PERGAMON

International Journal of Project Management 21 (2003) 233–242

INTERNATIONAL JOURNAL OF PROJECT MANAGEMENT

www.elsevier.com/locate/ijproman

Assessing the value of a project management simulation training exercise

John K. McCreery*

College of Management, North Carolina State University, Raleigh, NC 27695-7229, USA

Received 8 January 2002; received in revised form 14 February 2002; accepted 26 April 2002

Abstract

This research addresses an important question: to what extent is project management training actually improving the project management knowledge and skills of participants. This question is examined through use of a team-based simulated project exercise as part of a graduate level course in project management. Findings indicate that the simulation exercise improves participant knowledge levels as well as the ability of participants to apply that knowledge. The educational benefits to participants are not dependent upon team performance or team dynamics in the exercise, but are contingent upon the amount of participant project work experience. Suggestions for future research are offered.

Keywords: Project management; Training; Competence; Teams; Simulation; Education

1. Introduction

Training and development of project managers is challenging for at least two reasons. First, the relevant knowledge base is quite large. As identified in the Project Management Body of Knowledge (PMBOK) [1], project management encompasses a large set of project management-specific knowledge areas. In addition to these knowledge areas, the project manager must have an understanding of the relevant industry, technology, and general management issues likely to be encountered on projects.

Second, the discipline of project management is both theory- and practice-based. It is not enough for the project manager to have an abstract, conceptual knowledge of project management methods, tools, and practices. The project manager must also be able to apply this knowledge in complex operating environments. As noted by Boyzatis [2], Parry [3], the International Project Management Association [4], and the Project Management Institute [5], competence in an area presumes both a strong knowledge base and the ability to effectively apply that knowledge base on the job.

Kolb [6] and Raelin [7] have noted that individuals learn through a process of conceptualization and experimentation. In conceptualization, the individual uses theory to build mental models of the knowledge domain. This type of learning is typically linked to traditional classroom methodologies such as lectures and the use of textbooks. Experimentation, on the other hand, is the process of *testing* conceptual knowledge by applying it to specific situations. Classroom methodologies such as case studies, simulations, and role playing focus more on enhancing learning through experimentation. Ideally, concepts focus the experimentation and experimentation refines the concepts in an iterative process over time, leading to a grounded set of knowledge, skills, and abilities. The challenge, then, is to offer training programs that use conceptualization and experimentation to enhance project management knowledge and the ability to apply that knowledge.

This paper attempts to address this issue by examining the use of a project management simulation exercise in an academic classroom setting. The simulation exercise is used after project management concepts have been taught, which allows participants to apply their conceptual knowledge through experimentation. The learning effects of the simulation exercise are then assessed.

* Tel.: +1-919-515-4093; fax: +1-919-515-6943.
E-mail address: john_mccreery@ncsu.edu (J.K. McCreery).

0263-7863/03/$30.00
doi:10.1016/S0263-7863(02)00026-1

The following sections describe the details of the research setting, present hypotheses to be tested, and examine the results of statistical tests on the hypotheses. The paper concludes with recommendations for future research.

2. Research setting

The setting for this study is two separate graduate level classes in project management offered at the North Carolina State University's College of Management in the 2000–2001 academic year. The classes have a total of 63 students, with 29 in one class and 34 in the other. The students in these classes represent a variety of academic disciplines. Sixty percent of the students are Master of Science in Management (MSM) majors, which is essentially an MBA program with a management of technology orientation. Most of these MSM students have technical undergraduate degrees, and have worked in their chosen fields for an average of 5 years prior to returning to school for graduate studies. The 40% non-MSM students are enrolled primarily in engineering graduate programs, with computer science/computer networking being the most highly represented technical discipline. These non-MSM students vary widely in their work experience, from a low of zero to a high of more than 20 years of prior work experience.

The project management course runs for one semester, 16 weeks in length. In the first 10 weeks of the course, students study an assortment of project management topics relevant to project initiation, planning, execution, control, and closing. The topics cover all of the knowledge areas identified in PMBOK. These topics are explored using various teaching techniques, which include lectures, case study analyses, in-class student team mini-exercises, report writing, examinations, PMBOK review, and the use of Microsoft Project 2000. At the end of 10 weeks, students have a general understanding of the important project management subjects.

From weeks 11 to 15, all students in the two project management classes participate in the project management simulation exercise that is the focus of this research. The final week of class is used to summarize and wrap up the course.

The PC-based simulation exercise is from Davis & Dean, and is the key component of their Managing by Project training course. Davis & Dean is a for-profit organization specializing in project management, leadership, and change management training. Since 1988, they have trained over 30,000 project managers using a network of affiliated training organizations. This training course has a track record of success, as evidenced by post-course feedback from participants, an upward trend in number of clients, and significant repeat business from their existing customer base. While the Davis & Dean simulation exercise has been successfully offered in corporate client settings, it has not yet been used in an academic setting. Davis & Dean and the College of Management at North Carolina State University agreed to an experimental trial of the simulation exercise in the academic classroom. The research hypotheses described later in this paper are central to the experiment.

Student participants are grouped into teams of three to five each to perform the simulation exercise. Each student team must manage a project of moderate complexity, containing 24 tasks with a budget of approximately $800,000 and a baseline schedule of 22 weeks to complete. The student teams must make a series of detailed decisions on a week to week basis. These decisions require the student teams to allocate human resources to tasks, to train personnel, to make project quality choices, and to effectively manage project-related problems as they occur. In order to operate effectively in this simulated environment, team members must cooperate with each other in order to make informed decisions.

Each team's project performance in the simulation exercise is measured quantitatively, by tracking the degree to which teams minimize project cost and time to completion, while still performing acceptably in the area of quality of deliverables.

3. Research questions

The use of this software simulation exercise is expected to produce a number of benefits for the participants [8,9]. First, participant levels of project management knowledge are expected to increase as a result of their training experience. The participants all come to the simulation exercise with their own levels of knowledge in various project management knowledge areas. Their pre-exercise knowledge may have come from prior work experience as well as classroom learning. Regardless of the source(s) of this knowledge, participants are asked to assess their knowledge levels by responding to the sixteen items shown in Table 1 prior to beginning the simulation exercise. The 16 items of Table 1 are prefaced by the following statement: "*Assess your current level of knowledge in each of the following areas.*" Responses are solicited from each participant using seven point Likert scales, where the anchors for the scales are: 1 = Extremely Low, and 7 = Extremely High.

The responses to the items in Table 1 allow us to create a pre-exercise knowledge profile for each participant. Upon completion of the exercise, the participants are again asked to respond in the same manner to the questions in Table 1. Comparing the pre- and post-exercise responses will indicate participants' perceived changes in knowledge resulting from participating in the exercise.