The Development of a Teaching Strategy for Implementing a Real-World Business Project into Database Courses

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ABSTRACT

Collaborations between business and academia provide valuable opportunities for students to connect classroom learning with practical work experience. To effectively reach a significant number of students, one approach is to meld a real-world business project and classroom assignment into a realistic business scenario that can be addressed by students within an academic course. This paper describes the process, challenges, and results encountered in a collaborative effort between a major health insurance provider and a local university to implement components of a business project as the final assignments in courses for introductory and advanced database systems. The approach generated significant enthusiasm among the student participants and promoted an improved awareness of current technological skills needed by business organizations.

Keywords: Academic-Business Collaboration, Course Partnership, Database Project, Teaching Strategy; Software Development

1. INTRODUCTION

Alliances between businesses and institutions of higher education have the potential to provide unparalleled opportunities to enrich the technological proficiencies for participants within both groups. From the viewpoint of an educational unit, an increased awareness of the current technology used by businesses provides valuable information for curriculum assessments and adjustments to course content ensuring that students learn the appropriate foundations and develop useable skills during their academic education (Gorgone et al. 2002). For a business, it helps to guarantee that future employees have the essential underpinning for careers in Information Technology (IT) and that fresh perspectives from recent graduates are brought to the work environment.

Business organizations and educational institutions can promote interconnections at many different levels (Becker and Brown 2000). The specific links are often dependent on the initial contacts and the particular needs at that given time. To establish common grounds, forums have been held for information sharing and discussions to identify possible approaches and potential challenges (Courte and Bishop-Clark 2005; Cohen et al. 1995; Carey and Seligman 1999; Sutliff 2000). Approaches, such as advisory councils, guest speakers, cooperative education, and student internships, have been utilized to develop connections (Courte and Bishop-Clark 2005). Often the connections through co-ops, internships, and research-oriented projects involve a limited group of student participants at the business site. To include more students and to help decrease the expanding technological gap between business and academia resulting from the rapid changes in computer technology, it is becoming increasingly imperative to also establish strategies that incorporate real-world business examples into the educational course offerings (Hawking and McCarthy 2000; Kock, Auspitz, and King 2003; Williams 1997; Youngbeom, Hsu, and Stern 2006).

In 2001, the School of Computing (SoC) at the University of North Florida (UNF) and Blue Cross Blue

Shield of Florida (BCBSF), a major IT employer in Jacksonville, initiated a joint academic/business partnership to explore the possibilities for enhancing the educational experience through a three-year grant from BCBSF. By mutual agreement, it was extended for an additional three years. This continuing partnership is a collaboration to develop links between classroom learning and practical work experience for undergraduate and graduate students. Two technical coordinators, one from BCBSF Employee Services and the other from the SoC faculty, work together to facilitate the development of strategies that result in productive outcomes for both BCBSF and SoC.

Adjustable utilization of the grant funds has allowed the coordinators to explore various interactive possibilities between BCBSF personnel and SoC faculty/students. The partnership has been particularly successful at placing motivated students into internship positions for the investigation and development of health-related computer applications in various BCBSF departments. The BCBSF coordinator handles identification of placements. The selection of students with the appropriate qualifications involves feedback from faculty members and an interview with the SoC coordinator. The SoC coordinator manages student compensations from the grant.

The focus of this paper is on another approach taken by the coordinators to increase student participation through the partnership. Similar undertakings between organizations and academic areas, such as engineering, science, and broadcasting, have provided valuable learning opportunities for students (Becker and Brown 2000; Halls 2005). In IT courses related to software engineering, collaborative efforts often encompass project development (Rodriguez 2003; Williams and Walter 2003). The BCBSF/SoC approach involved the integration of a project from BCBSF into the classroom with the goal of providing practical, reality-oriented assignments.

It was anticipated that the end results would benefit SoC by providing students with real-world IT experience to complement the theoretical knowledge learned through lectures, and BCBSF by providing additional knowledge that would help to increase efficiency and automation in particular IT areas. To achieve the desired outcomes, the adaptations needed to substitute an actual project for the typical "canned" assignments required the faculty members to go beyond the traditional classroom setting into the corporate environment, which provided a bridge for exploring innovative enhancements to typical course content. The next three sections present an overview of the interactions, decision-making, and preparations that occurred to successfully bring the assignments into the classroom. Following these sections, information is provided about the student responses regarding their experiences, lessons learned by BCBSF and SoC, and conclusions about the collaborative venture.

2. DETERMINING THE BEST FIT FOR PROJECT AND COURSE

The initial step involved determining the appropriate combination of SoC course, BCBSF project, and personnel from both sides. Linking these essential components began in the summer to enable a start date within the fall semester.

After reviewing the course possibilities within the SoC curriculum and faculty willingness to participate, the SoC coordinator selected the beginning and advanced database courses as the initial venues to test the feasibility of utilizing a BCBSF project in a classroom setting. A faculty member (instructor) with previous database consulting experience committed to work with the BCBSF and SoC coordinators to identify a suitable project and to develop the necessary requirements for the course assignments. A faculty stipend was provided to help compensate for the additional time requirements.

The BCBSF coordinator diligently contacted department managers to solicit projects that would be appropriate for a database course. Emphasis was placed on projects which had repeatable functions, reports, or data collections that could be put into an automated tool, but that were not tied to a date-driven, financially-responsible project to avoid unnecessary business risks and costs. The information requested from the departments included a brief description of potential items for discussion and contact information. The response to the BCBSF coordinator's solicitation of possible projects was substantial in quantity, quality, and variety. In the description section, the managers expressed enthusiasm about exploring the possibilities of collaborating with SoC faculty and students on this type of initiative for the classroom.

The SoC coordinator and instructor evaluated the submitted ideas and selected two that appeared to have the most potential for fitting into the academic framework of the database courses. Meetings between the coordinator and instructor from SoC and the project leaders from BCBSF were arranged to explore the project requirements, deliverables, software, and completion time frame. With considerations for the course structure, the synchronization of mandatory course topics, and the availability of the BCBSF personnel for meetings and information sharing, the Service Pricing Financial Model (SPFM) was chosen for development as the final team assignment in the introductory database course. The SPFM involved a file-based spreadsheet system for statistical information in the initial process of being moved to a relational database for improved data processing and analysis. The multiple components of the SPFM also made expansion into the advanced database course feasible for the spring semester.

3. ESTABLISHING THE FRAMEWORK FOR THE ASSIGNMENTS

The SoC coordinator and the database instructor met once a week with the BCBSF Service Pricing project manager throughout the fall semester as well as several times during the spring semester to prepare the SPFM information for the class assignments. Due to the more flexible time schedule of the faculty members, the meetings were held at the BCBSF office complex, which also provided an opportunity for them to leave the academic setting, to broaden their understanding of the business environment, and to provide visibility for their educational programs.

At the beginning of the regular meetings, the BCBSF project manager provided the following information requested by the instructor.

- General description of the SPFM and its functions
- Descriptions for the primary SPFM areas and their business purposes
- Existing business rules
- Data format of the file-based SPFM
- Anticipated users
- Interface and query language requirements

The planning discussions focused on assessing the current status of the SPFM, determining the major design components, and analyzing the business needs. Multiple components were identified in the complex model. Two of these components were selected for the first database course and an additional component for the second course. To appropriately match the students' level of knowledge, the database instructor and the SPFM manager further refined the SPFM descriptions, business rules, data associations, data characteristics, relationships, attribute names, terms, input/output, query examples, and the final deliverables. The instructor adapted this information into assignments appropriate for the educational program and topic requirements of the database courses.

Detailed decision-making between the project manager and instructor was indispensable in the following areas to develop well-defined requirements for the assignment write-up.

1. Necessary requirements for structure, relationships, and functionality of SPFM areas
2. Workable components that could be completed within the time frame of the courses and that would fit within the curriculum requirements of the courses
3. Identification of sensitive BCBSF information and provisions for alterative data to preserve confidentiality and security
4. Meta-data for the design and information from existing documentation for the selected components
5. Assignment requirements and complex design issues of the selected components for conversion to relational database

4. BRINGING THE PROJECT TO THE CLASSROOM

In the first course, beginning database students study basic database foundations, including entity relationships, database design, relational database model/operations/integrity rules, concurrency control, normalization, and SQL, through lectures and individual assignments prior to the final assignment. The advanced database course extends the student knowledge into more advanced topics, such as advanced design/SQL/normalization/denormalization, data warehouse, e-business/web databases, XML, DBA skills, and project management. The first course is a required course for all Information Systems students, while the advanced course is a major elective. Each course is offered during a semester that consists of 16 weeks.

For both courses, the students worked in teams consisting of 3-4 members on their BCBSF assignments to convert the file-based system into a relational database with software access for information retrieval and statistical analysis. Each team utilized ERwin design tool, Oracle database, and a group account on Blackboard, a course management system. SPFM descriptions, associated business rules, spreadsheet data format, meta-data descriptions/samples, and user requirements were provided to the teams.

The teams completed the assigned project components and presented the final software results to invited BCBSF representatives, UNF faculty, and their classmates at end of both semesters. Evaluation forms regarding the database designs and implementations were completed by the instructor, students, and the BCBSF and SoC attendees, as well as a confidential evaluation form emailed to the instructor by each student that assessed the performance of individual team members during the final assignment.

The supervision of the students during the class assignments was the responsibility of the database instructor. The meetings with the BCBSF manager provided the instructor with a good understanding of the design and implementation expectations. After providing the assignment scope to the student teams in the database courses, the instructor met frequently with the teams for clarification and more importantly, to motivate critical thinking and thoughtful decision making by posing questions similar to what would be asked by the project manager.

4.1 Team Assignment for Beginning Database Students

Information about the SPFM file system, including spreadsheet files and data, was distributed in the 9th week of classes, followed by the distribution of the detailed assignment and submission requirements in the 10th week. Prior to the first meeting with the instructor, the teams were required to meet to discuss their analysis of the existing SPFM documents and the assignment as well as determine the significant factors in the transition process from a file system to a relational system.

4.2 Continuation of Assignment into the Advanced Course

The SPFM assignment continued in the advanced database course using the best database and software developed in the previous semester. In the 5th week of the course, the teams were provided with enhanced entity relationship diagrams based on adjustments and updated requirements made by the instructor and Service Pricing manager. The student assignment involved modifying the database and software to reflect the enhanced diagrams and adding a new component. This provided a situation similar to what employees frequently encounter in the work environment when a project has required changes that need to be made prior to designing and implementing a newly requested project component.

Students gained significant experience in making modifications and additions to an existing system software. During the semester, a meeting between the SPFM manager and the students was arranged as an in-class visitation. The manager presented a general overview of the project and the students had an opportunity to ask questions to augment their understanding of the requirements. The teams worked on the assignment simultaneously with an assignment involving the design and development of a data warehouse, which provide experience in time management and project management.

5. FEEDBACK ABOUT CLASS PROJECT

At the end of the advanced database class, the students were asked to respond to a questionnaire about the assignment. The responses from the students were very positive about their experiences with the design, implementation, and interface of a practical, real-world database management system. The students ranked their overall satisfaction with the BCBSF Service Pricing project as 86% Extremely Satisfied and 14% Very Satisfied, with 0% for the remaining categories of Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, Very Dissatisfied, Extremely Dissatisfied, Not Sure/Can't Rate.

The students unanimously agreed that this type of real-world project should be continued for future students with 100% selecting Strongly Agree and 0% for the remaining categories of Agree Somewhat, Agree Slightly, Neither Agree nor Disagree, Disagree Slightly, Disagree Somewhat, Disagree Strongly, Not Sure/Can't Rate. Their written comments revolved around the following two areas.

1. It would definitely help students to gain experience with a real-world project similar to what they will encounter in the future and help to make them better database designers and implementers.
2. The students will come away with a broad range of practical knowledge that is difficult to teach through lectures.

There were four areas that the students identified for improvements (other than additional time).

1. More meetings with the BCBSF representatives
2. On-site visit to BCBSF
3. More sample data for the database development
4. Better understanding of the user requirements for the interface

5.1 SoC Faculty Comments

Adapting components of an actual business project into final classroom assignments involved several pivotal steps from the initial SoC match-ups through the final presentations and evaluations. Although the preparation of the assignments was more time-consuming than initially anticipated, the utilization of a real-world project from a major business organization produced excellent outcomes for the students and faculty members.

From a faculty viewpoint, the opportunity to explore classroom options with BCBSF managers provided a mechanism to rejuvenate awareness of computing and communication skills needed by graduating students. A cooperative connection was also created between the managers and the faculty members during the processes for assessment of potential business projects and adaptation of the selected SPFM project. Throughout the interactions, the BCBSF managers were very receptive to exploring additional collaborative educational opportunities to help students develop skills needed by future IT employees.

The final assignments in both classes have routinely required students to work in teams to develop a database based on given requirements for a hypothetical scenario, to prepare documentation, and to present the results to the class. The difference noted by the faculty members about the utilization of the SPFM assignments revolved around the students' enthusiasm. Knowing that they were facilitating the actual transition of a spreadsheet data system to a relational database system and that BCBSF managers were involved in the assignment gave students a dedicated sense of responsibility for the outcome of the assignment. The significant analysis and overall project size did not deter the students, who strove as if in a competition to deliver the best project and presentation to the BCBSF managers and UNF faculty.

5.2 BCBSF Perspective

The Service Pricing manager was extremely pleased with the results provided by each of the participating student teams. With limited information, each team was successful in interpreting needs, dependencies, and results. Assumptions were listed to justify the direction for their designs. Presentation of the final results was spread between the team members with each participating in assigned portions of the presentation. Excellent tools were used to come up with designs worthy of consideration in the business environment.

Future collaborations are deemed as beneficial from the business side to influence the following areas.

1. Relevant curricula in the classroom that will fit with the business world
2. Tools utilized in the academic and business worlds
3. Two-way efforts between academia and the business world

The expected outcome would be the ability to better prepare students for entry into the workforce. Lastly, interaction between the students and the Service Pricing manager in the earlier phases of the assignment would have helped in building an understanding between the students and the business. With limited time, the SoC instructor acted as the intermediary. In the future, the Service Pricing manager recommends earlier meetings with the students to aid in communicating the desired results. Additionally, providing business "on-site" tours would also be beneficial for the students.

6. CHALLENGES AND DIFFICULTIES: LESSONS LEARNED

At the end of the course partnership, the general view was that it had been a rewarding experience for all of the participants. There were some lessons learned through the challenges and difficulties encountered during the academic year that may be useful for similar course collaboration efforts.

Communication is crucial. From the initiation of this collaborative teaching strategy through the students= final presentations, communication was the most important ingredient for achieving a positive outcome. The lines of communication required rigorous coordination to move the theoretical idea to a practical reality. This is a considerable challenge given the organizational differences between business and academe. Although the BCBSF/SoC classroom collaboration was expedited by the working relationship that had been established through the partnership grant, connecting the right people, course, and project took persistence and continuous follow-up. The initial actions

taken by the BCBSF and SoC coordinators helped to focus and organize the activities between the organizations.

Consistent communication was definitely essential between the database instructor and the SPFM manager. The weekly meetings provided an opportunity to establish a mutual rapport, trust, and understanding that helped to facilitate the giving and sharing of necessary information. Without the commitment of allocated time for the collaboration, developing a usable assignment for the students would have been difficult. The guidance, input, and approval at pivotal points by the BCBSF Service Pricing manager helped to clarify information.

The project timeline needs to be adaptable to an academic time frame. Identifying a time frame that made business sense while at the same time fitting within the boundaries of a nine-month academic year was a major concern in selecting the project. Real-life business projects are not automatically declared complete at the end of a semester. However, students and universities activities tend to orbit around semesters. It was imperative that the selected project be of significant value to BCBS, but without the time anxiety of most high visibility projects.

The transition from a real-world project to a classroom assignment is dependent on the background foundation of the students and the academic requirements of the course. From a business standpoint because an actual project was involved, it was important to have a good, mutual understanding of the current SPFM and to determine the appropriate direction for the automated version. Since the courses were not capstone courses, several adjustments to the business project were required to make it suitable for the course structure and learning objectives. Making decisions about the data requirements and business rules needed to occur prior to writing up the assignment because handing over a non-refined project would have defeated a correct learning experience for the beginning database student. The instructor=s previous consulting experience helped to organize the essential business material needed for the assignment.

Combining an additional SPFM component into a project from the beginning class provided the students in the advanced class an opportunity to analyze an existing structure, make decisions about improvements, and incorporate additional capabilities to the software. On the other hand, taking the project from one semester to another semester in two non-continuous courses (the first course being required and the second course being a major elective) presented some incongruities in the enrolled students which was somewhat overcome by structuring the teams to contain a mixture of students familiar with SPFM from the fall semester and students without SPFM experience.

Expectations for the end results need to be agreed upon prior to the distribution of the assignment requirements to the students. Considering the dynamic nature of a real-world business project, discussions about the requirements and rules remained fluid until the assignment had to be declared static to fit into the rigid time frame of the course and avoid student confusion about the final submission requirements. Although questions from the students occurred throughout the assignment, the answers were given within the framework of the written assignment.

Project continuity played a key role in the positive outcomes of the course partnership. Continuous participation by students on the project from the initiation to the final phase offered the best chance to reach the objectives of the courses. The beginning database students would put in place the foundation for the project. Yet, given the very nature of the enrollment process for classes at any university, it was clear that some students in the first course would not return for the follow-up advanced database course. It was essential that the methodology used to bring this real-life business effort into the classroom provided for project continuity.

Having the same instructor teach both classes provided stability. It is equally important to have a business manager who will remain proactive on the project starting with the planning stage and continuing until the end result is delivered. Frequent meetings over a nine-month time span present a challenge to any manager's schedule. The continuous energy and enthusiasm brought to this effort by the BCBSF Service Pricing Manager proved to be invaluable.

Having more interactions between the BCBSF manager and the students would have afforded additional clarification about the SPFM and BCBSF operations. Unfortunately, these types of interactions are dependent on the time that the class meets and the working hours of business employees. By scheduling in advance, invitations to attend the final team presentations were given to appropriate BCBSF representatives and SoC faculty. The meeting between the BCBSF manager and the advanced database students was one of the assignment highlights mentioned by several students. In future collaborations, it would be good to set up additional opportunities for interaction.

7. CONCLUSIONS

As technology continues its rapid expansion, the exploration of options for alliances between business and academia is essential to improve the educational experience for students and their preparation for the IT workforce. The integration of a real-world project into a course can impact a significant number of students and provide them with an excellent opportunity to apply their academic knowledge in an IT project similar to what they will encounter in the work environment. Determining the best approach to facilitate this type of collaboration involves a variety of personnel, course, project, and time considerations that must be addressed cooperatively by the business organization and the academic institution for favorable results. Although the described experiences focus on database courses, the joint initiation and challenges encountered may provide insights that can be applied to other courses.

It is particularly important for the collaboration to have mutual benefits so that both sides end up with positive outcomes from their time commitment. BCBSF and SoC achieved multiple benefits in this teaching strategy. It

provided an opportunity for direct interaction between UNF faculty and BCBSF personnel to share knowledge and expertise, which have proven to be valuable assets for both organizations. For BCBSF, the additional assistance from the students and instructor helped in the SPFM transition towards a relational database. The faculty revitalized their knowledge of current business applications and gained an enhanced understanding of skills needed by graduating students from a business perspective. This awareness has encouraged the continued seeking of methodologies that provide flexibility in the way that knowledge and practical applications are made available to students.

Most importantly, the students gained experience with an actual IT project along with a better understanding of applying theoretical concepts to solve IT issues. Their involvement with the development of an actual database system gave them a more realistic understanding of information systems and improved their educational knowledge as well as their preparedness for IT employment. Building on the experiences from this teaching strategy, the BCBSF-UNF SoC group plans to continue bringing real-world business projects to the classroom in other computing areas by further developing a paradigm for matching faculty, course, and project. Based on the positive feedback from the students, it may be a methodology to generate increased enthusiasm within the information systems program that may in turn help to promote the enrollment of future students.

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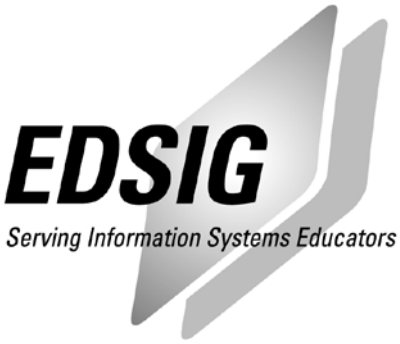

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