Experience-Based Learning

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INTRODUCTION

The College of Information Sciences and Technology practices an applied approach to learning. This approach entails hands-on activities supported by a solid practitioner knowledge base. In addition, the curriculum presents a strong business orientation to the practice of information technology.

The need for IT consulting education at the undergraduate level became increasingly apparent after numerous discussions with many corporate partners. Approximately one-third are of the graduates from the College of IST are exclusively placed with consulting firms and more than 50% are working in a consulting capacity after graduation. All graduates, regardless of where they choose to work, will function in a consultative role as part of their jobs. The feedback received from corporate partners indicated that most IT curriculums do a good job with technology and business topics but rarely touch consulting-related issues, skills, and methodologies.

The ACM, IEEE, and AITP (previously known as the DPMA until 1996) have continuously addressed the educational needs of future IT professionals by curricula development and standardization. Each organization, in their latest curriculum guidelines, emphasize the importance of development and mastery of problem-solving skills in concert with real-world project and group activities. However, a recently published paper comprised of members from academia and industry reported that current graduates are often unprepared for entry positions in industry (Woratschek & Lenox, 2002). Among the specific deficiencies cited were problem-solving skills and the ability to work in groups. By failing to address these shortcomings, we ignore the needs of industry and neglect to prepare our students for employer expectations.

In response to this data, the College of Information Sciences and Technology IT Consulting track was created. The curricular track consists of three courses: IST 301 IT Project Management, IST 443 IT Consulting I, and IST 444 Advanced IT Consulting. At the heart of the track is a series of real-world consulting engagements with corporate clients from all areas of the country. The students work in teams of four or five on in-depth corporate projects, most of which span traditional semesters. In order to provide the students with an experience that is in-depth and as close to real-world as possible, we recognized that projects should not be forced into the 15-week constraint of the traditional semester. Rather, utilizing a flexible scheduling model allowed us to consider projects that are much more robust than typically undertaken in traditional courses.

Most projects are broken into implementation phases. The semester-long phase I typically consists of requirements gathering, solution design, and prototyping and is completed in IST 443. Phase II of the project can be accommodated in a variety of manners, depending on the interests of the client corporation. The second phase of the project can be conducted in a subsequent course, as members of the team working for the client as interns, or as part of a relationship where the client corporation provides funding for the development of the project at Penn State.

The success of the IT consulting track can be attributed, in part, to a unique, synergistic relationship between the faculty that teaches the courses in the track, the career services unit with the college, and the university development office. The track has proven to be a great mechanism for engaging corporations with the IST students and curriculum. Almost all of the participating corporations extend internship and/or full-time placement offers to one or more team members, thereby becoming an innovative placement tool for the career services unit within the college. The development office of the university views the track and associated projects as unique mechanisms for engaging corporations and alumni with the students. The positive experiences generated through the projects have generated substantial donations to the college and helped to foster stronger long-term relationships with a variety of organizations and individuals.

RATIONALE FOR THE IN-DEPTH PROJECT EXPERIENCE AND CONSULTING FOCUS

The typical course structure in the track utilizes traditional lecture and discussion and a real-world derivative of problem-based learning (PBL) known as problem-centered learning (PCL). The project experiences are modeled after PCL theory. Problem-based learning (PBL) stimulates engagement and learning by presenting students with complex problems PBL can also share qualities with experiential, service, and cooperative learning. Designing open-ended, directed problems for small groups of students with the intent to produce solutions that benefit real-life people and institutions can be a powerful pedagogical construct. Problem-centered learning (PCL) is more explicit and structured than PBL. These teaching strategies can encourage other learning outcomes beside developing problem-solving skills, including high student motivation, teaming skills, ability to organize, plan and execute, problem solving (technical, procedural and social), greater appreciation of course content utility, longer knowledge retention, knowledge of the real world, positive community awareness and civic responsibility, and the value of teamwork (Edens, 2000; Mierson & Parikh, 2000). Many PBL and PCL classroom experiences are case-like in nature. The variation in IST utilizes well-constructed real-world problems.

One learning objective that is persistent throughout the track is to develop in-depth problem-solving skills—to develop our students' skill to solve open-ended, high-risk problems that may have multiple potential solutions. Another learning objective includes the ability to work well with all of the various stakeholders associated with the consulting engagement, including the members of the consulting team.

The projects selected for the consulting courses are carefully selected and scoped by faculty with substantial industry experience. Projects that provide opportunities for learning experiences for the students on multiple levels, as well as those that provide substantial value for the client organization, are sought. The selection and scoping of the project is one of the most crucial elements of the learning experience. Projects should be challenging and force students to step out of their comfort zones to learn (or re-learn) new skills and technologies in a real-world, on-demand mode. At the same time, projects must be scoped to determine achievability.

In-class lectures and discussions focus on a variety of consulting and project management issues, methodologies, and tools. A wide assortment of industry speakers are also utilized in the track. The use of structured methods require careful planning like the process to define requirements, evaluate design options, build-on schedule, and the set-up of testing and evaluation tools do not hold much relevance to today's IT professional. Real-world projects change this perspective. Students gain a meaningful understanding of why and how structured methodologies affect success in a team-based environment. The implementation and relevance of textbook methodology comes to life in real-world examples of changing requirements, budget constraints, culture, and competing objectives. Students gain experience with the less tangible "people skills" qualities that get lost in the prescriptive text book descriptions. Grades are determined by the use of individual, group, client, and instructor measures. In this manner, it is possible (and is usually the case) that members of the same team receive differing grades. This design helps to prevent the "free rider" from receiving the same or similar grade as the team member who contributed to the project.

Choosing a collaborative approach is a departure from the traditional model of the controlled, lecture-driven classroom familiar to most instructors and students. Bosworth (1994) contrasts the traditional approach to the collaborative approach in terms of the attributes of each. The traditional approach is characterized by: (1) competition; (2) focus on one's own work; (3) destructive criticism of others; (4) manipulation of the system for one's benefit; and (5) a general lack of trust. The collaborative approach is characterized by: (1) cooperation; (2) compromise; (3) flexibility or roles; (4) trust and respect of others; (5) questions as well as constructive criticism; and (6) group problem solving.

The use of groups and teams is not without perceived disadvantages. MacGregor (1992) identifies seven belief shifts that must take place to enter into such a collaborative learning environment:

1. From listener, observer, and note taker to active problem solver, contributor, and discussant.
2. From low or moderate expectations of class preparation to high ones.