Interdisciplinary Student Teams Projects: A Case Study

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ABSTRACT

In today's organizations team work has become an integral part of the day-to-day routine. For this reason, University professors are including group projects in many courses. In such group assessments, we advocate the use of interdisciplinary teams, where possible. As a case study, we report an interdisciplinary group technical project with members from a Master of Business Administration course and a Master of Science in Accounting course. We also describe the refinements made to the course in order to enhance the collaboration between students from two classes.

Keywords: Interdisciplinary Projects, Collaborative Group Projects, Interdisciplinary Research, Technical Projects

1. INTRODUCTION

Organizations rely on teamwork to accomplish the work that ultimately makes the firm thrive and maintain success (Chen et al., 2008). Thus, it is important for college graduates to possess the skills needed to help them function effectively in workplace teams. The safe environment of the classroom is a place where students can learn to be effective team members. It has been stated that teamwork needs to be considered a basic critical skill. It should be taught just as reading, writing and mathematics are taught; and, if this were the case, students and corporations would be well served (Kozlowski and Ilgen, 2007). University professors have strived to replicate the corporate environment by having students work in teams to accomplish course learning objectives.

One important aspect of today's workplace is that teams consist of a mosaic of interdisciplinary members with diverse functional areas as their primary responsibility. Such teams are now at the core of how work is accomplished in today's corporations. Thus, students should learn how to function effectively as members of interdisciplinary teams. The purpose of this paper is to describe an interdisciplinary group technical project designed by two professors to help students learn how to function in interdisciplinary teams. Interdisciplinary teams, as the term is utilized in this paper, refers to combining students with differing undergraduate majors; from two different courses; and two different graduate degree programs.

As part of the interdisciplinary technical group project described in this paper, Master of Business Administration (MBA) and Master of Science in Accounting (MSA) students were required to collaborate as team members. This paper may be beneficial in assisting other faculty who may seek to initiate such teams. In the related literature, this paper describes the need for such interdisciplinary learning environments. This section is followed by a description of the students; a description of the interdisciplinary group technical project and how it was implemented; team formation and preparation for membership; and course objectives met through participation in the project. Lastly, the project learning outcomes are discussed.

2. RELATED LITERATURE

The numerous benefits of teams have long been known in the workplace. Many different industries publish articles in popular press indicating the importance of teamwork and often include steps or factors that are vital to team success (Rutter, 2007). For example, in a garment plant that implemented teams, average productivity increased by 18% with 14% being directly attributable to teams (Hamilton, Nickerson, and Owan, 2003).

Another study looked at U.S. steel mini mills and found that teams raise productivity as the production process gets more complex (Boning, Ichniowski, and Shaw, 2007). In their field study, Falk and Ichino (2006) used zero financial rewards and a dull task of stuffing envelopes and found the average worker productivity was higher when each person worked in the same room as another person than when they worked in isolation. The least productive workers were the most affected by working in a group.

The benefits of teams can be seen in many environments including the educational environment. Teachers have found that cooperative work among students can increase learning (Jensen, Moore, and Hatch, 2002). However, research also indicates that organizational teams are often not as effective as they should be (Kozlowsky and Ilgen, 2007; Rutter, 2007). A number of research studies have looked at what makes a team successful. Teams that were the most productive were also the most satisfying team of which to be

a member (Napier and Johnson, 2007). Other researchers have examined the influence of personality styles (Gorla and Lam, 2004) and assigned or self-selected membership (Brabston and Street, 2005) on team success.

When the specific field of technology was examined it was found that information systems projects are often staffed by interdisciplinary teams, not necessarily in the same location, working together to solve complex tasks (Ramesh, Pries-Heje, and Baskerville, 2002). At present, virtual teams have become widespread in their use throughout organizations (Chen et al., 2008; Goodbody, 2005; Nandhakumar and Baskerville, 2006).

For example, virtual teams have become an essential part of making off-shore outsourcing effective (Krishna, Sahay, and Walsham, 2004; Xue, Sankear, and Mbarika, 2004). With the increased use of virtual teams, managers in organizations are now observing that some virtual teams are able to achieve a higher level of effectiveness than other virtual teams (Goodbody, 2005). This further strengthens the need for instructors to help enable students to achieve a high level of effectiveness as interdisciplinary team members through course assignments and other activities.

More and more collaboration tools are available to enable those virtual teams. These tools are often free via the internet and allow easy collaboration at convenient times and locations. Web 2.0 services provide many more options than were available just a couple of years ago (Zhang, Olfman, and Ractham, 2007). Educators in the field of technology, be it computer science, computer information systems, or management information technology, need to help their students acquire the skills needed to work in teams. Teamwork is a very relevant and needed skill both in business in general and in the information technology environment in which many students are either currently employed or will be seeking employment when they graduate (Drake, Goldsmith, and Strachan, 2006; Abraham, et al., 2006). It is clear that our students need to be able to function in work teams separated by space or time with technology bridging the gap. We need to make certain our graduates possess effective teamwork skills in order to make them competitive in today's corporations.

Real-life corporate teams will be made up of diverse people and students must learn to work in those diverse teams (Shaw, 2004). Since work life consists of integrated teams, many college educators have been including culturally integrated team projects for years; but they generally have only been in one course, not across courses and majors (Napier and Johnson, 2007). Napier and Johnson reviewed the literature and conducted a study to determine the key factors that influence student's satisfaction with teamwork. They identified team spirit, work ethic, and equal team member contributions as the top three factors of successful student teams when required to work in teams. This study was done with a homogeneous student group.

Another example from the related educational literature included a project-based team work game used to demonstrate e-commerce in Hong Kong (Ngai et al., 2005). These researchers found that students like practical, enjoyable, and meaningful projects.

In a study that is somewhat similar to the interdisciplinary group technical project created by the authors of this paper, the related literature revealed an article about an interdisciplinary course with students majoring in finance and students majoring in information systems. The purpose of that interdisciplinary course was to show students how IS applies to other business disciplines (Aytes and Byers, 2005).

In response to the need for increased team productivity and the present need for students to come into the workforce with effective interdisciplinary team skills, we developed an interdisciplinary group technical project. Most of the teams we found mentioned in the related literature were homogeneous. Perhaps this is because it is easier to work within your own class or discipline. However, professors need to start investigating opportunities to bring in cross class, cross program, and cross degree teams to more accurately reflect what students will experience when they graduate and enter the workforce.

3. THE INTERDISCIPLINARY GROUP TECHNICAL PROJECT

As suggested by Abraham, et al., (2006) information systems programs must offer a more functionally integrated curriculum. In response to this suggestion, during the fall 2006 semester, graduate students from a large regional university in two separate graduate level courses and two different graduate programs participated in interdisciplinary group technical projects. The interdisciplinary group technical project was repeated with two additional classes of students during the fall 2007 semester. MBA graduate students were enrolled in the Management Information Systems course; and MSA graduate students were enrolled in the Technology Assisted Decision Making course. The interdisciplinary group technical project teams were formed with students from these two courses. Thus, the teams were interdisciplinary because they were cross major and cross course. The following discussion focuses specifically on fall 2007 semester project.

During the semester, the two professors taught each course individually and, at the same time, team taught the interdisciplinary group technical project. The following section describes: the student participants; the project and how it was implemented**;** the team formation and preparation for effective team membership; and course objectives met through participation in the project.

3.1 Description of Students

The MBA students were career professionals who were attending evening classes and had several years or more experience in managerial positions. The average age of the MBA students was approximately 32. In contrast to those students, the MSA students graduated with an undergraduate accounting degree and went directly into the MSA program to earn the additional credit hours required to sit for the Certified Public Accountant (CPA) exam. Currently most states require 150 credit hours to become a CPA. These students did not have work experience other than summer jobs or internships and their average age was approximately 22.

3.2 Description and Implementation of the Interdisciplinary Group Technical Project

The interdisciplinary group technical project consisted of researching a very current technical topic; documenting the research database search process; documenting the interdisciplinary group process; writing a group paper regarding the team's research findings on their technical topic; presenting the technical project to the class; evaluating presentations made by other teams; and evaluating peer team members' participation throughout the project.

The two faculty members involved scheduled their individual classes to meet on the same evening and at the same time. Recognizing the importance of getting the groups off to a good start, the professors gave a lot of attention to how the interdisciplinary group technical project was introduced. The syllabus given to the students in each class clearly stated the course requirement of participating in an interdisciplinary group technical project and the project deliverables.

For the second half of the first day of class, one class moved to join the other class. This allowed students to participate in the initial introduction of the project as one large group. Students were introduced to the interdisciplinary group technical project and specific information about their participation in the project was provided. The project assignment sheet was discussed and students had a chance to get their questions answered. Students were given information regarding the schedule for required interim and final deliverables. The primary deliverables include the written professional technical report and the presentation to both classes. The assignment sheet and all other project documents supplied by the professors were also posted on Blackboard.

Next, 15 to 20 minutes of class time was devoted to an ice breaker. Since very few of the students within the same class or between the two classes knew each other, it was felt that this time was well spent in order for the students to get to know each other.

For the second class, both classes met in one classroom. Students were given a list of project topics and an index card. They were asked to rank their top three project topics to indicate their first through third choice. Students were also asked to note on the index card if they have had two years of continuous full-time work experience. The cards were picked up immediately as the students finished.

The next part of class was dedicated to helping students become as skilled as possible in utilizing the university's research databases. One of the university's business school liaison research librarians visited with the class as a guest speaker. She briefly questioned the students about their present level of expertise in using research databases. Then she gave the students real-time, online instruction on effectively using the many research databases and other research aids available online through the university library. The research librarian picked a technical project topic from a prior semester and showed the students more advanced search strategies. The librarian gave the students a one page handout consisting of: search tips, a listing of the more relevant research databases, and her contact information. The research librarian offered to help the students individually or as a group at any time during the semester.

3.3 Team Formation and Preparation for Effective Team Membership

When the librarian was speaking with the students, the two professors were collaborating to determine the members of each team. The first criterion in assigning students to a team was to make the team interdisciplinary by having both MBA and MSA students. Thus, the team membership would also include students with at least two years of full-time work experience and students with no work experience or only temporary work experience. While an effort was made to assign students on the basis of common interest in a specific topic, not all students received their first choice of a topic. However, our primary objective of interdisciplinary team composition was met. Each four member group typically consisted of two MBA and two MSA students.

When the librarian finished her presentation, the next class activity consisted of a small group and then a large group class discussion of the article "The Science of Team Success." A full reference to this article is given in the references (Kozlowski and Ilgen, 2007). The students were to have read the article prior to class. For these discussions, students were randomly divided into small groups, given a list of several questions to be answered pertaining to the article, and to be prepared to share their group's answer with the class. The main premise of the article is the numerous ways in which work groups can take steps to enhance the group's performance. The class discussions were centered on the article's main points.

Recent research literature describing effective teams suggests that the team formation stage plays a crucial role in the ultimate effectiveness of the team (Goodbody, 2005). With this in mind, the professors gave careful attention to the "up front" work that should take place within the team during the important team formation stage. Several in class activities were designed to meet the objective of teaching the students the importance of and how to perform the numerous preparations that must take place before the team moves onto the other official work of the team.

The students were divided into their interdisciplinary technical projects groups. They were given their assigned technical project topic. To give the teams a chance to "socialize" and begin to think like a team, the teams did two team building exercises which took about 20 minutes of class time.

Next, a large segment of the class for this evening was designed to have the students understand the importance of establishing effective overall team operating procedures prior to beginning any other work on the project. The professors talked briefly about the importance of addressing overall operating procedures openly and setting guidelines in writing that all members agree to follow.

The students were given a handout on "Effective Group Membership." This handout described the numerous preparations for group work that must take place before any other teamwork begins. The students spent class time in their designated groups discussing the handout and how their team would respond to each item. A written deliverable was due at the end of class from each team. The professors called this deliverable the team contract. Generally the team contract outlined all aspects of the group's standard operating procedures throughout the time they were completing the

interdisciplinary group technical project. The team contract specifically addressed:

1. Establishing guidelines
   a. when and where team will meet
   b. how work will be assigned
   c. how the behavior of non-performing members will be addressed
   d. what roles are needed in the group
2. What are some other matters that may be important to the group?
3. Signature indicating that they agree to the developed guidelines.
4. Roles and assignments for the first meeting were determined.
5. First meeting time, date, and place was set.

After all teams had the written contract deliverable completed, the class participated in a discussion on how each individual group addressed the important up front work to which all team members agreed. Students then reconvened in their designated groups to see if their contract needed any adjusting. Each team's contract was then collected by the professors.

Also, to help each team become a cohesive unit, each group was asked to come up with a team name. That team name was used in all team communication.

Research by Ashraf (2004) found that the game-theory approach to groups allowed free riding to happen and that free riders should be penalized. In addition, the outcome for "industrious" students for carrying less motivated ones is that contributing team members are short-changed in terms of grades. In developing our project process, we allowed members to be fired for non-performance. The model used was based on Kruck and Reif (2001). Students were made aware that their individual grade could be adjusted based on the peer evaluations. If a team had a non-performing member, the problem was to be documented; the non-performing student had to be informed of the other team members' opinions regarding their lack of adequate contributions to the team; and the team had to agree on needed corrective actions to be performed by the non-performing student; and those corrective actions had to be communicated in writing to the non-performing student. If the student was non-communicative or unwilling to work with the group, the group could then fire the non-performing team member.

3.4 Course Objectives Met Through Participation in the Project

The course objectives that students would hopefully attain through participating in the interdisciplinary group technical project were:

1. Augmentation of analytical thinking and problem solving skills by performing unstructured problem solving.
2. Further development of general research skills using both the internet and university library research databases.
3. Improvement of presentation, written and interpersonal communication skills.
4. Further development of leadership and teamwork skills.
5. Enhancement of students' ability to work with individuals whose primary discipline is different from their own.

4. OBSERVED OUTCOMES

After the paper was turned in and the presentation completed, students were required to complete an online form that anonymously rated the group dynamics. Students also had to rate their peers and themselves, both with justification of the rating. Finally, students answered several open ended questions about the process. The first time we did this cross course project during fall 2006, the two classes did not meet on the same evening. We found students with multiple classes, long drives to and from campus, and hectic career and family life demands needed a common day and class time so that they could easily meet before or after class with group members from the other class. Although we did not restrict the use of technology and even created Blackboard groups, the students did not seem to embrace the use of technology to facilitate meetings and collaboration. During the second semester, fall 2007, the two classes were taught on the same day and at the same time; thus, students no longer complained about the difficulty of finding a common time to meet.

Responses to the question "What was the WORST thing about this group experience?" were positive after the change in class meeting dates for fall 2007. The only negative response "having someone from the other class - low connectivity" is odd because we did not put any technology requirements, allowed students occasional class time to meet, and they could easily meet before or after class. Most students responded with a positive opinion when asked "What was the BEST thing about this group experience?"
One student responded "Efficient. We communicated via emails all the time, didn't waste a lot of time on meeting." Other positive comments included "Learning the topic and meeting the other group members" and "The way that the younger members of the team stopped deferring to me to make decisions and began to take control of the project." Other positive comments related to the combining of courses include "Meeting David and working with a heck of a good group of guys to present an interesting topic" (Note: David was in the other class). "The variety of educational/personal backgrounds" and "As with any group project whether it be in academia or in the work place the most positive aspect of this group project was learning to work with new people. I thoroughly enjoyed the challenge of coordinating across classes."

5. LESSONS LEARNED

We recognized the need to sell the students on the importance of doing the "up front work" that should take place during the team formation period. Thus, to better bond the teams and to bring about a higher level of team effectiveness, we developed a class activity around the article "The Science of Team Success" and other information on team effectiveness. Second, we introduced the project earlier in the semester and added required due dates to check the interim deliverables of each group. Finally, the biggest

lesson was that the classes needed to meet at the same day and time throughout the semester.

6. SUMMARY

Professors need to allow students numerous learning opportunities that enable students to obtain the skills needed to become effective and creative members of work teams. We described one such learning opportunity—the use of an interdisciplinary group technical project. The students who participated in the project learned from their interactions with students enrolled in different courses and who also had a major different from their own. The benefits for the student participants were discussed. An extension would be to create a project such as one that cuts across universities, programs, and classes.

It should be noted that there were benefits for the two professors. It was fun to create an interdisciplinary project with another professor. And, while it took time to communicate and coordinate with the other professor, on the balance, some time was saved in that course documents were jointly developed. We definitely enjoyed the synergy of working together as colleagues to develop the interdisciplinary group technical project.

6. REFERENCES

Abraham, Thomas, Breath, Cynthia, Bullen, Christina, Gallagher, Kevin, Goles, Tim, Kaiser, Kate, and Simon, Judith (2006), "IT Workforce Trends: Implications for IS Programs." Communications of the Association for Information Systems, Vol. 17, Article 50 pp. 1147-1170.

Ashraf, Mohammad (2004), "A Critical Look at the Use of Group Projects as a Pedagogical Tool." Journal of Education for Business, Vol. 79, No. 4, pp. 213-216.

Aytes, Kregg and Byers, Steve (2005), "Innovation in Information Systems Education-IV: Mutual Fund Management Information System: An Integrated Project for the Introduction to MIS Course." Communications of the Association for Information Systems, Vol. 15, No. 20, pp. 343-356.

Boning, Brent, Ichniowski, Casey, and Shaw, Kathryn (2007), "Opportunity Counts: Teams and the Effectiveness of Production Incentives." Journal of Labor Economics, Vol. 25, No. 4, pp. 613-650.

Brabston, Mary E. and Street, Christopher (2005), "The Impact of Team Selection Methodology on Team Performance and Individual Team Member Satisfaction." International Conference on Informatics Education Research, pp. 254-262.

Chen, Fang, Sager, James, Corbitt, Gail and Gardiner, Stanley (2008), "Incorporating Virtual Teamwork Training into MIS Curricula." Journal of Information Systems Education, Vol. 19, No. 1, pp. 29-41.

Drake, Robert, Goldsmith, Geraldine and Strachan, Rebecca (2006), "'A Novel Approach to Teaching Teamwork." Teaching in Higher Education, Vol. 11, No. 1, pp, 33-46.

Falk, Armin and Andrea Ichino, (2006), "Clean Evidence on Peer Effects." Journal of Labor Economics, Vol. 24, No. 1, pp. 39-57.

Goodbody, Jenny (2005), "Critical Success Factors for Global Virtual Teams." Strategic Communication Management, Vol. 9, No. 2, Feb/Mar 2005, pp. 18-21.

Gorla, Narasimhaiah and Lam, Yan Wan (2004), "Who Should Work with Whom?" Communications of the ACM, Vol. 47, No. 6, June, pp. 79.

Hamilton, Barton H., Nickerson, Jack A., and Owan, Hideo (2003), "Team Incentives and Worker Heterogeneity: An Empirical Analysis of the Introduction of Teams on Productivity and Participation." Journal of Political Economy, Vol. 111, No. 3, pp. 465-497.

Jensen, Murray, Moore, Randy., and Hatch, Jay (2002), "Cooperative Quizzes." The American Biology Teacher, Vol. 64, No. 1, pp. 29-34.

Kozlowski, Steve and Ilgen, Daniel (2007), "The Science of Team Success." Scientific American Mind, June/July, pp. 54-61.

Krishna, S., Sahay, Sundeep, and Walsham, Geoff (2004), "Managing Cross-Cultural Issues in Global Software Outsourcing." Communications of the ACM, Vol. 47, No. 4, pp. 62-66.

Kruck, S. E. and Reif, Harry L. (2001), "Assessing Individual Student Performance in Collaborative Projects: A Case Study." Information Technology, Learning, and Performance Journal. Vol. 19, No. 2, pp. 37-47.

Nandhakumar, Joe and Baskerville, Richard (2006). "Durability of Online Teamworking: Patterns of Trust." Information Technology and People, Vol. 19, No. 4, pp. 371-389.

Napier, Nannette, P. and Johnson, Roy D. (2007), "Technical Projects: Understanding Teamwork Satisfaction in an Introductory IS Course." Journal of Information Systems Education, Vol. 18, No. 1, Spring, pp. 39-47.

Ngai, Eric,W. T., Lok, Chun K., Ng, Eugenia. M. W., Lo, C. N., and Wong, Yun K. (2005), "Collaborative Project Across three Hong Kong Universities: A Case Study in E-Commerce Education." Journal of Information Systems Education, Vol. 16, No. 1, Spring 2005, pp.109-116.

Ramesh, Balasubramaniam, Pries-Heje,,Jan, and Baskerville, Richard (2002), "Internet Software Engineering: A Different Class of Processes." in Annals of Software Engineering, December (eds.), Kluwer Academic Publishers, Vo.l. 14, No. 1-4, pp. 169-195.

Rutter, Paul. (2007), "Golf Facilities of All Shapes and Sizes Can Benefit from the 5 C's of Team Success." Golf Range Magazine, July/August, p. 50.

Shaw, James (2004), "A Fair Go for All? The Impact of Intragroup Diversity and Diversity-Management Skills on Student Experiences and Outcomes in Team-Based Class Projects." Journal of Management Education, Vol. 28, No. 2, pp.21-51.

Xue, Yajiong., Sankar, Chetan, and Mbarika, Victor (2004), "Information Technology Outsourcing and Virtual Team." Journal of Computer Information Systems, Vol. 45, No. 2, pp. 9-16.

Zhang, Sonya Xuesong, Olfman, Lorne, and Ractham, Peter (2007), "Designing ePortfolio 2.0: Integrating and Coordinating Web 2.0 Services with ePortfolio Systems

for Enhancing Users' Learning." Journal of Information Systems Education, Vol. 18 No. 2, pp. 203-214.

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