

Project Management Courses in IS Graduate Programs: What is Being Taught?

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ABSTRACT

The most recent model curriculum for graduate information systems programs includes a project management course, which contains a balance of technical and managerially related skills. Prior research has shown that adoption of this project management course among information systems graduate programs is not extensive. This study compares the topical coverage of the courses that are being offered against the Project Management Institute's "Project Management Body of Knowledge" (PMBOK) and Georgia State University's Computer Information Systems graduate project management course in information technology. A web-based survey of 206 institutions with graduate information systems programs was conducted; 103 responded and 78 indicated that they had a project management course with 41 instructors completing the questionnaire (53% response rate). Data collected from the survey were then analyzed using descriptive statistics. With respect to the topics of project management found in the PMBOK, information systems programs are covering hard skills such as project scope and cost management to a large extent and giving less emphasis to soft skills such as human resource and project communications management. Also, procurement management is only covered to a very small extent. Similarly, information systems programs matched well with the benchmark course at Georgia State University in the extent of coverage for hard skills such as work breakdown, estimation, and project networks, but their coverage of areas such as project chartering and dealing with vendors and suppliers was considerably lower.

Keywords: IS curriculum, IT project management, graduate course, PMBOK

1. INTRODUCTION

Organizations that have taken on large-scale projects will attest to the value of project management (PM) skills and techniques for coordinating complex multidimensional tasks over extended periods of time. It is generally agreed that PM is a necessary ingredient for successful completion of most large-scale undertakings. When projects fail to achieve their desired ends, the culprit is often identified as a weakness in PM. In a recent study of information systems (IS) project risks, lack of PM skill was ranked among the top five risks by a panel of experts (Schmidt, et al., 2001).

Model curricula for the IS discipline have always included some aspects of PM. The earliest recommended curricula for IS specialists anticipated that graduates would become project leaders and team members of systems development projects (Ashenhurst, 1972; Couger, 1973). Students were expected to understand organizations to the extent that was

necessary to accurately create specifications of systems for their use. However, methods were not very rigorous, and business managers saw IS development as more of an art than a science (Richardson and Ives, 2004). By the 1980's, IS programs were emphasizing skills needed for technical work such as structured programming and systems analysis. Students learned how to define requirements, represent them in the form of data flow diagrams, and develop corresponding systems. In an effort to gain some control over the systems development process, concepts such as the systems development life cycle (SDLC) were established. SDLC and the concept of phases and sign-offs were the central focus in terms of managing large-scale projects. In addition, more explicit descriptions of PM concepts were added to course objectives. In a set of IS curriculum recommendations made in the 1980s, Nunamaker, Couger, and Davis (1982) suggested a course on information analysis aspects of system development that included

coverage of PM responsibilities such as management of change, problem resolution, and management reporting.

The most recent model curriculum for graduate IS programs includes a PM course which contains a balance of technical and managerially related skills. Students are expected to learn aspects of project planning such as scoping, scheduling, budgeting, and allocating resources. In addition, course topics address softer skills such as motivation, interpersonal relations, and leadership. Finally, items that affect project success are included such as culture and resistance to organizational change (Gorgone, et al., 2000).

Adoption of this PM course among IS graduate programs has not been extensive; only 27% of the respondents in an earlier survey reported that they followed the Association of Information Technology Professionals (AITP) model curriculum guidelines to a great degree or completely (Johnson, et al., 2004). In the same study Johnson, Du, and Keil (2004), found that the PM courses offered did not necessarily conform to the AITP model curriculum guidelines for topical coverage. Specifically, it was found that coverage of PM topics was not uniform and that change management topics were not emphasized.

In addition to the AITP curriculum guidelines, which include suggested topics, there are other benchmarks against which to compare the courses that are being offered. This study compares the topical coverage of the courses that are being offered against two such benchmarks. First, the Project Management Institute's "Guide to the Project Management Body of Knowledge" (PMBOK) was used as a benchmark to determine how well existing courses cover the core areas identified in the PMBOK. Second, building on the work of Keil and Johnson (2003), Georgia State's Computer Information Systems (CIS) graduate PM course in information technology (IT) was also used as a benchmark to determine how well existing courses cover the topics that are being taught in the Georgia State University (GSU) course. In this earlier paper, Keil and Johnson (2003) examined the GSU graduate IT PM course (part of a top ranked program) as an exemplar for what such an offering might look like.

2. BACKGROUND AND RESEARCH QUESTIONS

IS projects are becoming more important for corporations, as companies seek competitive advantage through the application of IT. Still the rate at which IS projects fail to achieve or fall short of their desired objectives is high. According to Johnson (1999), only 26% of IS projects are completed on time and on budget and classified as successful. One possible explanation for this lack of success is a deficit in the educational background of project managers, which accounts for a lack of familiarity with good PM principles. A remedy for this deficit might involve requiring a course in PM for all students of IS. Alternatively, graduates could obtain familiarity in these topics through continuing educational programs from

professional societies such as the Project Management Institute (PMI).

PMI is a nonprofit organization of PM professionals that has codified a comprehensive set of PM practices and knowledge into a framework with component processes. The core component processes are organized into nine knowledge areas that are summarized in Table 1. During the management of a project, these component processes are envisioned as interacting in a progressive, iterative, and overlapping fashion as the project moves closer to its intended goal of project completion. In order to achieve successful outcomes, a project manager needs to understand all knowledge areas and how their interacting processes change throughout the different project phases.

In a recent study, an example of a graduate PM course was described which is part of the core curriculum at GSU's CIS masters program (Keil and Johnson, 2003). The authors (one of whom was involved in the development and delivery of the course) describe the underlying approach of the course as one in which students develop the ability to identify and appraise elements of IT projects that may lead to failure. Students in the course learn about PM through case method teaching, group presentations, and mini-lectures. First hand experience in PM techniques is gained from in-class group exercises and homework assignments that use PM software.

Course content draws from articles published in practitioner and scholarly journals, business case studies, and a novel about software PM (DeMarco, 1997). Topics cover areas of broad management concern such as project chartering, risk management, measuring project success, project escalation, and de-escalation. The course also includes examination of several specific techniques of PM such as work breakdown structure, critical path method, resource loading and leveling, and post project audits. A summary of topics from the course outline is presented in Table 2.

Table 1. Project Management Institute Knowledge Areas (PMI, 2000)

PROJECT INTEGRATION MANAGEMENT
A subset of project management that includes the processes required to ensure that the various elements of the project are properly coordinated.
PROJECT SCOPE MANAGEMENT
A subset of project management that includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully.
PROJECT TIME MANAGEMENT
A subset of project management that includes the processes required to ensure timely completion of the project.

PROJECT COST MANAGEMENT

A subset of project management that includes the processes required to ensure that the project is completed within the approved budget.

PROJECT QUALITY MANAGEMENT

A subset of project management that includes the processes required to ensure that the project will satisfy the needs for which it was undertaken.

PROJECT HUMAN RESOURCE MANAGEMENT

A subset of project management that includes the processes required to make the most effective use of the people involved with the project.

PROJECT COMMUNICATIONS MANAGEMENT

A subset of project management that includes the processes required to ensure timely and appropriate generation, collection, dissemination, storage, and ultimate disposition of project information.

PROJECT RISK MANAGEMENT

Risk management is the systematic process of identifying, analyzing, and responding to project risk. It includes maximizing the probability and consequences of positive events and minimizing the probability and consequences of adverse events to project objectives.

PROJECT PROCUREMENT MANAGEMENT

A subset of project management that includes the processes required to acquire goods and services to attain project scope from outside the performing organization.

- Managing the Project Team
- Resource Loading and Leveling
- Project Risk Management
- Managing Projects that Involve Packaged Software Selection
- Controlling Software Projects
- Measuring Project Success
- Post-Project Audits and Inquiries
- Avoiding IT Project Escalation and De-escalating Troubled IT Projects
- Managing the Mum Effect, the Deaf Effect, and Whistle blowing

Students in IS programs need to understand concepts and techniques of PM if the success rate of IS projects is to improve. PMI has become widely recognized as a standards body in defining PM practices and skills and has taken the lead in certification exams. Therefore, it is important to understand the extent to which existing courses in IS PM conform to the knowledge areas identified by PMI. At Georgia State, which houses one of the larger IS graduate programs in the U.S., they have implemented a core course in IT PM as part of their Master of Science CIS curriculum. This course has been documented in the literature and is used as a second benchmark in this paper for examining other programs' offerings in IS PM. In this paper, the following research questions are addressed:

- RQ#1: How does the PM topic coverage of graduate IS programs compare to the Project Management Institute's Body of Knowledge?
- RQ#2: How does the PM topic coverage of graduate IS programs compare to the PM course taught at GSU?

Table 2. GSU Course Topics in Project Management (Keil and Johnson, 2003)

- Introduction to the Challenges of IT Project Management
- Similarities and Differences Between IT and Other Types of Projects
- Project Chartering
- Developing a Business Case for an IT Project
- Evaluating Alternatives and Selecting a Course of Action
- Work Breakdown Structure (WBS)
- Estimating Activity Durations
- Project Networks and the Critical Path Method (CPM)
- Time/Cost Tradeoff Analysis
- Managing Large, Complex, Highly Compressed Projects

3. METHODOLOGY

To address the research questions, a web-based survey of institutions with graduate IS programs was conducted. Peterson's Guide to Graduate Programs was used to identify candidate institutions (retrieved September 18, 2003 from www.petersons.com/GradChannel). From an initial list of 297 institutions with graduate IS programs, duplicates were removed for those that had a standardized course offered at multiple campuses. There were 208 unique IS programs identified for subsequent analysis. Contact information for administrators from 206 institutions (out of the 208 institutions) was obtained, constituting the study sample and representing 99% of the study population (206/208).

Administrators were contacted by e-mail and asked to solicit input from the appropriate instructor in the PM area. The survey was directed to faculty teaching PM and focused on the curriculum topics and course content covered. This survey asked the following question:

“To what extent does your graduate course covering Project Management and/or Change Management include coverage of the following topics?”

Table 3. Coverage of PMBOK Knowledge Areas by Response Average

To what extent does your graduate course covering Project Management and/or Change Management include coverage of the following topics?						
	Not at all	Small extent	Moderate extent	Large extent	Completely	Response Average
Project time management	5% (2)	2% (1)	24% (10)	38% (16)	31% (13)	3.88
Project cost management	2% (1)	7% (3)	21% (9)	42% (18)	28% (12)	3.86
Project scope management	5% (2)	9% (4)	23% (10)	33% (14)	30% (13)	3.74
Project quality management	5% (2)	12% (5)	33% (14)	23% (10)	28% (12)	3.58
Project human resource management	5% (2)	14% (6)	35% (15)	23% (10)	23% (10)	3.47
Project communications management	5% (2)	16% (7)	28% (12)	26% (11)	26% (11)	3.51
Project integration management	12% (5)	14% (6)	29% (12)	26% (11)	19% (8)	3.26
Project procurement management	16% (7)	33% (14)	21% (9)	16% (7)	14% (6)	2.79
Total Respondents						43

Instructors selected answers to the questions using a 5-point Likert-type scale (1="Not at all," 2="Small extent," 3="Moderate extent," 4="Large extent," and 5="Completely").

To deliver and collect the survey data electronically, Survey Monkey (www.surveymonkey.com) was used. Of the 206 administrators surveyed, 103 responded and 78 indicated that they had a course in Project Management and/or Change Management. The administrators were also asked to forward the URL of the instructor survey to the appropriate member of their department. The survey procedure for sending reminders to subjects followed recommendations by Dillman (2000, Chap. 11). After the initial survey request, two e-mail reminders were sent to the faculty identified by their administrator as teaching a PM course. For the 14 administrators who indicated they had a PM course, but who did not provide any instructor e-mail address, no instructor survey reminder was e-mailed.

A large portion of the responses were received immediately after the initial survey requests were e-mailed on October 30, 2003. Additional responses were received after two reminders were e-mailed. Survey response collection ended after the last few weeks of diminishing returns on December 19, 2003. There were 41 instructors who responded to the instructors' survey. This represents a 53% response rate based on the 78 administrators who indicated that

they have a PM course in their curriculum. This response rate was better than that reported in similar web-based surveys (Cobanoglu, Warde, and Moreo 2001; Weible and Wallace, 1998). Data collected from the survey were then analyzed using descriptive statistics.¹

4. RESULTS AND DISCUSSION

The results of the survey are summarized in Tables 3 and 4, showing distributions of the extent to which graduate IS courses cover various topics of PM. The group of topics in Table 3 represents the PMBOK reference benchmark.

RQ#1: How does the project management topic coverage of graduate IS programs compare to the Project Management Institute's Body of Knowledge?

Among the knowledge areas of the PMBOK topics, project scope, time, and cost management show coverage to a large extent. Project integration, quality, human resource, and communications management are covered to a moderate extent. Note that although the means are slightly lower for these topics, the distribution is broad. Project procurement management has a significantly lower mean score compared to the other areas; there is only a small extent of coverage. Soft skills such as human resource and project communications management appear to receive less attention in IS programs than hard skills such as time and cost management.

Table 4. Coverage of GSU Topic Areas by Response Average

To what extent does your graduate course covering Project Management and/or Change Management include coverage of the following topics?						
	Not at all	Small extent	Moderate extent	Large extent	Completely	Response Average
Work breakdown structure	5% (2)	7% (3)	19% (8)	40% (17)	30% (13)	3.84
Estimation (activity durations, effort, costs)	2% (1)	9% (4)	19% (8)	42% (18)	28% (12)	3.84
Project networks and the critical path method	7% (3)	9% (4)	14% (6)	37% (16)	33% (14)	3.79
Time/cost tradeoff analysis	5% (2)	7% (3)	37% (16)	33% (14)	19% (8)	3.53
Project chartering	7% (3)	12% (5)	33% (14)	19% (8)	29% (12)	3.50
Earned value analysis	9% (4)	9% (4)	35% (15)	28% (12)	19% (8)	3.37
Resource loading and leveling	7% (3)	21% (9)	30% (13)	28% (12)	14% (6)	3.21
Development methodologies/approaches (SDLC, prototyping, RAD, agile programming)	16% (7)	23% (10)	23% (10)	26% (11)	12% (5)	2.93
Post project audits	12% (5)	24% (10)	38% (16)	17% (7)	10% (4)	2.88
Dealing with suppliers/vendors (RFPs, vendor selection, contracting)	14% (6)	28% (12)	23% (10)	26% (11)	9% (4)	2.88
Total Respondents						43

Table 4 summarizes the results of the survey for the group of topics that represent the GSU course reference benchmark.

RQ#2: How does the PM topic coverage of graduate IS programs compare to the PM course taught at GSU?

Among the topics covered in the PM course taught at GSU, work breakdown, estimation, and project networks (with critical path methods) appear to be covered to a large extent. In contrast, project chartering, time/cost tradeoff analysis, resource loading and leveling, and earned value analysis appear to be covered to a moderate extent. It is troubling that project chartering is not emphasized to a greater degree. Many projects lack a clear charter (Dean, Clark, and Young, 1996) and could benefit from the direction it provides. However, the bimodal distribution indicates that some programs are teaching project chartering.

It was noted that earned value analysis (EVA) is not covered to a great extent. This is surprising given that EVA is an established tool for monitoring and controlling projects. It seems important to teach students accepted practices for achieving better monitoring and control

given the propensity for large IT projects to spiral out of control.

Looking at the means, post project audits, dealing with suppliers and vendors, and development methodologies appear to be covered to a lesser degree. It is curious that post project audits are not widely taught. This mirrors the state of practice in that such audits are rarely performed. Yet, only through such organizational learning as can be produced through post project audits can companies hope to learn from past mistakes and improve their PM practices. The modal response suggests that most courses teach this to a “moderate extent,” but this item actually trends lower with 36% not teaching it at all or only to a small extent.

Although there is a wide variance in teaching how to deal with suppliers, the average response mean was only 2.88. This is perhaps troubling given that many of today's projects are not purely in-house development projects. Recent research suggests that fit between development methodology and type of project is an important risk factor. Yet, there was wide variance in the degree to

which existing courses cover development methodologies.

Looking across categories, there are two findings, which are similar for both the PMBOK and GSU models. Adherence to PMBOK and GSU models in the areas of scope management (work breakdown structure and estimation in the GSU model) and time management (project networks in the GSU model) are similar, providing a measure of confidence in these findings. Also, in both the PMBOK and GSU models, the topic of dealing with vendors/suppliers (procurement management) is considered a low priority. Given the current trend of increasing outsourcing activities, one may speculate that academic departments will soon update their programs and find that dealing with vendors and suppliers may be an important topic to teach to project managers.

5. IMPLICATIONS AND CONCLUSIONS

IS graduates are facing a time of increasing complexity and opportunity. Technological advances are contributing to increasing the pervasiveness and sophistication of existing IS infrastructures. Yet organizations continue to experience disappointing IS project success rates.

The practice of PM was well established when IS curricula were first developed, but these principles have not yet been fully incorporated into the educational programs that instruct emerging IS practitioners. With respect to the topics of PM found in the core body of knowledge from a leading professional organization, IS programs are covering hard skills such as project scope and cost management to a large extent and giving less attention to soft skills such as human resource and project communications management. Also, procurement management is only covered to a small extent. Similarly, IS programs tend to align with the PM course at GSU for emphasis on hard skills such as work breakdown, estimation, and project networks, but their coverage of areas such as project chartering and dealing with vendors and suppliers was considerably lower.

Given the continuing demand for IS professionals, and the anticipated needs of the industries that employ them, in what ways can existing PM curricula in IS programs change to improve the prospect of benefits afforded to its graduates?

When reexamining the top reported reasons for software project failure, technological risks are not considered nearly as critical as organizational and communication related issues (Schmidt, et al., 2001). Apparently, IS practitioners are succeeding in applying their hard skills and finding challenges in tasks requiring softer skills. Thus one might expect benefits to accrue from an increased focus on developing softer skills in IS program in general, and specifically in PM courses.

An alternative area for potential benefits is those topics that address interactions with supplier and vendors such as procurement and outsourcing. Recently, there has been significant growth in corporate interest in these areas. Thus, IS programs might consider incorporating these topics into a new course dealing specifically with the challenges of outsourcing, specifically contracting for services, managing cross-cultural differences, communicating virtually, and ownership of intellectual property. An increased focus on developing skills in communication and managing organizational relationships would bring benefits to IS graduates for both in-house and outsourced projects.

6. ENDNOTE

The survey also solicited additional information for a different set of research questions, the results of which are reported in a separate paper (Johnson, Du, and Keil, 2004).

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