

Learning through Leading: The Power of Integrating Information Systems Courses

Richard W. Woolridge, Ph.D

Janet L Bailey, Ph.D

University of Arkansas at Little Rock
2801 S. University Ave
Little Rock, AR, USA.

Abstract

Industry requires employees with strong project management and leadership skills, but for students to develop and improve, they need the opportunity to practice the concepts, techniques, and skills described in the typical lecture. An exploratory case study was conducted at a metropolitan commuter campus to determine if assigning graduate MIS students as project managers for undergraduate MIS student teams working on experiential-learning projects in a systems analysis course would result in an effective learning environment. The course integration delivered a positive outcome for clients, undergraduate students, and graduate students. Clients received projects that met requirements. Undergraduates received higher-quality grade assessments when compared to prior semesters. Graduate students received a hands-on project management experience within the course and were observed to improve in the areas of leadership, communication, relationship development, and team building; as well as the more traditional “hard” technical skills. Recommendations to improve future course integration were developed.

Keywords: Integrated experiential learning, project leadership, project management, service-based learning, graduate education, undergraduate education, integrated courses

1. Introduction

Industry requires employees with strong project management and leadership skills; however entry-level applicants often fail to possess these skills (Abraham et al., 2006; Woratschek & Lenox, 2002). Notwithstanding this need (Jones & McMaster, 2004), opportunities to teach students to work in or with project-based teams are frequently limited (Hogan & Thomas, 2005) despite recent improvements to universities’ project management offerings (Smith, Smarkusky, & Corrigan, 2008).

Teaching project management successfully involves classroom lecture and some type of practice such as case studies, simulations, and live projects (Geist & Myers, 2007). While lectures provide the content of project management and may convince students of the importance of the processes described, it is a challenge for students to translate that content into actual usable skills (Abernethy, Piegari, & Reichgelt, 2007). Live projects in academic curriculums can help to fill this gap by providing students with the opportunity to gain and hone project management and other analytic skills while helping to meet course objectives in a real-world environment (Avital, 2005; Camarero, Rodríguez, & San José, 2009; Cordoba & Piki, 2012). These environments allow team members to demonstrate project management skills such as project charter development, project plan development, project presentations, meeting scheduling, task monitoring, risk management, and others—all activities that may be rotated among individuals or teams (Abernethy, et al., 2007; Tan & Jones, 2008).

2. Context

There is a significant need to shift emphasis from project *management*, which is defined as benevolent dictatorship in a hierarchical organization managing to standardized processes, products, support environments, and skills, towards project *leadership*, which is defined as an orchestration of a relationship network that emphasizes results, communication, collaboration, trust, motivation, and negotiation (Nidiffer & Dolan, 2005).

Putting students into actual leadership roles in live class projects has been shown effective as a way to teach them how to become agile, entrepreneurial leaders who can act and communicate effectively in the face of the unknown (Edson, 2012; Foote, 2013). In a project management class, there must be an academic desire to reposition student activities from “doing the project” to “being an effective leader in getting other people to do the project”.

This paper reports on the results of a case study in which two professors took a graduate-level project management class and a service-learning based undergraduate-level systems development course and integrated them to reposition the graduate students’ learning experience as aforementioned. The goal of this separation was to provide the graduate students a live project on which to exercise the project management, leadership, and communication concepts learned in the classroom. The separation was designed to introduce students to the complexities and nuances of achieving the project management outcomes required for successful project completion.

3. Background

3.1 Lecture

While insufficient by itself, teaching via lectures is an important part of imparting the necessary project-management concepts to students (Geist & Myers, 2007). Lectures provide students with concepts and processes (Abernethy, et al., 2007), but poorly delivered lectures can lead to inadequate student interest in the concepts (Grenci & Hull, 2004). Moreover, the key question surrounding lectures’ effectiveness is whether students can apply lecture-delivered conceptual material to real-life situations (Kitchens, Sharma, & Harris, 2004; Kloppenborg & Baucus, 2004; Meyer, 2006).

This is not to say that lectures cannot be augmented to improve student learning. Well-designed textbooks aid students with concept definitions (Frank, 2010). Case analyses and discussion, presentations of project failures and exercises linked tightly with those cases and failures along with quizzes and web research can improve students’ learning experience (Abernethy, et al., 2007; Geist & Myers, 2007; Grenci & Hull, 2004; Guthrie, 2010; Hogan & Thomas, 2005; Jennings, 2002; Poston & Richardson, 2011). In addition, guest lecturers provide experience-based materials synchronized with the course lecture schedule (Poston & Richardson, 2011), as well as insight into job realities, context for concepts, and practical applications of concepts (Geist & Myers, 2007). Exercises can also enhance learning by increasing student involvement (Camarero, et al., 2009) and can provide the means for skill development (Jennings, 2002).

3.2 Experiential Learning

Experiential approaches lead students to acquire the critical skills and competencies required for their profession, and these experiential approaches may include case studies, simulations, video games, or live projects (Gaskin & Berente, 2011; Geist & Myers, 2007).

Case studies may present real or artificial situations, but these situations can help students understand the issues of applying concepts to solve problems on paper (Grenci & Hull, 2004). The case approach might be used to develop understanding of situations, concepts, and techniques, but they might not be able to fully present all of the realities of a real-world situation (Jennings, 2002).

Aside from case studies, simulations can be an effective tool for project management and other IT-management based learning experiences reflecting real-world applications (Arbaugh, 2007; Heim et al., 2005). Simulations can be timed to reflect the course schedule and repeated to reinforce a single or multiple lessons (Murphy, 1999). With the increasing availability and utilization of advanced information technologies, the degree with which simulations can accurately reflect live environments is quickly becoming realized (Balamuralithara & Woods, 2009; Finkelstein et al., 2005; Ramasundaram, Grunwald, Mangeot, Comerford, & Bliss, 2005).

Despite these proposed benefits, many educators favor live projects for the learning environments they provide in the course (Geist & Myers, 2007). Live projects might come from the university organization or from organizations external to the university (Ellen & West, 2003). The use of live projects is important as they tend to increase the involvement and satisfaction of students (Camarero, et al., 2009) while enabling students to experience the complexity of working with customers and end-users under real-world constraints (Tan & Jones, 2008). Project management tasks can be accomplished by rotating project management responsibilities among individuals or sub-teams (Abernethy, et al., 2007; Tan & Jones, 2008).

While students tend to solve the “hard” skill technical problems of their projects, they do not do so well at solving the “soft” skill people issues (Soe, 2003). This gap no doubt often extends to entry-level positions in industry where recent college graduates are unable to adequately assess and adapt to real project constraints (Jackson, 2009; Lee, Koh, Yen, & Tang, 2002). Accordingly, academicians must improve their focus on the integration of these vital soft skills in project management activities (Du, Johnson, & Keil, 2004).

4. Methodology

This paper describes the results of a case study conducted within a graduate IS project management course that seeks to teach project management and leadership by having graduate students enrolled in the course act as project managers for an undergraduate systems analysis course in which students were completing a service-learning project for a small local business. The graduate students were not “to do the work” but were instead “to lead and manage the work” as though they were in industry.

Research Questions

There were two primary research questions evaluated:

1. Will leadership and communication skills of graduate students be improved by managing an undergraduate project?
2. Will undergraduate learning outcomes be improved by being managed by graduate students?

While the focus of the study was on the graduate students, the learning outcomes of the undergraduates were used as a further indicator of graduate student success.

Participants

There were nineteen graduate students in the capstone project management class, some with extensive work experience and others with little. Since there were five undergraduate projects to be managed and led, graduate students were placed into four teams of four students and one team of three students based on skills and experience. Technical skills and project experience were used to allocate students to teams. Approximately one-third of the graduate students tasked to manage the undergraduate projects had technical skills and one-third had project experience, which was defined as having worked on IS projects as either a manager or developer in their previous or current jobs. The skills and experience were spread across the projects so that each project management team had at least one person with technical skill and one person with project experience. These project management teams were responsible for the project management and leadership duties for the undergraduate projects.

The undergraduates had little team-based project exposure prior to the start of the course. About half of the students had taken programming and/or database courses. To increase student exposure to members of various backgrounds, each of the five teams was assigned three to four members based on a mix of previous programming and database experience, age, and gender.

Course Descriptions

The syllabus listed three objectives for the graduate course. The first objective was for students to understand the project lifecycle. Specifically, the objective was for students to understand how to initiate a project, then monitor and control a project, and finally, to close out the project. Secondly, the objective was for students to apply project management theory on a real project. Lastly, the objective was for students to learn and practice project management techniques and tools. Measurement of student achievement of these objectives was based on an outcome-based assessment that included:

- Planning – demonstrate the ability to develop and get agreement on a project plan including context, scope, contingencies, schedule, and budget
- Monitoring – demonstrate the ability to establish and follow formal and informal methods of status review and risk assessment
- Control – demonstrate the ability to execute to the plan, anticipate and avoid execution issues, and redirect counter-productive team behaviors
- Communicate – demonstrate the ability to establish and execute a communication plan upwards to management, downwards to the team, and outwards to the customer
- Negotiate – demonstrate the ability to maintain the balance between scope, schedule, and budget in the face of necessary changes

- Adapt – demonstrate the ability to manage change, keep history of decisions, maintain stakeholder support, and ensure stakeholder understanding of current plan
- Close – demonstrate the ability to develop and get agreement on project closeout document, as well as, document and get agreement on project manager and project team performance

The undergraduate systems development methodologies course is an early course in a Management Information Systems Bachelor's degree. The course covers systems development methods, tools, and techniques including the system development life-cycle (SDLC) and agile approaches.

Projects

Five projects were executed by the students. These projects were provided by local small businesses through a state-funded small-business development center. The projects all began and were completed within the sixteen-week semester. The deliverables from the projects were varied and included:

- Project 1 – Proposal and billing process
- Project 2 – Marketing profile and cost estimation tools
- Project 3 – Website enhancements
- Project 4 – Operational process improvement
- Project 5 – Product distribution route optimization tool

Process

The project management teams communicated with three stakeholders: business client, undergraduate team, and project management course professor. The students' were required to submit weekly status reports that included project status, client communication, student communication, and project management assessment status. The status report was presented to the class. The week's project communications to stakeholders were evaluated based on five criteria: (1) What was the purpose of the message? (2) What message was intended for delivery? (3) What were the details of the message delivery including medium, content, and context? (4) What did the recipient hear, or what was believed or speculated to have been heard? and 5) Was the purpose of the message achieved? Students were expected to communicate their activities and accomplishments associated with demonstrating the outcomes described on the assessment. The goal of this communication was for students to realize that they must provide ongoing evidence that they were performing according to the expected measurement criteria.

Results

Each of the five projects succeeded in delivering a product before semester's end. While significant variance existed in some of the projects, other projects held close to the initial design plan. Overall, and even with the variance, all of the projects delivered value to the clients. Overall, the project managers performed well, but a closer evaluation using the project management assessment criteria shows room for improvement.

Plan

The project managers were responsible for delivering project plans early in the semester. These project plans were limited and late. The limitations were a lack of risk management and a lack of budgets in the plans.

In addition to lacking the experience and resources, the concepts and strategies of risk management had not yet been covered at the time the students were planning the projects. The best the project managers could do in their risk management plans was to establish a contingency in their schedules to use when "bad things happen". All of the plans included "contingency time" in the schedule and all of the teams used their entire allocation of contingency time prior to the end of the project.

The late delivery of project plans, several weeks after project assignment, was due to two issues: establishing communication with the undergraduate teams and establishing communication with the clients. All project management teams made an error during their initial contact with the undergraduate teams. When the undergraduate team that they would be managing was identified, each student in the project management class sent an email to every member of his/her undergraduate team introducing themselves and telling the undergraduates that they were going to manage them, or help them, or both. This flurry of uncoordinated over-communication immediately created a barrier that the project managers had to overcome, which took time.

Monitor

The monitoring performed by the project managers was limited by ongoing communication issues with the undergraduate teams and by poor meeting attendance. These communication issues began as described in the project planning section, but communication issues persisted for most of the projects throughout the semester. The results of project manager monitoring were visible through the presentation of current status against the plan using an updated Gantt chart. The project managers believed, as described in weekly presentations, that one of the issues was goal non-alignment between the project managers and the undergraduate teams.

The graduate-level project managers were driven to achieve their goal of high grades and the undergraduate students were not as driven to achieve high grades. This caused a perception by the undergraduate students that the project managers were too demanding and too pushy, so the project managers' requests for communication were often ignored or delayed at best. The project managers had a difficult time scheduling meetings with the undergraduate teams, and some undergraduate students did not attend the scheduled meetings. The project managers believed that the meeting scheduling, and poor meeting attendance, were strongly related to the communication issues as reported during their weekly status presentations.

Control

The project managers had limited success demonstrating an ability to impact project execution. The results of project manager control actions were visible through the weekly presentation of next steps and plan adjustments. The perception of the project managers as reported in weekly status discussions was that the undergraduate teams were used to working individually—not in teams—and the only deadline that they recognized was the end of semester deadline. In addition, the undergraduate students were accustomed to assignments that they could complete within some fraction of the allocated time and so they tended to procrastinate. The undergraduate students seemed to believe that they could apply maximum effort over a short period time and complete the project within the last few weeks of the semester. Several of the project managers with significant work experience were frustrated by their lack of authority.

In their workplaces, the communication and control issues would have been addressed by the simply telling the team members about the expectation and leaving no doubt in their mind that they would be held to that expectation. On the course's projects, the project managers were only able to exercise control to the extent that they could demonstrate value to the project team (e.g., through advice based on experience, mentoring on needed skills, task performance, etc.) and then trade that assistance for the undergraduate team's cooperation. Without this trading of value, the project management team was seen as irrelevant since they had no direct impact on the undergraduate students' grades.

Communicate

The classroom process of presenting weekly status of the projects helped ensure that the team followed a plan for communication. After the initial flurry of uncoordinated over-communication, the project managers improved over the semester as they became aware of the five communication criteria and achieved some proficiency at meeting those criteria. The five communication criteria were: (1) know the message purpose, (2) know the message intended for delivery (3) know how to craft a message including medium, content, and context (4) know what the recipient heard, or what was believed or speculated to have been heard, and 5) know if the message purpose was achieved. Improvement in communication continued, and progress was certainly achieved throughout the semester.

Negotiate

The project managers' ability to negotiate was limited. The ongoing communication issues with the project teams limited the project managers' ability to negotiate changes in the project team's behavior, schedule changes, or changes to project scope. Those project teams that were able to recognize that they could trade value (e.g., through advice based on experience, mentoring on needed skills, task performance, etc.), as previously discussed, had much more success than other project managers in negotiating with their project teams. The professor (i.e., "boss") had to interact with and actually force the negotiation on the project managers in some cases. For example, delays in customer contacts caused all of the initial project plan deliverables to be delayed. Initially, instead of negotiating new delivery dates they simply communicated that they would be unable to deliver. This initial negotiation had to be forced by the professor.

This was done by responding to their inability to deliver by introducing seemingly unreasonable delivery date, thus forcing the students to address the initial schedule, propose a solution to the problem, and commit to their new proposal. Several iterations were required before negotiations became more common between the students and the professor acting as the “boss”.

Adapt

The ability of the project managers to demonstrate their adaptability varied based on the project. In the case of Project 2, the project’s simplicity negated the need for adaptation. However for Project 5, the initial project definition was unreasonable and the whole project had to be converted from a *specify, design, and implement a system* project to a *search and select package* project. The project managers on the project that required adaptation received a much stronger learning experience than the project managers on the simple project. The other project teams varied between these two extremes with some projects requiring very minimal adaptation and others requiring some rework of scope and schedule.

Closeout

The project managers successfully delivered project closeout reports. The projects were evaluated through the presentation and justification of variances between the plan and actual project performances. The project manager teams self-evaluated their performance using the project management assessment and that self-assessment was reviewed and refined by the professor. The individual project managers were evaluated using 360 degree evaluations. The 360 degree evaluations were used by the teams to give each project manager team member constructive feedback on their performance. In addition, each project manager gave their team members a grade representing their contribution to the team’s effort. The professor used these scores to help determine individual grades. The big issue with the project management teams was that they did not emphasize their success enough. On a scale of 1-5, they often scored themselves with a 2 or 3 on the assessment instead of finding examples that would let them argue higher point scores. A project manager needs to be able to sell his/her success.

Undergraduate Teams

Overall, the undergraduates performed well in their execution of the various stages of the projects. In addition to issues outside the students’ control (e.g., illness of business owner and key representative, and unwillingness to provide proprietary information about operating procedures), two issues and one improvement should be mentioned. These issues and improvement are associated with the course integration.

Some undergraduate groups did not know whether the graduate groups should have influence over the questions asked to the client. Since a series of important client questions were covered during classroom activities, at least one undergraduate team expressed concern about having the project managers review and make changes to those questions. These undergraduate groups also did not know whether a member of the project managers should attend the face-to-face meetings with the client. This issue caused a delay in the requirements elicitation stage. In the end, the students admitted that having someone more experienced present with them at the meetings with the client brought a heightened sense of professionalism and importance to the meetings.

The undergraduates were also hesitant to release their initial prototype designs to the project managers. Some groups felt that having the project managers perform reviews of their work prior to submitting it for client feedback was time consuming and unnecessary. Undergraduate comments indicated this likely stemmed from their resistance to additional effort and their desire to “move on.” Despite these concerns, the initial prototypes and the changes made from the comments of the project manager groups produced prototypes that more closely matched the gathered requirements than did prototypes submitted by undergraduate teams during previous offerings of the course. Whether this is due to an increased focus and concern for following the requirements or simply the elicitation of more specific requirements is not known.

Finally, the undergraduates did very well at explaining the business value of their changes. In previous offerings of the course, the undergraduates have typically had a difficult time in assessing this important part of their project evaluation. The interaction with project managers, who have professional experience, seems to have had significant positive influence on the undergraduates’ business mentality and their ability to present their work relative to the business to which they were assigned. This is in stark contrast to previous offerings of the course when students were not specific about how their semester-long projects delivered value to the clients. This observation demonstrates improvement in undergraduate outcomes using the integrated course approach.

Recommendations

The integration of the courses to enable the development of project management and leadership skills in the graduate students was successful, but certainly not without lessons to be considered in future iterations of the course integration.

Overall the semester was considered a success, but there certainly was room for improvement. Creating a situation where a group of driven graduate students are highly dependent (i.e., grade dependent) upon a group of undergraduate students with whom there is no prior interaction provides a significant opportunity for lessons to be learned. These lessons can be categorized into three broad areas: relationships, deliverables, and participation.

Relationships

There were relationship issues between the graduate-level project managers and the undergraduate-level project teams. The managers and the teams had no relationship prior to the course. This lack of relationship prevented the project managers from being effective as early as they could have been. This issue is evidenced by the initial “let me introduce myself” communication flurry by the project managers. The undergraduates felt inundated by these messages and caused them to not respond, which caused another wave of messages, which was also not acknowledged, which set a tone of resentment, tension, and non-communication.

This initial introduction communication issue was exacerbated by the goal mismatch between the graduate project managers and the undergraduate project team members. The project managers were extremely grade conscious and were focused on getting an “A”. The undergraduates were not so fixated on getting an “A”. Consequently, the graduate students enthusiasm and effort to drive the projects was met with resistance. These relationship issues were further amplified by the lack of bi-directional dependency between the project managers and the project teams. The project managers were totally dependent on the project teams’ execution of their projects as evidenced by the outcome-centric nature of the assessment. However, there was no reciprocal dependency by the undergraduate project teams on the project managers. If the project managers completely failed to plan, monitor, control, communicate, negotiate, adapt, and close the project, the project teams’ grades were completely unaffected as long as the project was completed.

These aforementioned lessons suggest that establishing relationships between two diverse student groups in the course of a single semester is difficult and must be addressed by faculty in future course integration. First, the faculty must introduce, or at least guide the introduction of, the teams through a more formal process and the introduction must occur as soon in the semester as is possible. Second, the fact that there is a goal mismatch must be communicated to the project managers by the faculty prior to the team introductions and the professor must give the project managers some tools to deal with the issue. Lastly, there is a need for the undergraduate course design to include some significant grade dependency on the project managers’ assessments.

Deliverables

There was significant limitation and delay in the initial project plans. The risk management portion of the project plans was particularly weak, which limited the plans’ effectiveness. The delays were due in part to the communication issues with undergraduate teams, delays in establishment of initial customer meetings, and delays in documenting the scope of the projects. These delays reduced opportunities for the project managers to demonstrate control, negotiation, and adaptability. In addition, each of the projects only had a single concrete non-negotiable deliverable, the final project delivered to the customer by the end of the semester. This single deliverable reduced opportunities for the project managers to demonstrate control throughout the semester. Lastly, each of the projects delivered closeout reports and presentations on the last two class periods. This extremely late delivery prevented review, feedback, and rework that would have significantly improved the quality of the students’ work.

These lessons suggest faculty must analyze and design the project management course syllabi to ensure course deliverable timing leads to successfully complete projects that fully exercise project leadership and management skills. First, the initial project plan needs to be delivered on a non-negotiable date early in the semester even if the plan must be incomplete. This will establish an early baseline against which the students can manage and prevent their attempting to create a “perfect” plan that takes all semester to create. Second, the risk management plan needs to be a separate deliverable scheduled later in the semester, not just a section of the initial project plan, so that students have an opportunity to learn more about risk management before they have to deliver a risk management plan.

Third, additional concrete deliverables need to be scheduled earlier in the semester (e.g., analysis or design) so that there are enough opportunities for students to demonstrate control, negotiation, and adaptation in their projects. Lastly, the sections of the project closeout document need to be delivered earlier to enable review, feedback, and refinement. This may be accomplished using earlier interim deliverables and using draft reviews and refinement cycles.

Participation

Meeting and communication participation were issues for all of the projects. Part of the participation issue, particularly the communication participation issue, was related to the previously discussed relationship issues. In addition, the metropolitan nature of the university means that full-time students are mixed in with full-time professionals who attend courses on a part-time basis. This mixing of full-time and part-time students causes significant scheduling conflicts that make meeting attendance problematic. These participation issues create significant project management and leadership difficulties for the graduate students.

While some project teams had more issues than others, faculty must establish policies that clearly communicate the overall participation expectations. These policies need to establish how often communication is expected, how quickly responses to communication are expected, and to establish non-compliance penalties. Likewise, there is a need to establish an expectation about meeting frequency and attendance that include penalties for non-compliance. In addition, higher-levels of technology use for virtual meetings may help alleviate the meeting participation issue.

Conclusion

This paper reports on a case study conducted by two professors through the integration of a graduate project management and an undergraduate systems development methodologies course at a medium-sized metropolitan university in the southeastern United States. The purpose of this integration was to facilitate live projects on which the graduate students could apply project management and leadership concepts, techniques, and skills. However, even with its successes, the course integration had some unexpected yet important difficulties that academicians must be cognizant of when meshing two such courses together.

Future course integration should pay particular attention to: a formal team introduction process, an early and explicit expectation setting process, issues of inter-class goal alignment, and establishment of inter-class grade dependencies. Integrated project management course curriculums should emphasize leadership, communication, relationship building, and team development. The syllabi should establish frequent concrete deliverables while paying particular attention to timing of course content to assist with deliverable achievement. Lastly, a set of policies and procedures should make clear to students the required levels of participation and interaction that help deliver successful projects.

The course integration delivered a positive outcome for clients, undergraduate students, and graduate students. Clients received projects that met requirements. The course integration led to higher-quality grade assessments for undergraduate deliverables when compared to prior semesters. Graduate students received a hands-on project management course. This course integration enabled project management students to learn and practice “soft” skill people issues of leadership, communication, relationship building, and team building; as well as learn and practice more traditional “hard” technical skills.

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