One such contest involved problem solving on a small Novell network available in the lab. Each week, the college Network Specialist, would put a "bug" into the system. These "bugs" were similar to the types of problems that network administrators would have to solve at the end of a Novell certification course. Students would attempt to find the bug and correct the problem. Once the problem was solved, students would communicate in memo form to the course director and the Network Specialist. This memo contained the steps for correcting the problem. Points were awarded for this hands-on problem solving. Additional points were available for answering a series of questions concerning network operations. The competitive nature of this event was both exciting and rewarding to the participants besides providing them real-world problem solving skills.

WWW Site Development

The World Wide Web is an exciting and intriguing place for students, especially the computer literate MIS major. While teaching HTML and home page development as part of a required MIS curriculum might be highly questioned, providing opportunities to build upon the knowledge and skills obtained through the required MIS courses is an appropriate use for this particular lab course. Developing a hyper-media application for the WWW is one project that has been used in the lab that serves just such a purpose. Articles written about hyper-media development using a form of E-R diagramming and page layout show strong ties to required MIS courses. This project allowed students to build upon their technical programming skills through the use of the development language HTML and writing of CGI scripts. Integrating database access through the web interface builds upon knowledge gained in courses such systems analysis and design and database management. Further, the project provided an excellent backdrop for the discussion of the strategic use of information systems technology and the importance of researching new technology for appropriate applications in the organization.

Resource Expenditure Planning

As part of this lab course, students have also written proposals for expenditures in the lab. Each year, the lab has a given operating budget. Part of that budget can be used to buy new software and hardware. The remainder is used to finance daily operations, namely to purchase paper, printer cartridges, and other such supplies. Every two years the college must request an allocation from a student computer fee fund for anything beyond the meager annual operating budget. Students in the lab become part of this process. As one project, students reviewed magazines and other sources to determine the expected direction of new hardware and software. From this review, students wrote a proposal for spending $10,000. These proposals included an executive summary highlighting the recommendations as well as providing additional supporting documentation. This project gave students experience writing proposals, researching technology trends, and drawing and supporting their own conclusions.

Training and Development

As various universities integration between courses across all the functional departments of a college, the lab has served as a stepping stone for such integration. One example is the integration of student activities in a training and development class with the resources and expertise available in the lab. As part of the course requirements for training and development, students were required to complete a project involving a software package such as Power Point, MS-Publisher, WordPerfect, Lotus Screen Cam, Sound Software, or Scanner Software. The students in the lab course were assigned the responsibility of learning one of the software packages and providing technical consultations to the student groups in the training and development class. The group members from the training and development class then assessed the technical consultants at the end of the term. This provided an opportunity for feedback concerning their training, communication, and technical skills besides that which they receive from faculty members. This particular project serves as an example of what might be done to integrate student activities between two totally different courses. Besides the fact that this project integrated technology into the training and development class, it also provided needed experiences to the MIS majors.

EVALUATION OF STUDENT LEARNING

One of the many responsibilities for the coordinator of this lab course is the evaluation of students. This course is a graded course. Assessment of learning on the part of the students, however, is very difficult. This can be said of almost any course based solely on experiential activities. There are no exams. There is not a standard course content. Frequently students are involved in totally different projects although each term there has been a common set of projects with which all students are involved. Objectives change over the semesters, often driven by technological advances and availability. Because students can take this class three times, the expectations for new students is, and should be, different than those placed on a student taking the course for the third time.

Given this environment, portfolios are used for evaluating the progress of students in the course. Each student has the responsibility for providing evidence of learning, experimentation, and participation. Generally, the documents are evaluated for quality, clarity, innovation, and growth. Students are asked to include:

- A personal summary that includes a resume, a list of all MIS courses taken, and a summary of their information systems experiences.

- A summary of the small bits of knowledge gained through working in the lab. Examples of this include using pconsole to evaluate print status, adding icons with a Windows environment, and accessing and using various editors.
- A summary of any required project to which the student has been assigned. For example, the technical consultant project might include a summary of the student role in the project, the frequency and amount of time required for consultations, an assessment of the groups' skills before and after the project, and the assessment of the student by the group receiving the technical help.
- A summary additional projects or responsibilities undertaken by the student.
- As much as possible, students are encouraged to provide deliverable evidence such as a hyper-media application or extensive paper.

Students taking the course for the second or third time are required to submit their portfolios with work from the previous semester(s).

CHALLENGES

The quality of student efforts in the lab has increased tremendously since the implementation of this course. Further, interest in the lab, lab resources, and the course itself has increased. Class size has grown from five to fifteen in the two short years it is has been offered. Additional prerequisites have been added to the course in an effort to keep the class size at approximately 10 students. This growth has been a challenge to manage but there are certainly other challenges that need to be addressed. These include:

- Training new students each term.
- Scheduling students around current job and course schedules.
- Scheduling students so that everyone experiences both high customer demand and low customer demand hours.
- Communicating to all the students between work sessions the problems occurring in the lab.
- Recruiting the best and brightest students for the class.
- Procuring additional funding for purchasing new lab resources.
- Finding experts to meet the requests of students taking the class whom are willing to make presentations during the course work sessions.
- Encouraging faculty members outside of the MIS program to use the lab resources and the students in the lab course.
- Finding and developing an appropriate mix of hands-on, real projects for students each term.

Last, but certainly not least, is recognition of the tremendous time and preparation required on the part of the faculty member facilitating this course. The faculty supervisor serves as a leader, rather than a teacher, and assumes a managerial role necessary to meet the operational challenges previously discussed. Because it is a non-traditional course based on experiential learning, however, many faculty members and college administrators are at a loss as to how to reward the faculty supervisor for the time invested. The student credit hours generated do not adequately reflect the contact hours of the course or the productivity of the supervising faculty member. Further, many faculty outside the department housing the course akin the facilitation effort as similar to that of supervising cooperative education or internships, little or no effort required on the part of the faculty member. These same faculty help determine how the rewards for teaching such a course are given. In the current cost cutting, efficiency focused, productivity measuring environment of many university level administrators, the benefits of the course may not be measured adequately nor faculty members rewarded appropriately.

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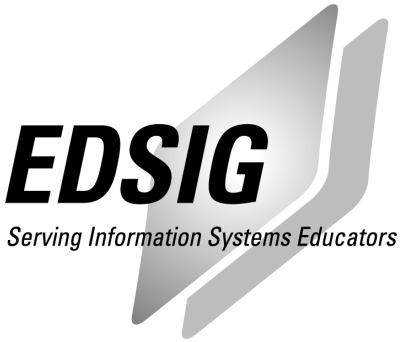

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