Preparing Students to Run Projects: A Self Evaluation Mapping Our Current Curriculum to Needed Project Management Learning Outcomes

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INTRODUCTION

The statistics and statements below demonstrate that the demand for better trained project managers has greatly increased over the last several years and will continue to grow well into the future.

- The U.S. Spends $2.3 trillion on projects every year, an amount equal to one-quarter of the nation's gross domestic product. (Schwalbe, 2004)
- The world as a whole spends nearly $10 trillion of its $40.7 trillion gross product on projects of all kinds. (Schwalbe, 2004)
- More than half a million new information technology application development projects were initiated during 2001, up from 300,000 in 2000. (Standish Group, 2001)
- A recent survey conducted at META Group's 2003 conference of attending Project Managers indicated that 77% of respondents believe lack of project and program management skills is a major IT issue. (META Group, 2003)
- On average, America spends over $275 billion each year on about 200,000 software development projects, many of which fail. (Crawford, 2002)

As project management positions become more important, it has become critical for organizations to place individuals in a project management role that have the skills to be successful. This paper will examine this concept as well as the necessary skills needed by an IT project manager to succeed and will compare these skills to skills obtained from our Computer Technology (CPT) curriculum. A final analysis will be conducted to examine any gaps that exist and determine the courses and learning outcomes that need to be added to adequately equip our students with the skills they will need to be successful in an entry level project leader role.

BACKGROUND

Recently, attention has turned to project management education for soft skill development of project managers. Many organizations are slowly realizing the benefits of formal project management education. "Companies that develop their project managers' interpersonal and business skills can improve the chances of a project's success by up to 30% over the next four years" (Dash, 1999). The Project Management Institute (PMI) has become part of the movement toward project management education by launching a program called Registered Education Providers (REP). The objective of this program is to "help organizations and individuals identify quality PM training providers and courses that meet their professional development needs" (Price, 2003). Educational institutions can develop their project management curriculum based upon work done through PMI and certify their program based upon PMI qualifications.

The programs that PMI as well as many others are developing are aimed at the professional or graduate student level. In our program, we are focusing our efforts on preparing our undergraduate students for the responsibilities of a project management position directly after graduation. As a result, we are making changes to our set of elective courses to facilitate the learning necessary for students to acquire the skills a project manager will need to be successful.

Moving the project management learning to undergraduate students is also consistent with the Information Systems (IS) model curriculum (IS'97) supported by the Association for Computer Machinery (ACM), the Association for Information Systems (AIS), and the Association for Information Technology Professionals (AITP). The ACM Special Interest Group for IT Education (ACM/SIGITE) is in the final stages of developing a model curriculum for Information Technology programs and they too have included a section on project management learning outcomes that are required of all undergraduates.

Why IT Project Managers are Needed

In 1995, a study entitled "CHAOS" was conducted by the Standish Group. The study surveyed 365 information technology (IT) executive managers in the United States who managed more than 8000 IT application projects. The sample contained small, medium, and large companies across several industry segments. The results of the study showed, as the title of the study indicates, that IT projects were in total disarray (see Table 1). "A huge portion of the more that $250 billion spent annually on IT application development is wasted because companies fail to utilize effective project management practices." Only 16.2% of projects were counted as successful and the projects were only delivering 61% of the desired features. Successful projects were defined as meeting all project objectives on time and on budget. The study concluded that project management was one of the top catalysts to ameliorate these statistics.

The Standish Group repeated the study in 2001, and again in 2003 and observed some noteworthy improvements (see Table 1). Successful projects have increased to 34%, average cost overruns have decreased to 43%, and likewise average time overruns have decreased to 82%.

One of the major reasons for the improvements, mentioned in the CHAOS study, was attributed to better project management practices and better trained project managers. Wilder and Davis (1998) agreed with the earlier CHAOS study stating that poor project management is a major contributing factor leading to failed IT projects. These results demonstrate the increasing importance of project management to today's organization and the significance of training and educating project mangers prior to assigning them to large complex IT projects. For these reasons, we believe that a project management education coupled with a technology focused undergraduate program can be the

Table 1. Standish Group Study Results

	1995	2003
Successful IT Projects	16.2%	34%
Average time overruns	222%	82%
Average Cost overruns	185%	43%
Delivery of required features	61%	52%

ideal foundation to promote good project management practices and students prepared for project manager careers.

SKILLS OF A PROJECT MANAGER

The basis of good project management is having the knowledge and skills necessary to perform the job. A project manager is generally defined as the person responsible for working with the project sponsor, the project team, and the other people involved in a project to meet project goals (Schwalbe, 2004). Being an IT project manager requires knowledge in the core Project Management competencies such as time, risk, and scope management, cost budgeting and a basic knowledge of IT systems.

A project manager must have soft skills in addition to the basics of project management to succeed. According to David Foote, a managing partner at Foote Partners LLC, "It requires all these soft skills that have to do with getting things that you want (and) adjudicating issues between people, managers, egos and agendas. It's how to get a job done without annoying people" (Melymuka, 2000). These soft skills can include basic leadership and team building abilities that are needed for the team to complete the designated project. Basic business skills are also needed for a project manager to be successful in the IT world. These can include the ability to communicate measurable results, utilize financial skills to keep the project cost effective, and identify and predict trends in the project.

Another important aspect of project management is the ability to communicate effectively. It is essential for project managers to have the capacity to listen and understand the people on their project team as well as the customers of their project. By doing so, expectations and feedback can be easily passed on to the team and it will be easier to solve problems and complete tasks within the project. A project manager will also need to be able to step outside the box and see things from a different perspective. Dennis Johnson, an Assistant vice President at USAA states "A project manager needs the ability to question without alienating – to listen and watch people's body language and really see what's happening" (Melymuka, 2000). This will allow the project manager to better communicate with the team and the organization.

Relationship management is a skill that is important to have while managing projects. The project manager should be capable of working with all levels within the organization. This means they should be able to communicate information to different levels of people and understand and have the ability to establish relationships with them. Relationship management can also include identifying the unique characteristics and abilities of each individual on the team and determine the most effective way to utilize them throughout the project. A project manager will also need to know how to mobilize and coach the people on their team. Another aspect of relationship management is establishing trust within the project team. "The project manager and the team must develop a level of trust and comfort with each other in single-minded pursuit of project goals" (Kharbanda, 2003).

There are many skills a project manager may have that are argued to be ingrained in the human spirit, the largest of these being the ability to influence others. Linda Pittinger, CEO of People3, states "It's hard to find people who can influence others and create win-win situations (Melymuka, 2000). The project manager needs to have the ability to sell the value of the project to other people within the organization and must be able to persuade and influence team members to get their job done well and on time. A project manager also must have the confidence, credibility, and commitment to overcome the obstacles when faced with the task of running an IT project.

Table 2. Detailed List of Project Management Responsibilities and Coinciding Skills

Functions	Skills
Recruit and manage the project team by creating an environment conducive to the delivery of the new application in the most cost-effective manner.	Personnel Management, Relationship Management, Leadership, Training, Oral and Written Communication, Mentoring, Teamwork, Staffing
Facilitate effective communication between customer, management, project sponsors, and the project team.	Written and Oral Communication, Effective Listening, Strategic Planning, Conflict Management, Teamwork, Business Writing
Create and manage project budget and perform cost estimation	Finance and Accounting, Personnel Management, Estimation and Mathematics
Negotiate, create, and maintain project charter, project requirements, and project plan by establishing its format, direction, and base lines that allow for any variance measurements and change control	Problem Solving, Persuasion, Decision Making, Forward Thinking, Vision, Organizational Alignment, Big Picture View, Sales/Marketing, Technical Writing, System and Business Analysis, Ability Manage Uncertainty
Manage the technology, people, and change with regards to schedule, staffing, budgeting, and equipment.	Oral and Written Communication, Motivation, Positive Attitude, Flexibility, Influence, Teamwork
Oversee the implementation of standard project management practices throughout the project lifetime.	Technical Project Management Knowledge, Organization, Organizational Alignment
Track project metrics and changes in the appropriate repositories	Organization, Metrics Tracking
Provide continued project tracking and ensure acceptable work products from the project team	Discipline, Problem Solving
Develop appropriate risk management tactics, contingency plans, and problem management.	Forward Thinking, Risk Management, Problem Solving, Intuition, Change Management, Ability Manage Uncertainty
Attend project and management meetings	Oral Communication, Leadership, Meeting Skills
Prepares appropriate project management reports and powerful project presentations to convey project progress.	Relationship Management, Written Communication, Technical Writing, Business Writing
Project management software tool expertise	Technical Foundation
Partner with the end users, work with project sponsors and other management to establish progress and direction of the project by achieving goals, reaching targets, solving problems, mitigating risks.	Business and Politics, Goal Setting, Problem Solving, Teamwork

The last critical skill that project managers must have is the ability to make decisions. It has been said that the best decision makers are the most experienced decision makers. "As a manager and leader, every step you take required decision making skills. What makes it more challenging is the pressure to make the right decision is often very high" (Canterucci, 2003). Making the right decision often involves basing that decision on past experience and gut instinct. No project manager will have the experience if they are new to the field of project management but they will have the ability to judge based on gut instinct and other projects within the organization.

A more detailed list of skills is included in Table 2. Each skill is tied to a general list of responsibilities for a project manager. This list is not comprehensive and will not pertain to every project manager in all organizations. This list is detailed in research conducted by Crawford (2002), Bigelow (2000), Anonymous (2000), Wideman (2003), and Melymuka (2000).

Skills Taught in Our CPT Curriculum

To reach the ultimate goal of prepared students, each skill described in the previous table needs to be found within the courses available in the CPT curriculum. Table 3 outlines each skill and the course that prepares our undergraduate students for a role as an information technology project manager. The match between skill and course was done by examining learning outcomes for each course. The learning outcomes were obtained through the respective course websites, conversations with faculty who are teaching each course, and the curriculum models and syllabus for each course.

Acronym Key
*   CPT: Computer Technology
*   OBHR: Organizational Behavior and Human Resources
*   OLS: Organizational Leadership and Supervision
*   COM: Communication

Table 3. List of Skills and Corresponding Course and Course Learning Outcomes

Skill	Course	Learning Outcomes
Finance and Accounting	MGMT 190B, MGMT 200	Basic Accounting models, concepts and procedures Analyzing financial statements
Oral Communication	COM 114	Communication theories as applied to speech Practical communicative experiences such as interpersonal communication, small group process, and informative and persuasive speaking
Conflict Management	OLS 477	Theoretical and practical aspects of conflict assessment, negotiation, problem solving, mediation, and arbitration.
Written Communication	ENGL 106	Recognize multiple genres, effectively read and understand scholarly articles, and contribute insight to a topic in his/her major. Enhance comprehension of various texts, critical thinking skills, and analysis.
Technical Writing	ENGL 421	Contextual research, analysis, and writing. Effective strategies for communicating with other people about and with technology Collaborate with colleagues in project teams Teaches the rhetorical principles that help students shape their technical writing to suit a range of readers in a variety of technical situations.
Technical Project Management Knowledge Risk Management Metrics Tracking	CPT 480	Application of knowledge, skills, tools, and techniques that project managers use to plan, staff, estimate, and manage IT projects. Managing scope, risk, budget, time, expectations, quality, people, communications, procurement, and externally provided services.
Business Writing	ENGL 420	Rhetorical principles and writing practices necessary for producing effective business letters, memos, reports, and collaborative projects in professional contexts.
Sales/Marketing	MGMT 323	Overview of the functional area of marketing.
Meeting Skills	OLS 474	Presenting technical information and conducting problem-solving and decision-making conferences or meetings.

Skill	Course	Learning Outcomes
Training	OLS 375	Systematic training program design, development, and evaluation. Principles, practices, and variations of basic methods of training, employee development, and mentoring
Relationship Management Personnel Management Influence Effective Listening Leadership Positive Attitude Flexibility Motivation	OLS 252 OLS 274	Organizational behavioral concepts and principles. Individual and group behavior in organizations Typical interpersonal and leadership behaviors. Applied leadership in the context of organizational functions, structures, and operations. Organizational functions, structures, and operations.
Estimation and Mathematics	MATH 223	Differential calculus with applications to management and economics.
Problem Solving	PHIL 120	Develop reasoning skills and analytic abilities, based on an understanding of the rules or forms as well as the content of good reasoning.
Organizational Alignment Big Picture View Strategic Planning	TECH 550	Enterprise view of the organizational impact of IT and includes both a descriptive component (describing how IT is affecting organizations) and a prescriptive component (exploring and evaluating effective methods of applying IT for organizational benefit).
System and Business Analysis	CPT 280	Comprehensive introduction to information systems development. Systems analyst, the systems development life cycle, methodologies, development technology, systems planning, project management, systems analysis, systems design, systems implementation, and systems support.
Change Management	OLS 386	Leadership and its relationship to the management of organizational change Managing the human side of quality improvement.
Metrics Tracking	STAT 301T	Statistical methods with applications to diverse fields. Understanding and interpreting standard techniques in data analysis

- STAT: Statistics
- MGMT: Management
- ENGL: English
- MATH: Mathematics
- PHIL: Philosophy
- TECH: General Technology Studies

In addition to the skills mentioned in the previous tables, a project manager must have the appropriate technical foundation to be able to communicate with their team successfully (Crawford, 2002). The Computer Technology program provides undergraduate students with technical courses in many areas. The following classes are core technical courses required for every undergraduate student:

- **Internet Foundations, Technologies, and Development.** History, architecture and development of the World Wide Web.
- **Introduction to Systems Development.** Types of information systems, system development, database management systems, and problem solving.
- **Introduction to Object Oriented Programming.** Fundamental computer programming all within an object-oriented programming framework.
- **Programming for the Internet.** Programming techniques used to develop Internet and intranet applications.
- **Information Technology Architectures.** A conceptual and technological survey of information technology architectures.
- **Systems Software and Networking.** Introduction to the data communications field.
- **Database Fundamentals.** This course studies relational database concepts and the use of Structured Query Language (SQL) to define, manipulate, and control the database.
- **Object Oriented Programming.** This course focuses on using object-oriented programming languages in the development of modern, business applications.
- **Systems Analysis and Design Methods.** Comprehensive introduction to information systems development including the topics: the systems development life cycle, methodologies, development technology, systems planning, project management, systems analysis, systems design, systems implementation, and systems support.
- **Requirements Discovery and Modeling.** Detailed overview of the approaches used by today's information system developers to discover and then model the requirements to implement a successful system solution.
- **Database Programming I.** Topics include relational concepts, SQL skills, data placement and storage requirements, stored procedures and triggers.

CURRICULUM GAP

By examining the individual skills and their corresponding course(s) within the CPT curriculum, it can be found that there are particular skills that need further consideration. These skills include Persuasion, Teamwork, Staffing, Mentoring, Business and Politics, and Metrics Tracking. Unfortunately, there is no general business course available at our University that can teach the fundamentals of business to non-business majors. In addition, there is no course to provide various mentoring techniques to our undergraduate students. However, there are courses available in the University that can be added as electives to ready our students with some of these remaining skills. These include:

- Com 318: Principles of Persuasion
- OLS 388: Leadership through Teams
- OBHR 230: Teamwork
- OLS 479: Staffing Organizations

Not all of the skills necessary for success can be taught in a classroom setting, there are certain personality skills that would be difficult to teach in an undergraduate course. These include Decision Making, Forward Thinking, Vision, Organization, Discipline, Goal Setting, and the Ability to Manage Uncertainty. These skills are incredibly difficult to teach and require constant repetitive action for a person to be proficient with them. "People can go to school to learn the technical things, and they can learn the business over time. The behavioral competencies are the ones people are least able to learn. They're intuitive" (Melymuka, 2000).

CONCLUSION

Understanding the skills and responsibilities of a project manager will enable us to better prepare our students for careers in the project management field. We may not be able to teach every skill that is needed but we can lay the foundation for students to be successful as project leaders. Project management is growing in importance for all organizations and according to Forrester Research Inc. analyst Marc Cecere, Project Management was one of the leading strategic staff functions that organizations can't afford to outsource (Ulfelder, 2004). By conducting this study, we are able to hone the CPT curriculum to meet the growing project management needs of organizations.

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