DEVELOPMENT OF PROJECT BASED LEARNING TECHNIQUES BY THE IMPLEMENTATION OF INFORMATION TECHNOLOGIES

Mesa, J. M.

Villanueva, J.

Rodríguez, V.

Rodríguez, F.

University of Oviedo

Abstract

The Project Engineering Area of the University of Oviedo uses, in order to obtain an important part of its learning objectives, the development of practice projects by groups of students. This technique is called Project Based Learning (PBL). From the learning point of view, the objective of this technique is to promote the teamwork and to stimulate the realization and evaluation of technical judgment on projects related with every technical discipline. In this paper, a project of educational innovation sponsored by the University of Oviedo and developed during the period 2007-2008. Such Project aims to provide the students with the necessary tools to develop those activities through the use of information technologies and it is structured in two main blocks: firstly a set of tools for the complete management of Project teams has been customized and secondly a virtual library for the use of the students with previous Project examples was designed and installed.

Keywords: *Project Based Learning (PBL), Information Technology (IT), Innovation in education*

1. Introduction

This paper describes de development of a project approved on the 7th Call for Innovation Projects (2007-2008) summoned by the Vice Chancellorship for Quality, Planning and Innovation of Oviedo University.

The Oviedo University Project Engineering Area uses group-based learning techniques for the practices of the Project Management subject following the Project Based Learning methodology (PBL) (De Graaff, 2003), to achieve a very significant part of the learning objectives of the practicum for the subject on Project Management.

The Practicum Projects aim to reflect as close as possible the professional work of the students, with special encouragement to team–based work, analysis and discussion. Therefore, both internal coordination and work planning are essential for success. Individually speaking, the development of the project means taking responsibilities which affect directly on the work of every group, on searching information and finding of solutions (Palmer, 2003; Pulko, 2003).

Students spend much of their working time on searching, managing and sharing a great amount of information and documentation within each group (Mesa, 2007). This work also requires the use of a series of tools for its internal management, so as to document decision-making, assign duties and responsibilities, and to control the development of the project.

Before this project was developed, communication among group-members was mainly via e-mail, which resulted in difficulties with websites and sending files. To avoid this, students would create internet groups in websites such as Google or Yahoo. However, these sites do not meet the specific requirements to develop a practicum project, since they are space-limited. This issue among others makes monitoring difficult for the tutor.

On the other hand, the use of former practicum projects in paper format as reference for current students faces some problems:

- It is not available any time required for students. It is therefore subjected to a restricted schedule.
- It gets damaged gradually, resulting in untidiness or even loss of documents.
- It demands a great storage capacity.
- It requires periodical updating and management to keep the standards.
- It makes it difficult to be checked for corrections or comments by the academic staff.

2. Objectives

Facing the above mentioned difficulties, the purpose of this Learning Innovation Project was to provide the students with the necessary tools they may need to perform these activities by using Information Technologies (IT). As well as the working environment in real engineering companies has implemented the use of new tools and working methods, the teaching staff must also be adapted to the possibilities that the Information Technologies can offer.

It dealt with developing an environment adapted to the use of methodology of the Project Based Learning and to the specific competence and professional skills demanded for the Project Engineering Area subject included in the project. Therefore, the objectives are as follows:

- To provide each group with a web site for managing, storing and sharing files. Learning how to manage this tool is a goal for this subject, since it will be essential for success in their future professional careers.
- To improve coordination and communication within groups out of monitoring meetings, providing communication tools such as forums and chats. This allows exchanging any kind of information or opinion among students and teachers, thus improving collaboration in the learning experience.
- To contribute with a virtual tutorial tool for teachers; this allows the groups to make the most of doubts or clarifications made by teachers.
- To serve as a tool to develop evaluation criteria and personal tutor sessions. It provides information on the performed activities and implication of each student in the group.
- A more efficient management of groups in terms of access, grants, modifications, notices, etc.

- A tool restricted to the teacher staff, which allows them the assessment of practice groups. Both the tutor and the examining board will enter their assessments as well as their personal comments on presentation and documentation.

As regards the consulting material, it is suggested:

- To develop a Virtual Library to store all Practicum Projects performed in the previous years. Such information, once evaluated and checked, will be available for future students as on-line consulting material to access during practices. This information should be available under student registration and log-in. It is also essential that the uploaded documents would be protected against editing.
- The compilation of rules, regulations, journals, specific bibliography, price tables and similar documents, as well as links to different useful web pages. Added and updated contents available every year.

3. Methodology and development

The first basic requirement of the project is the data-processing equipment and corresponding software. The Learning Innovation Project is structured into two major parts. Firstly, a set of tools for the Project Groups Management and secondly, a series of utilities based upon the development of a Virtual Library for this subject.

Regarding the software selection, there is plenty of teaching experiences using Educational Platforms such as WebCT (Manning, 2004) o Moodle (Moreno, 2007) to improve the teaching quality in Higher Education. However, in this particular case, a specific tool for Project Management was chosen (Microsoft Sharepoint), so as to favour the approaching to a real professional working environment. Such a tool is normally used by companies to manage their engineering projects; therefore students must learn how to use it properly in order to pass the subject. That is the reason why it is important not to customize the system just as an educational tool, but also as a professional one. This software allows companies to build a web portal which enables different users (students in this case) to interact with each other and create work groups. At the same time, it brings the opportunity to create work groups in their own internet portal, allowing them to manage and control all information available on the site. Besides, SharePoint tool allows users to work with Microsoft Office Applications and web explorers to create, manage and share information among the members of an organization. Therefore, this tool fulfils the necessary requirements besides being the best integrated with Microsoft Office Programs, which is the most popular software used to create project documents.

Afterwards, Microsoft Sharepoint Tools were customized and adapted to the project requirements. After a trial period of its functionalities, the system was eventually adapted to the development of Projects Subject on Industrial Engineering.

A Users Guide for students was also developed, handed along with the Practice Guide at the beginning of the term, so as to provide the students with all the necessary information and guidelines to help them make a proper use of this application. This guide is also available in digital form to help immediate access online.

Detailed below is the teaching material developed in this project:

The User Guide was first developed. It covered the following points:

Learning objectives agreed for this practice.

Meetings and deliverables schedule.

Practice methodology and dynamics

Evaluation criteria

Available resources

A website model was developed to be reproduced by each practice group. Each group was provided with the following elements online after validation:

- Documentation area
  - Shared documents: stores useful external documents
  - Final documentation: stores the final documents for the project.
  - Internal management: records the minutes and other internal documents
  - Temporary documents: stores documents made by the students of the practice group.
- Listing area
  - Schedule: to arrange meetings and to manage dates for documents and presentations.
  - Project planning: project implementation planning.
  - Contact information: stores contact details (phone number, email) of each group member.
  - Web links: gathers web addresses useful for the project development.
- Discussion area:
  - Group discussion: for internal group discussing and decision-making
  - Tutor Query: doubts and questions for group tutors.

Illustration 1 shows the developed work environment:

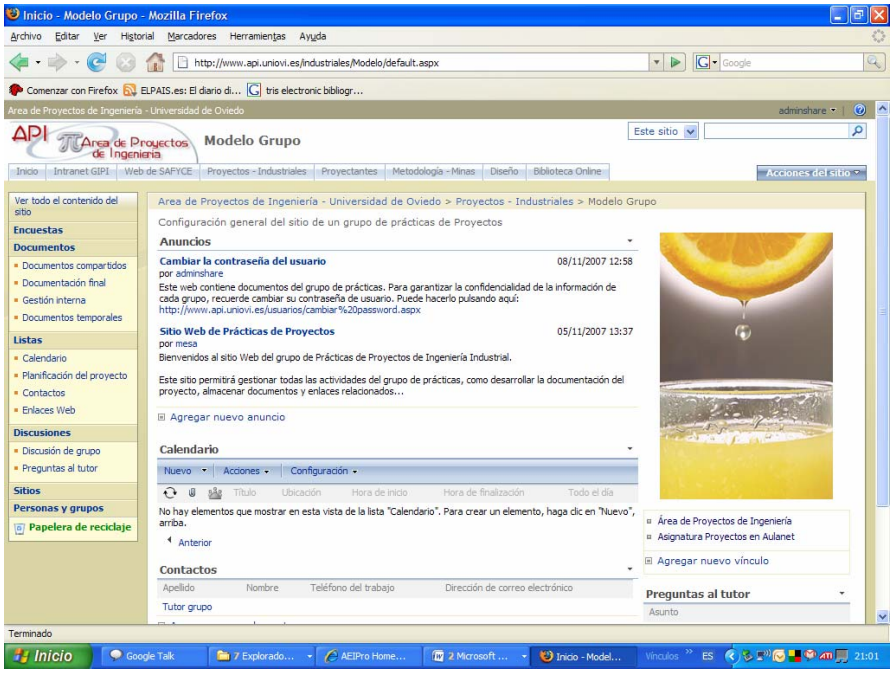

Figure 1: Web Site for the Industrial Engineering Practicum.

Taking into account the availability of the Visual Library from every Microsoft Sharepoint environment, it is expected to grow and develop for the academic years to follow until it is completed and filled with the following parts currently established:

- Common errors: where the most frequent mistakes are included, taken from practice project documentation.
- Legislation and regulation: it compiles norms and regulation sorting them by sector and coverage.
- Example documents: it gathers different real project documents to be used by students as practice reference.
- Links: links to some useful web pages for the development of the project.
- FAQ: frequently asked questions

As indicated, new sections and contents will be added periodically depending on necessities. Illustration 2 shows.

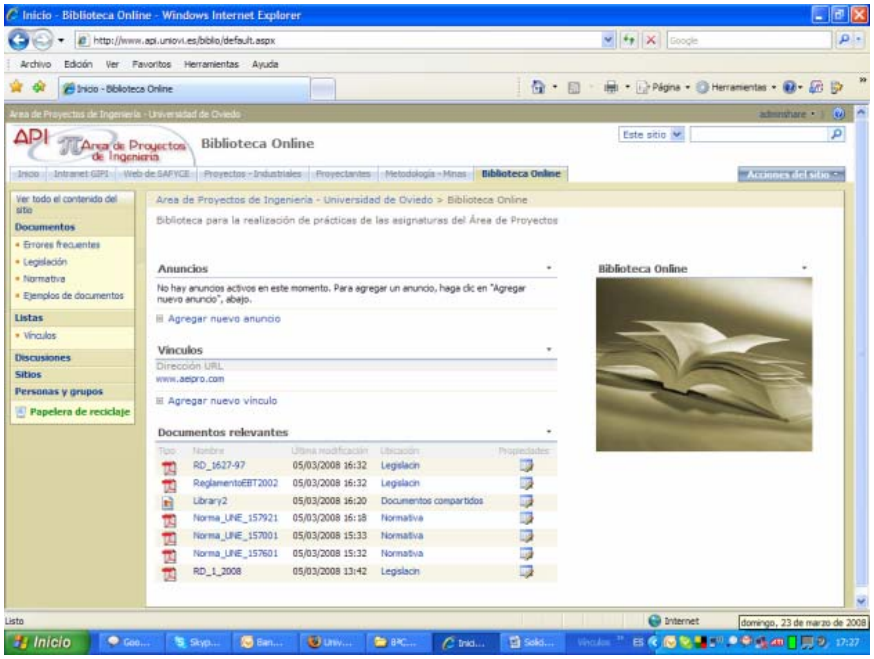

Figure 2: Virtual Library.

The use of this application as working environment in the first term of the course has been positive, especially the use of some of its tools. Both Documentation Area and Discussion Groups have been generally in use; the latter was used for internal coordination as well as for making any queries to the tutors.

Among the least used tools, were the internal planning and schedule tools. It is here where future attention should be paid to improve its use.

4. Conclusions

The academic team involved in this teaching innovation project considers the application of these developed tools to be a remarkable improvement in the quality of teaching Projects Subject. It is also properly integrated in the use of the methodology of Based on Project Learning. Finally, some relevant conclusions are detailed below:

- The implementation of Information Technologies encourages team work and helps internal coordination among students.
- It provides a virtual tutorial tool where questions get registered to be consulted afterwards by fellow group students.
- Apart from providing monitoring through weekly meetings, the web platform provides the teacher with relevant information about the students' virtual work.
- Though most of the students were generally positive about the use of the web platform for the practices, some of them were reluctant about the uploading of internal work group documents.

Finally, it is essential to remark the achievement of all the main objectives of the subject practices, emphasizing the performance of some remarkable final projects from some of the groups.

References

De Graaff E. and Kolmos A., 2003. Characteristics of problem-based learning, *International Journal of Engineering Education*, 19, pp. 657 - 662

Manning, C. K., 2004. Web CT discussions in problem based learning (PBL): analysis of use by representative groups in an introductory food science course, *Journal of the American Dietetic Association*, 104, Supplement 2, 40-341.

Mesa J. M., Ortega F., Villanueva J., Álvarez V., 2007. *Aplicación de la metodología PBL a la enseñanza de la dirección de proyectos de ingeniería*, 1ª Jornada Internacional UPM sobre Innovación Educativa y Convergencia Europea

Moreno, L., Gonzalez, C., Castilla, I., Gonzalez, E., and Sigut, J., 2007. Applying a constructivist and collaborative methodological approach in engineering education, *Computers & Education*, 49, 3, 891-915.

Palmer S. R., 2003. Framework for undergraduate engineering management studies, *Journal of Professional Issues in Engineering Education and Practice*, 129, pp. 92 – 99.

Pulko S. H. and Parikh S., 2003. Teaching 'soft' skills to engineers, *International Journal of Electrical Engineering Education*, 40, pp. 243 - 254

Correspondence (for further information, please contact):

José Manuel Mesa Fernández

University of Oviedo, Project Engineering Area.

C/ Independencia, 13, 33004 Oviedo, Asturias, Spain

Phone: +34 985 10 42 72

Fax: +34 985 10 42 56

E-mail: mesa@api.uniovi.es

URL: www.api.uniovi.es