BRIDGING THE GAP BETWEEN THE UNIVERSITY AND THE LOCAL DPMA CHAPTER: THE CASE FOR COOPERATIVE UNIVERSITY/INDUSTRY STUDENT PROJECTS

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ABSTRACT: Universities, and more specifically instructors in four-year undergraduate programs in computer information systems, have been challenged to produce technically trained graduates that can work effectively in a team environment to produce new products, processes and systems. A cooperative university/industry student project can be an effective way for the university instructor to teach and nurture skills in interdisciplinary problem solving, teamwork and communication. Members of the local DPMA chapter can support cooperative projects by being a source of new projects, by providing technical information to student teams, and by attending and critiquing the final presentation. A case study of a cooperative university/industry student project is presented. A survey, administered to industry professionals at the final presentation of the project, indicated that industry professionals would be more likely to sponsor student internships and future student projects, and to hire a graduate of a program in information systems.

KEYWORDS: Team projects, Curricula Development, Teaching Methods, DPMA Chapter

INTRODUCTION

In 1986 the MIT Commission on Industrial Productivity, convened to address the decline in industrial performance of the United States, challenged American universities to restructure higher education in order to better prepare students for the modern, technologically-oriented workplace. In particular, it was recommended that universities "create a new cadre of students and faculty characterized by (1) interest in, and knowledge of, real problems and their societal, economic, and political context; (2) an ability to function effectively as members of a team creating new products, processes, and systems; (3) an ability to operate effectively beyond a single discipline; and (4) integration of a deep understanding of science and technology with practical knowledge, a hands-on orientation, and experimental skills and insight" [4]. Business and engineering schools in the United States are accepting the challenge and devising courses that emphasize interdisciplinary problem solving, hands-on design, teamwork and communication [10] [11].

The Data Processing Management Association (DPMA) has long played a supportive role in assisting universities and colleges in preparing computer information system students for the workplace. First, DPMA student chapters play a vital role in maintaining ties between university students and the local DPMA chapter. Dawley points out that student chapters help students learn about the "real world" from a variety of IS professionals from different companies and different career paths [3]. In addition, the DPMA provides curriculum guidelines to four-year undergraduate programs in computer information systems. The 1981 and 1991 DPMA Model Curriculums emphasize that students must be able to communicate in a variety of settings, must be able to function individually or as a member of a project team, and must interact with and understand diverse user groups [5] [6]. While DPMA student chapters and the DPMA model curriculum are important mechanisms for

linking universities and industry, this paper suggests an additional approach.

This paper makes a case for adopting a cooperative university/industry student project as a part of the undergraduate computer information systems curriculum. These projects provide a unique opportunity to train information system professionals in the analysis, design and implementation of a computer-based information system while working with a highly motivated client. Unlike "canned" projects, internships and student-initiated "real" projects, the cooperative student project gives the student an opportunity to work through an entire systems project with the purposeful anticipation of an eager client and under the close supervision of an academic instructor. These features of the cooperative student project produce an exciting and dynamic environment for learning in which the local DPMA chapter can play a vital part.

COOPERATIVE UNIVERSITY/ INDUSTRY STUDENT PROJECT DEFINED

Class projects provide valuable hands-on experience for students and serve to bridge the gap between a textbook understanding and the application of structured analysis and design principles. Information systems and computer science programs have long recognized the importance of class projects, and numerous papers have appeared on how to successfully incorporate projects into the CIS curriculum [1] [2] [7] [8] [12]. The literature seems to indicate a trend towards favoring "real" projects as opposed to "canned" projects. Representative of this trend is the following statement by Salchenberger: "the best student evaluations from the MIS course over the past five years are from the years when a "real world" project was completed, rather than a case ("toy project") was developed [10]."

A cooperative university/industry student project is defined as an instructor-initiated semester-long project whose client comes from the local business community. It is important to emphasize that contact with the client is initiated and nurtured by the instructor. The instructor serves as the manager of one or more student teams that analyze, design and document a computer-based information system. Generally, the project is conducted in a highly participative manner in which student teams work together with the instructor to schedule client meetings, establish team mileposts, and define the project scope. Class lectures not only emphasize the technical subjects of system analysis, design of a proposed system, and implementation, but also include the "softer" subjects of project planning, team management, client interviewing, written communication and oral presentation. In the end, each team is expected to produce a final product for the client within the specified time frame.

The instructor-initiated "real" project, such as the cooperative university/ industry student project, ensures both a highly motivated client and high involvement on the part of the instructor.

The literature on student projects in information systems distinguishes between "canned" and "real" projects. Typically, in a "canned" or simulated project the instructor provides the functional specifications of the information system to the students. It is the responsibility of the student team to develop and document a working information system. While "canned" projects can provide students experience in teamwork and in written and oral communication skills, many aspects of "real world" systems development are not captured.

"Real" projects may be classified as either instructor-initiated or student-initiated. In student-initiated "real" projects, the instructor asks the student team to pick a project of their choice. While student-initiated projects have some advantages, typically the instructor has little involvement in the day-to-day management of the project, there is a tendency for the client to simply "go through the motions", and often only one team member will interact with the client [9]. The instructor-initiated "real" project, such as the cooperative university/industry student project, ensures both a highly motivated client and high involvement on the part of the instructor. In the cooperative university/ industry student project, not only are students exposed to a real world problem, but they are placed in a highly charged environment where the instructor, the client, and teammates are looking for effective and practical solutions that meet both the cost and time constraints associated with the project.

ROLE OF THE LOCAL DPMA CHAPTER IN COOPERATIVE STUDENT PROJECTS

The local DPMA chapter can play a vital role in ensuring the on-going success of cooperative university/industry student projects. In particular, the local DPMA chapter can provide support in three areas: (1) source of projects, (2) source of technical information, and (3) project review. First, DPMA members can serve as a source for suitable projects. The instructor must search for a project of moderate technical complexity that has a committed client and uses software development tools that are compatible with the skills of the students. Second, DPMA members can be a valuable source of technical information. Secondary sources of technical information can be particularly important to student teams during the implementation phase of the project. When properly managed, DPMA members enjoy sharing their expertise with developing system analysts. Finally, members of the local DPMA chapter can be an invaluable resource for the instructor during project review. In particular, DPMA chapter members can critique project performance by attending the final presentation and/or reading project reports. Experience has shown that students respond quite favorably when feedback on the project comes not only from the classroom instructor, but also from experienced data processing professionals.

COOPERATIVE PROJECTS FROM THE UNIVERSITY PERSPECTIVE

Cooperative student projects provide benefits to the university well beyond those of simply providing a better classroom education for the students. Increasingly universities are looking to develop closer ties with industry in order (1) to find employment opportunities for its graduates, (2) to establish internships for students, (3) to provide research and consulting opportunities for faculty, (4) to provide service and support to local industry, and (5) to promote educational opportunities offered by the university.

There can be drawbacks to cooperative university/industry projects from the university perspective. First, it requires a great deal of time and effort on the part of the instructor to establish business contacts, screen project proposals, maintain a project schedule, and to help solve the problems that the student teams encounter. Second, large class sizes can create an overwhelming management problem for the instructor. Strategies for managing a large class size include having teams concurrently work on different aspects of the problem, having teams work on the same aspect of the problem but using different design methodologies, and having teams competing for the best design. Third, the instructor may have to work with the university legal staff to resolve issues of intellectual property rights, liability and proprietary data. Finally, it is important that the students present themselves as professionals, and work to enhance, not hinder, the image of the university. Active cooperation with the local DPMA chapter can serve to minimize these drawbacks.

COOPERATIVE STUDENT PROJECTS FROM THE INDUSTRY PERSPECTIVE

Industry has shown a strong willingness to support cooperative student projects. Following are some reasons for industry's willingness to sponsor student projects. First, the client often feels that he may get a high return for a rather modest investment of time and effort. After all, there are few MIS departments that don't have a backlog of software development projects. Often a student project is an opportunity for an industrial client to see quick results on a "pet" project. Second, industrial clients are often truly interested in advancing the education of university students. Clients often adopt a warm relationship with the students, and enjoy sharing their knowledge with a non-threatening group of people.

Finally, industrial clients are often eager to further their own education. Sponsoring a student project is an easy way for industrial clients to keep abreast of developments in system design tools and methodologies without an investment in formal classroom instruction.

Industrial sponsors do have several concerns with sponsoring student projects. Typically the client is concerned that students may occupy an inordinate amount of valuable department time by overrunning the office with phonecalls and visits. It is important to adopt a classroom policy that allows for only scheduled client contact. Also, the client is often concerned that students may make the client look bad by "crucifying the client" in front of his colleagues or peers.

It is typical for beginning system analysts to want to show how smart they are by pointing out all of the problems of the client. Great care must be made by the instructor to have dry rehearsals for client presentations, and to rid students of the innocent arrogance often found in beginning system analysts.

CASE STUDY: A COMPUTERIZED INVENTORY AND EVIDENCE TRACKING SYSTEM

The cooperative university/industry student project presented in this paper is an integral part of a course in Information Systems Development. Students in the class are typically in the final year of a four-year undergraduate degree in Information Systems. In Spring 1992, prior to the start of the course, members of the Azalea Chapter of the DPMA were asked if they would be interested in sponsoring a cooperative university/industry student project. Several members indicated a desire to sponsor such a project. The instructor evaluated candidate projects according to the skills required for the project, the complexity of the project, and the required completion schedule. Ultimately, a microcomputer-based database project was initiated through the MIS Department of New Hanover County to serve police officers in the New Hanover County Narcotics Division Task Force.

Sponsoring a student project is an easy way for industrial clients to keep abreast of developments in system design tools and methodologies without an investment in formal classroom instruction.

The New Hanover County Narcotics Division Task Force had maintained a manual evidence inventory and tracking system for all drug-related evidence seized during the arrest of criminal suspects. In order to reduce the time needed to produce summary reports and to facilitate case status queries, a microcomputer-based database system was desired for evidence inventory and tracking. A detailed analysis of current evidence handling procedures was undertaken prior to system design. This analysis described a system that accounted for the physical location of evidence materials from their confiscation at the scene of a drug-related arrest through the court disposition of the case.

In order to identify the nature of confiscated matter, evidence was often sent to a state laboratory for testing. Returned evidence was stored, along with the rest of the case's evidence, in a vault until the case was closed or the evidence was transferred to the custody of the courts. Maintaining and documenting an evidential chain of custody was paramount to the success of the system.

The project was composed of two student teams. The first student team was responsible for the overall design and

implementation of a working evidence inventory and tracking system. The software development tool was a relational database (dBase IV). The MIS Department of New Hanover County recommended dBase due to their experience with this software. The second student team was responsible for developing a physical database design for an evidence inventory and tracking system that would be fully integrated with both the database developed by the first project team and an existing arrest database already established within the New Hanover County law enforcement system. The existing arrest database contained approximately 30% of the data needed by the evidence inventory and tracking database developed by the first team. The physical design focused on reducing data redundancy by integrating the two databases.

Seven mileposts were established early in the class:

1. establishing project objectives and schedule
2. requirements analysis
3. analysis and design
4. data design
5. development, testing and implementation
6. delivery of system
7. the final presentation

Throughout the project, only scheduled meetings with the client were permitted. Client meetings typically involved end-users of the system, specialists from the MIS department, students and the instructor. From these meetings, the students were able to experience first-hand the requirements and the concerns of both the end-users of the system and the technical specialists who were responsible for operating and maintaining the system.

Seven persons were in attendance at the final presentation: one person from the New Hanover County Narcotics Division Task Force (the end-user), two persons from the New Hanover County MIS Department, and four members of the Azalea Chapter of the DPMA. A survey was administered to the seven persons in attendance in order to determine the quality of the presentations and the effectiveness of the class project in meeting university objectives in developing internships, having industry hire graduates and sponsoring future student projects. The results of the survey are shown in Table 1 (Evaluation of the Final Presentation) and Table 2 (Survey Results). Table 1 indicates that both student projects were evaluated very well in terms of technical content and style of presentation. The question and answer sessions were evaluated somewhat less favorably. Table 2 indicates that 6 out of 7 (85.7%) industry professionals would be more likely to hire a department graduate if they had a job opening, and 7 out of 7 (100%) industry professionals would be more likely to sponsor a student internship.

Table 1: EVALUATION OF THE FINAL PRESENTATION

	Mean Score (5 point scale)
Group 1 (Microcomputer Design)	
Style of Presentation	4.14
Technical Content	4.36
Question and Answer Session	3.85
Group 2 (Integrated Design)	
Style of Presentation	4.50
Technical Content	4.30
Question and Answer Session	3.66

(Scale: 5 - excellent, ..., 1 - poor)

Table 2: SURVEY RESULTS OF PERSONS IN ATTENDANCE AT THE FINAL PRESENTATION

	More Likely	No Change	Less Likely
Would you be more likely to sponsor a future project with our students?	85.7%	14.3%	0.0%
Would you be more likely to consider sponsoring an internship at your company?	100.0%	0.0%	0.0%
Would you be more likely to consider giving a talk/seminar to students on a topic related to professional development?	71.4%	28.5%	0.0%
If you had a job opening, would you be more likely to consider hiring a Business Systems student?	85.7%	14.3%	0.0%

In addition, both the students and the client viewed the cooperative industry/student project favorably. When asked "How valuable was this course in helping you achieve your educational and professional objectives?" and "How does this course compare to all other college courses you have taken, all qualities considered?" on the formal Student Opinion Survey, one-hundred percent of the students gave the course the highest rating. Perhaps the following statement made on the formal course evaluations best reflects the attitude of the students towards the cooperative university/industry student project: "This class taught me more about real job situations than any other class that I've attended in 3 years of college." These results are consistent with those found by

Salchenberger [10]. In addition, a post-implementation conversation with the Director of New Hanover County's MIS Department indicated a successful implementation and operation of the evidence inventory and tracking database.

CONCLUSIONS

There are ample opportunities to develop cooperative university/industry student projects as part of an academic program in computer information systems. The educational benefits of such projects are well documented. However, less emphasis has been placed on the benefit of such projects on building and strengthening ties between the university, the local business community, and the local DPMA chapter. These projects can serve to increase the employment opportunities of program graduates, and can lead to increased research, consulting and service opportunities for department faculty. In addition, the local DPMA chapter can play a vital role in ensuring the continuing success of such projects by being a source for new projects, by providing technical assistance and by participating in project review. It should be noted that local chapters of other professional organizations such as the Association for Systems Management (ASM) and the Association for Computing Machinery (ACM) may also offer opportunities for supporting cooperative university/industry student projects.

Cooperative student projects can be viewed as a high risk, high payoff venture for the university. An unsuccessful project, i.e. one that fails to meet its technical objectives or one that unintentionally casts a negative shadow on the client, can have negative consequences for both the instructor and the university. The risk associated with cooperative student projects can be reduced by having multiple teams working in parallel and by carefully monitoring student-client interactions. A well-managed project is always a challenging experience for the information system instructor, and can return positive results to the students, the university, the client and the local DPMA chapter.

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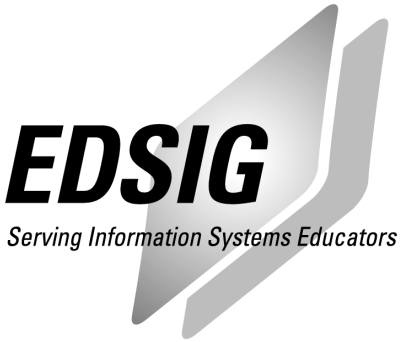

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