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Creating a Project-Based Learning Environment to Improve Project Management Skills of Graduate Students

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ABSTRACT

This article describes the project-based learning environment created to support project management graduate courses. The paper will focus on the learning context and procedures followed for 13 years, in 47 project-based learning MBA courses, involving approximately 1.400 students and 34 community partners.

Keywords: Project-Based Learning, Project Management, Education

INTRODUCTION

From 2002 to 2014 the first author taught Project Simulation, a course that is the final requirement for completion of the MBA degree in Project Management at the University of São Paulo, Brazil. During the course the students reviewed the basic theoretical concepts related to project management. They then learned how to make a project plan, studied project execution and learned control techniques. They also learned how to go about obtaining project funding, how to manage a project's risks and how to assure project quality. In this course they had the opportunity to put into practice the theory that they had learned in their previous studies.

In the course, the students were challenged to solve real-world problems brought by NGOs and Public Institutions (hereafter, Clients) that work to give assistance to poor and disadvantaged Brazilians.

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THE LEARNING CONTEXT

The classes were held in regular classrooms, using basic educational tools such as data show, the Internet connection, a whiteboard, removable chairs and desks. The students also worked outside the classroom - in their homes, in clients' facilities, or elsewhere. The key actors in the learning environment were the student teams, the clients and the professor (Figure 1). They interacted intensively each other during all project phases.

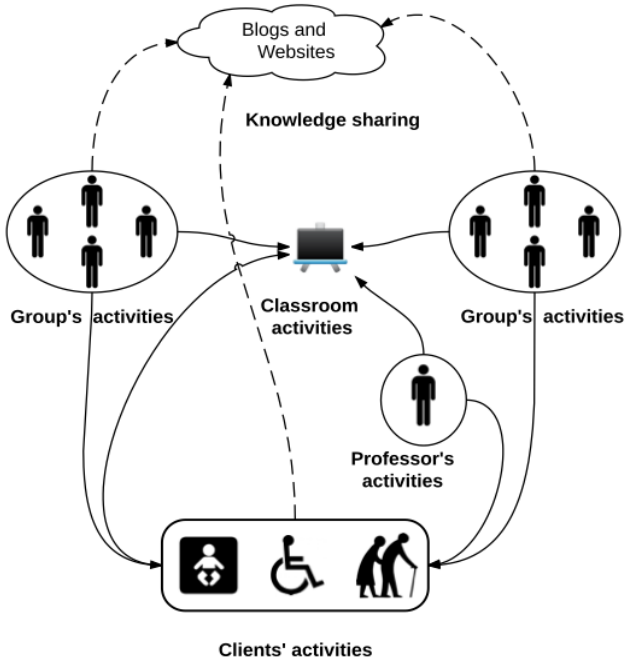

Figure 1. The course environment overview

The students

The majority of students held undergraduate degrees in Engineering, Management or Information Technology and had had at least five years of work experience. These graduate students worked in teams of 3 to 5 individuals. All had background in project management theory. The teams worked like real-life project teams: each member had a role and specific responsibilities. Each team had one project manager.

The clients

The clients were NGOs and institutions that work to help the poor and disadvantaged (Figure 2 and Figure 3). These organizations work with orphans, teenagers, elders, and children with non-contagious diseases or physical deficiencies.

Fifteen of the NGOs provide educational assistance, professional training courses, food and recreational activities to children from poor neighborhoods. Some of them also work with children who have suffered physical and sexual violence. Four are orphanages or work directly with orphanages, providing assistance such as school materials, food and furniture Four institutions help teenagers from poor families that live in drug-dominated city areas. They offer professional courses and job opportunities. Three work with elders who have been abandoned by their families, providing them food, clothing, medicine and recreational activities. Two institutions work with children with cancer and other non-contagious diseases or disabilities.

The majority of institutions that the students worked with do not receive any governmental help. They obtain the resources they need from donations and from the selling of products and services. The clients therefore needed a variety of help: food, school materials, clothes, medicines, equipment, toys, books, computers, assistance repairing their buildings, and so on. They presented their needs in a format of themes of projects. Each client was encouraged to present their real needs to students. Consequently the project scopes ranged from simple to complex.

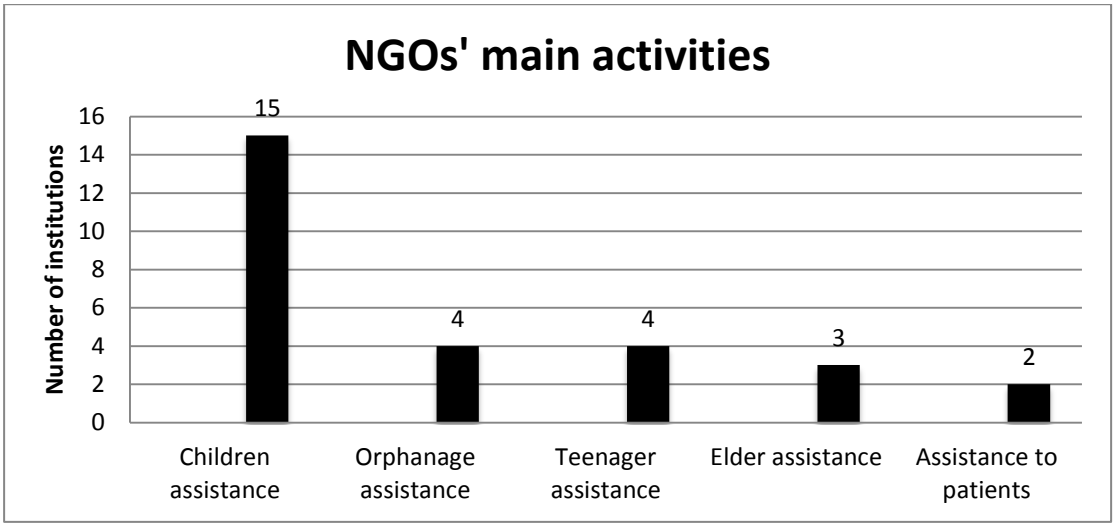

Figure 2. The main NGOs activities

In addition to NGOs, the students have worked with Public Institutions (City Counties, Public Schools, Public Hospitals and Community Centers), (Figure 3).

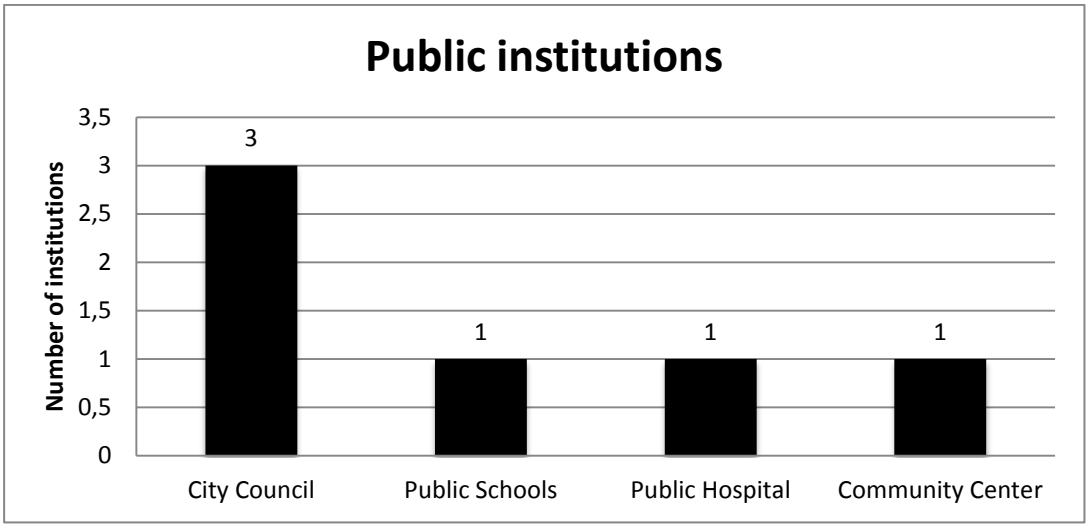

Figure 3. The main Public Institutions activities

The projects proposed by City Counties were related to website development and assistance in project planning. Hospitals proposed projects that involved helping them with hemophiliac patients. Public schools proposed projects related to small reforms and equipment acquisitions.

The professor

The professor has background in project management. He acted as instructor and program coordinator: he was responsible for seeing that the teams and clients worked in harmony. He was also responsible for managing the network of the clients.

Classroom activities

Each class met for three hours. In the first half of the class the professor gave a lecture about system dynamics techniques applied to project management. The students used the second half of the class to develop the projects and later report on them.

Group activities

Outside of class hours, the students had freedom to choose where to work, when to work and how to work. Usually they visited the clients facilities at the beginning of the project, in order to better understand the clients' requirements. During the project they intensively exchange information with clients.

Many of the project activities involved fundraising. The students obtained the necessary resources in a variety of ways: by seeking donations from corporations, selling raffle tickets, organizing fundraising events (like workshops and parties), soliciting donations from people of their social networks, and so on.

Clients' activities

The clients worked closely with the professor during the course preparation, presenting themes suitable for academic projects. They inspired the students with short presentations at the first day of class, when they presented the history of their institution, their achievements and their needs. During the project, clients tried to meet the students' requests as quickly as possible in order to avoid project delays. They also came to the final day of class in order to give feedback to the students about their performance.

Knowledge sharing

The students were required to create a blog for their projects. The blogs brought together all project information: plans, schedule, lessons learned, photos, videos and all other relevant information. The course combined traditional instruction techniques with intensive use of information technology.

THE PEDAGOGICAL FRAMEWORK

Problem-based learning (PBL) is an educational approach derived from the constructivist theory. According to Savery (2006, p.12):

> PBL is an instructional (and curricular) leaner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem.

Barrows (1996) emphasizes PBL's main features: teaching is centered on the learner, the learning takes place in small groups of students, teachers act as guides (or facilitators), the problems serve as a stimulus for learning and new information is acquired through self-directed learning.

The use of PBL techniques is not new. Markham (2003) reports that for more than 100 years educators (such as John Dewey) have the benefits of having students learn through performing practical projects. In United States, the problem-based learning has been used for years in schools, from elementary school to universities (Torp & Sage, 1998).

The concept of project-based learning is very similar to problem-based learning, but there are some conceptual differences. According to Savery (2006, p.16) in problem-based learning the learning activities are organized around achieving a shared goal (project). Markam et. al (2003, p.4) defines project-based learning as:

> Systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks

Project-based learning is suitable when the students are working in teams in order to create a product or service within a limited amount of time. In our experiment, the students were provided with project's themes (specifications of a final product or service to be created) and were oriented to follow well defined projects' phases.

Problem and project based learning is becoming increasingly relevant in today's world. Bell (2010) suggests that the use of these teaching methods enable students to develop key skills such as collaborative working, capacity and ability to solve complex problems. Nowadays some universities make use of problem and project-based learning in their courses (Barge, 2010) (Fredhom et. al., 2002), such the University of Aalborg (Denmark) and the Olin College (United States).

Some authors (Larmer, Mergendoller, 2010), (Thomas, Mergendoller, Michaelson, 1999) point out the essentials elements of project based learning as follows. They must have a significant content, develop in students 21st century competencies, allow in-depth inquiry and include driving questions. In addition, students should learn during the project and be able to exercise their voice to make choices, the process itself should involve critique and revision, and should have a public audience beyond the students and professor.

In our experiment we pursue those essential elements. We though that in order to become better project management professionals, the students should have not only theoretical experience, but practical experience as well. The project-based learning was the way of achieving it.

THE PBL EXPERIENCE

The PBL experience was carried out from 2002 to 2014, in a sequence of 47 courses.
Each course had twelve lectures. The experience followed sequence of activities described in Figure 4.

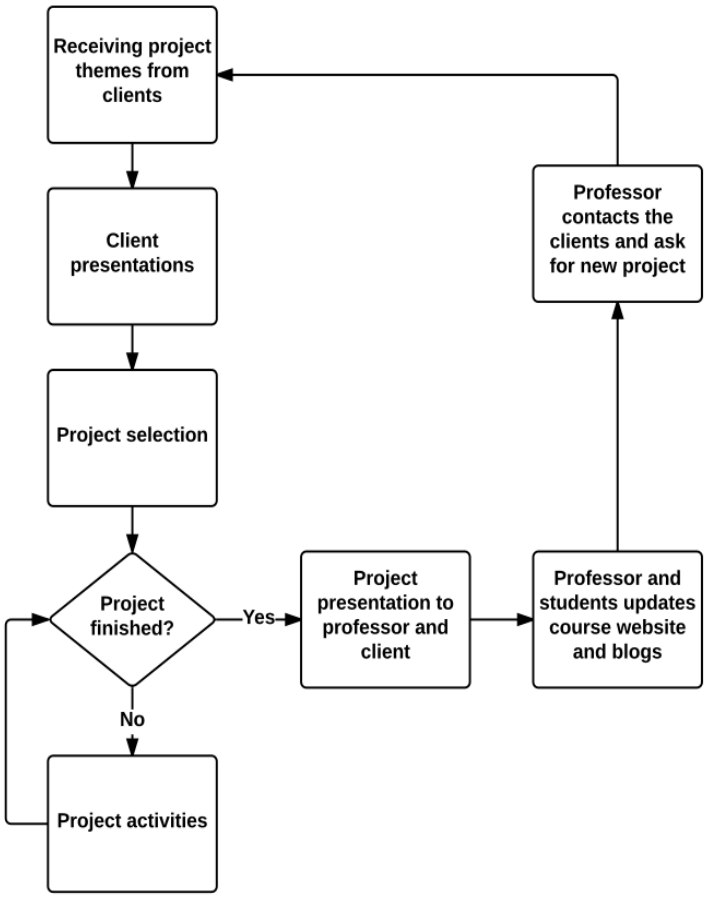

Figure 4. The course activities flowchart

The professor contacted the clients one week before the first day of class, in order to receive the projects' themes from their institutions. The clients sent the themes and the professor updated the course website. The first class was very important to both students and clients: the clients provided more than information, they gave motivation and inspiration to the students. Motivation is a key issue in Project Based Learning, as it inspires students to work hard to overcome the difficulties.

Moreover, the feeling of working on a socially relevant project, one that will bring benefits to community, touched the students deeply.

The face to face contact with clients at the first meeting was also important, for it invigorated the clients, improving their willingness to work with the students. After this meeting the students had one week to choose a project from a theme list available on the course website.

The project then began; students were involved in project activities right up to the final day of course. The final class was also a landmark. The students presented the achievements of the project, and reported on the main lessons learned. They received feedback from both the professor and the clients.

RESULTS AND REFLECTIONS

Reflecting about the experiment, it was clear to us that it brought educational benefits to all involved and material benefits to the community. Thinking about the educational benefits, we asked ourselves if the courses addressed the essentials of the project-based learning. We guess that one good way of making our reflection useful to the wider community of PBL researchers and practitioners is confronting what we achieved with the essentials of project-based learning.

1. Did our courses have driving questions?

Yes, there were two tacit driving questions in Project Simulation course:

- What has to be done in order to deliver, in twelve weeks, the product or service that the client needs?
- How can it be done, working in a project team structure?

The first driving question has to do with strategy and planning. The second is related to execution and control. The project management activities brought the answer to the two driving questions.

2. Did the course bring significant content to the students?

The Project Simulation course worked as a project management laboratory. In the laboratory the students had the opportunity to develop skills based on theory they have learned previously. For example, in previous disciplines they studied how to create a plan. In the course they had the opportunity not only to create a plan, but also to execute it. Planning and re-planning, working and reworking, are all parts of the learning process. During the project the students had the opportunity to figure out solutions to the problem that they faced. They learned from their successes and from their failures. The course content was significant to students because it gave them the responsibility of solving real life problems, similar to those that they will face in organizations where they work.

3. Did the students develop 21st Century Competencies?

In order to accomplish the projects, the students developed competencies of today's world: they were be able to collaborate and communicate using modern computational resources and tools. Most of students worked during the day and attended the MBA course at night. In other words, they had limited available time to devote to the project. In order to work more effectively, the students made intensive use of internet-based collaborative software. They also were very creative in finding solutions to the problems that they faced.

The majority of projects involved fundraising. The students developed several strategies to obtain the necessary funds, including soliciting resources from their social network, requesting donations from companies, organizing fundraising workshops, and so on.
One important competency of the modern manager is the ability to manage conflicts. The students faced several kinds of conflicts, including between team members, between the team and the client, and between the team and the professor. Sometimes the students disagreed each other about the management process to follow, sometimes the students and the clients had different opinions about the better way of accomplish the project. Conflict management was thus an essential part of the learning.

Another important competency project managers should have is the ability of manage the changes in project's scope. Sometimes the client changed his or her mind during the project, asking more than what was agreed upon at the beginning of the project. The students were thus obliged to put into practice scope management theory in order to accomplish the project successfully.

4. Did we allow in-depth inquiry?

The in-depth inquiry was present in the academic projects in several ways. In every class the professor challenged the teams with project management related questions. He asked the students about the strategies that they had chosen and the management process they followed. Every week they discussed the decisions taken and their direct and indirect effects and consequences. For example, sometimes when they discussed possible changes in the project's scope, they did an in-depth inquiry of the possible consequences in terms of project's costs, schedule and product's quality.

The students also questioned the professor about relationship between the theory they studied in previous project management courses and the practical use of this theory in the real-life project. The students questioned the clients about their needs, and questioned themselves about effective ways of solving the problems they faced.

5. Did the students gain knowledge during the project?

As the projects moved forward, the students felt the need to know more about socially-related projects. The majority of students had never worked with NGOs. The students usually worked for corporations or for the government. Socially-related projects were a new experience for almost all of them.

In order to accomplish the project with NGOs the students had to learn the basic organizational structure of the clients' institutions, their processes, their needs and expectations. Every project brought the students new learning opportunities, since they were working in areas with which they had had no prior experience.

6. Did we allow the students to have voice and choice?

At the beginning of the project, the students chose a project from the project theme list. Usually we worked with ten clients in each course and each client presented at least seven projects. Hence, the students might choose a project theme among 70 project themes. During the project they were totally free to choose the team structure, the team member roles, the management tools to be used, and the plans to create. The professor did not interfere in the decision process.

7. Were there critique and revision processes?

Every week the students did a short project status presentation to all other students and the professor. The process of critique and revision was clearly defined. After each team made his presentation, the professor chose specific points to critique. The critique was made with the objective of bringing improvements to the project and to the learning. Moreover, all other teams were also invited to critique the project of their peers. This proved to be an excellent way of knowledge sharing. The best management solutions were shared with all participants. Each group could observe the development of other groups. Those groups whose performance was below the average became motivated to increase their efforts in order to keep up with the leading teams.

8. Were the projects presented to public audience?

At the last class of each course the project were presented to all the community partners. Sometimes the projects were also presented to other professors, interested in the methodology and the results.

The projects also brought several material benefits to the community partners and to the to poor and disadvantaged people.

We estimate that, in average, each project had raised about 2,500.00 (two thousand and five hundred dollars) in genres, products and services. So, conservatively, it can be estimated that the projects have led to resources on the order of half million dollars.

CONCLUSION

We hope this article contributes to disseminate a practice that worked quite well for many years. We expect this experience would inspire other professors that work in similar context.

For further information about the academic projects, there is a short documentary available in www.projectbasedlearning.com.br

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