

PROJECT MANAGEMENT AS A POSITIVE FORCE FOR CHANGE IN UNDERSERVED COMMUNITIES

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ABSTRACT

This paper discusses the development of a project management course at a high school in an underserved community in the United States. This course was part of the Thrivals® initiative, which strives to be a positive force in the African American community. Our research goal was to assess whether high school students could acquire and demonstrate knowledge of the Project Management Body of Knowledge (PMBOK) at a proficiency level equivalent to the level of university students. We compared the performance of the pilot class at the high school to that of a university level class and found no statistically significant difference in high school students' learning compared to that of the university students.

JEL: L3, M53, O22

KEYWORDS: Project Management Education; High School Learning; PMP Community Outreach

INTRODUCTION

Project management tools and techniques have the ability to help anyone tackle complex, real-life problems. Using project management processes, tools, and techniques could be the difference between success and failure when an individual is solving a problem. However, often business professionals do not learn the recognized body of knowledge from the Project Management Institute until asked to work on a project at their employer. Assignment to a project team and the necessity of understanding project management processes are likely to occur early in an employee's career.

High school students also could learn and benefit from knowing the project management body of knowledge (PMBOK) from the Project Management Institute. Although projects could exist as part of a professional job, projects also could involve community improvement programs, major initiatives people face in their personal lives, and a myriad of other applications. Our goal was to provide high school students exposure to the concepts and techniques of project management at the level of rigor that they could expect from a university course. The University of Louisville mission statement includes as part of its mission, "an effort to improve education, health care, social services and economic opportunity in a traditionally underserved area in west Louisville" (Dr. James Ramsey University President). To support this mission, we developed and piloted a project management course at Central High School in Louisville, Kentucky. This school is located in an underserved area in west Louisville. We wanted to give these high school students the knowledge, tools, and confidence to be able to make an impact in their communities. We used the PMBOK framework to structure a project management course, and the pilot instructor was a university professor who is Project Management Professional (PMP) certified with more than 20 years of experience in managing projects. All instructors in this analysis of high school and university-level project management training were PMP-certified from the Project Management Institute. The instruction took place at a high school during normal school times in Spring Semester, 2014, and the pilot class was well-received by all parties. A year after the pilot class, another PMP-certified instructor taught a second class using the same

course materials. Our intention is to roll this course out to other high schools, which have already contacted the authors regarding offering this course to their students.

The remainder of this paper is organized as follows. The next section describes the literature related to project management education. After that, we discuss the methodology used in the study. Next, the results are discussed in the following section. The last section includes conclusions.

LITERATURE REVIEW

In this section, we review the literature related to project management education. Relevant concepts and outcomes to include in project management education are discussed next. As Berggren and Söderlund (2008) suggested, education in project management is increasingly important for educators to teach leadership. They proposed six learning modes for project management training: (1) Reflection reports to summarize individual lessons learned and their implications, (2) Learning contracts to set learning targets and individual objectives, (3) Roundtable examinations for participants to share knowledge and reflections, (4) Live cases to foster group-level quasi-experience, (5) Thesis work for which participants solve important problems in their organizations, and (6) Knowledge theatres held annually to discuss lessons learned. Four of these learning modes—reflection reports, learning contracts, roundtable examinations, and live cases—were used in this study. The learning contracts, used only in the high school class, were a key element in recruiting motivated students. Hartman (2008) integrated three levels of learning in a test course at the University of Calgary: (1) Grounding in basic project management, business, technical, and social skills, (2) Appropriate levels of trust, communication, and expectations management, and (3) Maximizing the wisdom that a person is capable of developing. The first level increases competence in project management tools and procedures and the ability to lead a project. The second level increases integrity: trusting one's intuition and recognizing biases in one's decision making, eliminating that bias, and avoiding the tendency to underestimate project risks and uncertainties. The third level fosters the development of intuitive skills to recognize patterns and to make connections between different aspects of project management. As outlined below, our project management course addressed each of these three areas by focusing on the PMBOK framework, which includes a basic grounding in project management principles, techniques for estimating risk and uncertainty, and linkages between different stages of the project management lifecycle. Mengel (2008) designed an undergraduate project management course to have students focus on two project management learning outcomes: (1) Ability to initiate and plan a project, and (2) Ability to execute, control, and close a project. Mengel, however, designed his course to focus on student community projects and basic project management skills rather than on the PMBOK on which we focused in our project management course.

Other factors related to pedagogy in project management courses are discussed next. As noted by Crawford, Morris, Thomas, and Winter (2006), different generations (e.g., Baby Boomers, Generations X and Y) display different work ethics, which need to be considered when developing a project management course. Given that the high school students and undergraduate students in our study were close in age, this was not a concern in our study. In addition, Bobrowski and Kumar (1992) noted that more class time could give better insight into planning, but not address the other seven areas that they identified as the most common problems faced by project managers. Therefore, they proposed an internship to close this gap. We agree that a follow-on internship after a basic project management course would be ideal, and we have made initial contact with members of the local Project Management Institute chapter who expressed an interest in mentoring interns after the conclusion of the high school class. Cobo-Benita, Ordieres-Mere, Ortiz-Marcos, and Pacios-Alvarez (2010) discussed the limitations of traditional lecture-based courses and advocated for student learning by doing instead, by having engineering students manage a real-life project. As another example of learning by doing, Brown (2000) had her MBA students conduct project work on low-income senior citizens homes in a predominately African-American central area. Therefore, as part of our study, we required students to work on mock projects. Conversely, Poston and Richardson (2011)

discussed the difficulty of finding student projects that could be used over multiple semesters. Instead, they argued for an approach of bringing in professionals from a local Project Management Institute chapter to share real-life experience with students. We added this dimension to our course by having instructors share their real-life project management experience during class time. Zhang, Zhao, Zhou, and Nunamaker (2004) stated that some students are intimidated or bored when using a computer for e-learning. Therefore, delivery of the course (face-to-face vs. online) was an important issue to address as well. We addressed this issue by structuring the course to include only face-to-face instruction, which was critical for the PMP-certified instructors to share their project management experience and to mentor students during class time for the high school course.

METHODOLOGY

Background

Projects are an integral part of business operations. Learning how to plan and manage these endeavors is important, yet surprisingly not every university has project management courses at the undergraduate or the graduate level. The College of Business at the University of Louisville, in Louisville, Kentucky, offers both a graduate (MBA) and an undergraduate course in project management. The undergraduate course is part of a management minor and is required for accounting majors in the College of Business also. Typically, students are juniors or seniors when they take this course.

As the course lead for the undergraduate project management course, one of the authors was presenting to department faculty about changes made in the project management curriculum to enhance student learning of the PMBOK. This commonly accepted framework gives any project manager, sponsor, or team member the language and tools to work with others on a complex project. At the end of the presentation, the Executive in Residence of the College of Business exclaimed, "These are skills that everyone needs, not just at the college level." Nat Irvin II, the Executive in Residence, serves as a liaison between businesses and the regional community. He started the Thrivals® Ideas Festival as an opportunity to be a powerful force to affect the black community positively. Thrivals® brings together thought leaders and artists to present to high school students to inspire those students. Similarly, he believed that concepts from the undergraduate project management course could give young people a set of skills that would set them on the path to success in life. Thus, the Thrivals Project Management Academy was born.

Curriculum Design

To develop the curriculum for this pilot, we started with a review of the existing materials of materials from the Project Management Institute Educational Foundation website (<http://pmief.org/>). A partial list of resources that we reviewed from that website includes:

Careers in Project Management

Building Project Management Skills for the 21st Century (Program Development)

Building Project Management Skills for the 21st Century (Curriculum for Secondary Schools)

Building Project Management Skills for the 21st Century (Planning and Implementation Guide)

Building Project Management Skills for the 21st Century (A Student's Guide to Leadership)

Throughout the design process, we also consulted with various partners: donors, local businesses interested in project management, and high school administration. The design of the curriculum was shaped by the lead professor and input from these partners. We took into account the level of maturity and business acumen of the target students as advised by Crawford et al. (2006). In addition, we decided to offer the course face-to-face given the concerns with online instruction addressed by Zhang et al. (2004). Our course

was designed to expose students to the PMBOK framework in the context of serving their local communities.

Through contacts at the university, we approached Central High School to be the site for the pilot class. Central High School had a pre-existing relationship with the university because university professors there taught a law class. Furthermore, the high school teacher with whom we collaborated for the pilot class had worked as an adjunct professor at the university. Thus, the players knew each other already. Similar to Brown (2000), we wanted to empower these predominately African-American high school students to lead future projects in their underserved neighborhoods.

Central High School has a long and distinguished history (Central High School History). In 1870, leaders among the black citizens asked the Louisville Board of Education to provide free schools for their children, and the Board of Education opened two new buildings. From its beginning, Central High School offered a college curriculum. On an interesting note, Cassius Clay (Muhammed Ali) graduated from Central High School in 1960. We observed his picture displayed with pride in the hallway adjacent to the principal's office. This high school specializes in preparing students for professional careers by offering many magnet programs. As an all-magnet school, Central High School has no home district per se; instead, it brings in students from throughout the Jefferson County Public School System in Louisville, Kentucky. The mission statement of Central High School is, "Our goal is to develop leaders for today, tomorrow, and the future. We will nurture every student in an environment that promotes high academic achievement, respect, and civic responsibility.

We will provide a career-focused magnet program and meaningful experiences through corporate and educational partnerships to help all students reach their full potential" (Mission Statement).

We were able to find a local business owner to donate money to purchase each high school student a copy of the text for the pilot class—CAPM in Depth: Certified Associate in Project Management Study Guide for the CAPM Exam (Sanghera, 2010). This made the cost of participating free for each high school student, given that instructors volunteered their time as well. In addition, large businesses expressed an interest to be involved with the Thrivals Project Management Academy and our students in the future. Additionally, as we neared the pilot kickoff, other high schools expressed strong interest to be next in line to participate in this program.

This project management course closely follows the framework outlined by the Project Management Institute's PMBOK 5th edition (Project Management Institute, 2013). Students learned about the five categories known as Project Management Process Groups: initiating, planning, executing, monitoring & controlling, and closing. Within each of these five process groups (listed as column headings), there are nine knowledge areas (listed as row labels) as shown in Table 1. In each process group, the major activities and deliverables are shown at a high level in this table (clearly, the details are what turn this simple overview grid into a full course!). Students learned the major process groups, knowledge areas, and techniques in the course via lectures and exercises. Homework assignments and a final exam were used to assess students' understanding of course concepts.

Table 1: Process Groups, Knowledge Areas, Activities, & Deliverables from PMI’s PMBOK

	Initiating	Planning	Executing	Monitoring & Controlling	Closing
Project Integration Management	Develop project charter, develop preliminary project scope	Develop project management plan	Direct and manage project execution	Monitor and control work, integrated change control	Close project
Project Scope Management		Scope planning, scope definition, create WBS		Scope verification, scope control	
Project Time Management		Activity definition, activity sequencing, activity resource estimating, activity duration estimating, schedule development		Schedule control	
Project Cost Management		Cost estimating, cost budgeting		Cost control	
Project HR Management		Human resource planning	Acquire project team, develop project team	Manage project team	
Project Communications Management		Communications planning	Information distribution	Performance reporting, manage stakeholders	
Project Quality Management		Quality planning	Perform quality assurance	Perform quality control	
Project Risk Management		Risk management planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning		Risk monitoring and control	
Project Procurement Management		Plan purchases and acquisitions, plan contracting	Request seller responses, select seller	Contract administration	Contract closure

This table lists process groups as columns and knowledge areas as rows. At the intersection of a row and a column, major activities and deliverables are identified.

RESULTS AND DISCUSSIONS

Conducting the Pilot

After designing the course curriculum for the pilot class, we needed to find students to enroll. We created an application for students that was quite involved. Given that this course would count as an honors program at the high school, we wanted only serious, motivated students to apply. This application served as the learning contract between the high school students and the instructors. All applicants had to apply and to answer questions addressing how they perceived project management being part of their future career and what dream projects they would advocate to help their community. The application process acted as a filter to dissuade any young people who would not dedicate the requisite time to this rigorous program. High school seniors were given preference because juniors would have an opportunity to take the course the following year. Students also needed to obtain letters of recommendation from both academic and community sources. All of the students easily obtained recommendations from teachers, but forcing them to approach people in their communities for letters initiated the connection between the Thrivals Project Management Academy and the local community. We wanted to inspire young people and to give them the knowledge and tools to make a difference in their communities by becoming positive role models for their peers and neighbors, while improving the overall community through future improvement projects that they would initiate.

We limited the seats available to twenty-five to ensure sufficient instructor availability to student teams as they worked through exercises and mock project planning during class times. To stimulate student interest in future projects for their communities, we had them plan either a playground cleanup mock project or a recycling and/or compost mock project. Mock projects such as these should allow high school students to apply sustainability concepts that they learned in other courses. We originally had scheduled two other project management instructors to assist the main instructor, but one had a conflict. Therefore, we ended up with two instructors to teach the pilot class. The main instructor was the professor from the University of Louisville's College of Business. This instructor presented the content in front of the class. The second instructor was a PMP-certified business professional who helped with grading, administration, and assisting teams during in-class exercises at the high school class. Having a PMP-certified business professional assisting in the course helped to spread the workload and to provide students more exposure to PMP expertise. Having two professionally dressed, PMP-certified instructors (one a faculty member at the nearby university) definitely set the tone of the rigor of this course. We took this program seriously and expected students to give us 100% effort and attention.

Model

To assess the learning of the Thrivals Project Management Academy high school students upon completion of the course, z-tests of means were conducted between the pilot class and an equivalent university level project management class taught by the same main instructor during Spring Semester, 2014. The Executive in Residence of the College of Business (Nat Irvin II) believed that the high school students could master the course concepts at a level equivalent to that of the undergraduate students. Therefore, we assessed whether students' mean homework scores during the class differed between the high school and the university students and if the mean final exam scores for these two groups differed. The null and alternative hypotheses were:

$$h_0: \mu_1 - \mu_2 = 0 \quad (1)$$

$$h_1: \mu_1 - \mu_2 \neq 0 \quad (2)$$

Comprehension was assessed via a variety of methods, including assessment of in-class discussions and quantitative aspects, e.g., homework assignments and a final exam. Homework assignments and the final exam were identical in both the high school class and the undergraduate class. The ten homework assignments included multiple-choice questions covering PMBOK concepts and basic project management problems (PERT calculations, critical path determination, and updates of project budgets and schedules). The final exam employed a multiple-choice format as well and was similar to the homework assignments. Note that due to unanticipated student conflicts, the final class size of the high school class was twenty-two, while the university class had fifty-four left after one student dropped out mid-semester due to an urgent family matter. As Table 2 shows, we failed to reject the null hypothesis for both tests. Therefore, we did not find a statistically significant difference between the mean homework scores of the high school students and the college students ($p = 0.6795$). In addition, we did not find a statistically significant difference between the mean final exam scores of the two groups ($p = 0.1229$). Our research goal was satisfied. Given that the results of our statistical tests did not allow us to reject the null hypotheses, we concluded that high school students taught by a PMP-certified instructor could learn and demonstrate PMBOK knowledge on a level equivalent to that of university students.

CONCLUSIONS

Given the prevalence of projects, understanding of tools, processes, and nomenclature of project management is critical. The Project Management Institute's PMBOK is a comprehensive knowledge base for project managers. We had been teaching university students about project management for many years. Only recently did we consider reaching out to a local high school to offer those students an opportunity to

gain unique skills in the area of project management. We developed a project management course and then conducted a pilot class at the high school with positive outcomes. Further, given the results of our statistical tests, the results of the high school students are not just good in the context of peer high school students—the results are comparable to the results of university students at a nationally ranked business school. As project management professionals, we can teach motivated students what we know, and they will learn it—whether they are high school or university students.

Lessons Learned

1) Need for serious students. Ensure that the students are serious about the course and view it as a privilege to be selected. The rigorous application process and requirement of letters of recommendation helped to filter out less serious students. However, we had three students who submitted the initial homework assignments late. That was a bad sign, and in retrospect, we should have asked them to leave the pilot class. They demonstrated this lack of professionalism throughout the entire semester. This lackadaisical attitude was disruptive to the educational environment for other students. In a second, follow-up class that we offered at the high school (one year later), students who demonstrated a lack of desire for learning project management in the first week were given stern warnings.

Table 2: z-Tests for Comparing Student Performance Results

Table 2a: Homework Scores

	High School	University
Mean	84.500	85.426
Known Variance	60	124
Observations	22	54
Hypothesized Mean Difference	0	
Z	-0.413	
P(Z<=z) one-tail	0.3398	
z Critical one-tail	1.645	
P(Z<=z) two-tail	0.6795*	
z Critical two-tail	1.960	

Table 2b: Final Exam Scores

	High School	University
Mean	84.545	88.222
Known Variance	48	189
Observations	22	54
Hypothesized Mean Difference	0	
Z	-1.542	
P(Z<=z) one-tail	0.0615	
z Critical one-tail	1.645	
P(Z<=z) two-tail	0.1230*	
z Critical two-tail	1.960	

Table 2 shows the z-test results for the null hypotheses that “High School” (high school class) had the same mean student scores for homework assignments and the final exam as the “University” (university class). Note: ***, **, and * indicate significance at the 1, 5, and 10 percent levels respectively. Even with using a significance level as high as 10% (0.10), we could not reject the null hypothesis that the mean homework scores were equal or that the mean exam scores were equal.

2) Small class size. To provide students the individual attention and help for complex project planning, the student to teacher ratio should be 12:1 or less (we had hoped for 8:1, but our third instructor had a last minute schedule conflict).

3) Firm schedules. Any instructors or facilitators teaching this course need to set firm schedules for when they will provide the classes for the high school students. Given that teachers are donating their time and expertise, professional courtesy suggests ensuring that they are able to plan around their other work-related activities. Students and school administrators also need set schedules. We had several instances where high school administrators canceled or rescheduled our project management class (due to ACT prep workshops or other unknown events at the high school level). This caused disruption and confusion among the students.

4) Face-to-face time. With the maturity and educational background difference, a little more time is required to cover material with high school students than with college students. The college level course is offered at a junior/senior level, so high school seniors are four years earlier in their knowledge base.

5) Planned subsequent projects and mentors. The handoff from class to field project management with mentors needs to be established. In our pilot, the subsequent mentoring program was not established by the end of the pilot, and the mentoring by local companies did not occur. The mentors typically work for corporations and need set schedules to work with students on a volunteer basis. If there is a delay between the end of class and the project work with mentors, momentum (and PMBOK knowledge) may be lost.

6) CAPM incentive. Emphasizing CAPM is important, but given that the certification is offered by a third party (the Project Management Institute), the grade in the high school or the university class cannot be based on CAPM exam performance due to accreditation reasons. The CAPM certification is recognized by the business world and would look good on a college application. The textbook we used for the class was a CAPM study guide. For future classes, we believe that obtaining donations to cover student Project Management Institute membership and CAPM exam fees (for the top students) would be ideal.

7) Nice to have requirement. Having a strong role model with whom students could identify should be considered. For the largely African American student body at the high school, having at least one professor who was a successful African American PMP was inspiring to the students.

8) Soft skills. Enough time needs to be dedicated to teaching soft skills given that these could be regarded as essential for managing any project (Ingason and Jónasson, 2009). Learning the hard skills is straightforward and mechanical but serves as a necessary, but not sufficient, skill base for project managers to be successful managing projects. Pant and Baroudi (2008) also found a general lack of human soft skills in university-level project management courses.

Future Directions

The project management pilot class was considered a great success. The limitation that we face is securing instructors to conduct additional classes. Many other high schools (public and private) have contacted us in the region and across the USA wanting to have this course offered at their schools. However, finding instructors experienced in both education and project management (with PMP certification) is quite difficult. Typically, a PMP-certified professional is a project manager, but does not have training or experience in teaching. In addition, instructors with no project management experience and lacking PMP certification would not do the program justice. It is important to have experienced instructors available to give students the best learning environment possible. Further, the design of the course should give students the transferable skills that they desire. Ojiako, Ashleigh, Chipulu, and Maguire (2011) found from their student survey that there were different participant perceptions of the value of key skills. The course should strive specifically to target transferable skills desired by the target population. Additionally, the course should be aligned to the learning styles of participants, as matched cognitive styles allow project information to be processed effectively (Sense, 2007). We hope that other PMP-certified instructors will become inspired to follow our lead and to offer high school courses similar to the project management

course that we designed and conducted. It is important for project management professionals to share their knowledge with young people, especially in underserved areas. We can give high school students the tools to be a positive force for change in their communities.

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BIOGRAPHY

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