Planning Project Based Learning

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ABSTRACT: *The use of active learning methodologies such as cooperative learning and project-based learning is increasingly widespread in Spain. Project-based learning is particularly suitable for engineering studies. However, planning an issue, using the project-based learning is not an easy task. This paper proposes applying this educational methodology for teaching cross-cutting theme "Patents and Trademarks". This theme is very suitable for students who are pursuing a degree in industrial design. If we approach the subject from the traditional view should bombard the student with a large number of laws and procedures, but the innovative project described in this paper is approached from the point of view of cooperative learning and project-based learning.*

Keywords: PBL Methodology, Cooperative Learning, Cognitive Activities

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1. Introduction

There is now worldwide interest in improving the quality of education. The improvement of teaching in an increasingly professionalized world is necessary. The use of active learning methodologies has been increased in recent years. One of these active methods of learning is project-based learning (PBL). One of its main precursors was Barrows [1-4]. This methodology is experiencing a significant increase in implementation in recent years and has also extended its use to other branches of knowledge such as engineering studies, since learning is accomplished through the search for solutions to the proposed projects. In Spain, the precursor of this type of innovation in engineering has been Miguel Valero and its implementation in Castelldefels School [5-6]. We have decided to implement this methodology in university education. In particular we have done a project to learn to patent and to inculcate the importance of patent. In this article we develop educational innovations made. The rest of the paper is organized as follows: section 2 develops the methodology used during the project. section 3 presents the evaluation, section 4 presents the results and finally in section 5 will present the conclusions.

2. Metodology

2.1 Metodology

PBL is a teaching strategy that takes students to learn how to learn and encourages students to develop critical thinking skills to solve projects. PBL is the search for solutions to projects of disorder of life. We will see the four main features that have project-based teaching:

2.1.1 Project approach
It begins with the presentation of a real life project, which could have the professionals.

2.1.2 Resolution of projects
It supports the implementation of projects solving skills, requires "*practice*". The role of the teachers to facilitate the implementation and development of effective resolution processes of projects.

2.1.3 Student-centered
Students take responsibility for their own learning. teachers should avoid relying on students to learn and know.

2.1.4 Self-directed learning
Develop research skills. Students need to learn how to get information when needed and will be current, since this is an essential skill for professional.

2.2 Project
The project PATENTED! Be developed in three distinct projects that feedback and will have to use the knowledge gained in previous projects.

2.2.1 Project 1

2.2.1.1 Project Approach
The initial project will be to adequately present the registration of a mark. Students are grouped into several groups to make learning collaborative. Each group will have to register the trademark in different classes according to the Nice Classification.

2.2.1.2 Resolution of projects
It will guide students to be directed to the website of the Spanish Office for patents and trademarks where they can find all the information necessary for registration of a mark. They will also have to learn for themselves that is the Nice Classification to properly register the mark. Finally should be aware of the different systems of trademark search to make sure their brand not previously recorded.

2.2.1.3 Student-centered
Students must assume full responsibility for their own learning. To do this teachers shall make available a forum for regular consultations and all material related to the project moodle classroom so that students do not rely on teachers to learn and know.

2.2.1.4 Self-directed learning
The teacher must present the completed registration of the mark concerned. In order for students to acquire knowledge the teacher will act as the Spanish Office of Patents and Trademarks by various requirements of the route so that student learning.

2.3 Project 2

2.3.1 Project Approach
The project will adequately present an industrial property registration. Students are grouped into several groups to make learning collaborative. Some groups will be assigned to patent an industrial design and others will be assigned a patent.

2.3.2 Resolution of projects
It will guide students to be directed to the website of the Spanish Office for patents and trademarks where they can find all the information necessary for the realization of a patent. Guide them to know the different public agencies that provide free help to advice on these issues. They require that the document contains the parts needed as well as have an impact on the importance of the claims. They will also have to learn for themselves which is a snapshot of the technique (IET) and involved. Finally should be aware of the different systems of patent search to make sure your invention is not patented previously.

2.3.3 Student-centered
Students must assume full responsibility for their own learning. To do these teachers shall make available a forum for regular consultations and all material related to the project moodle classroom so that students do not rely on teachers to learn and know.

2.3.4 Self-directed learning

The teacher must present the completed registration of the patent concerned. In order for students to acquire knowledge the teacher will act as the Spanish Office of Patents and Trademarks by various requirements of the route so that student learning.

2.4 Project 3

2.4.1 Project Approach

The project will aim to extend the patent or industrial design to different countries. They will have to choose the country where they want to patent your invention while you will know the laws of each country. Students are grouped into several groups to make learning collaborative. Each student group will be assigned a country in which patent their invention.

2.4.2 Resolution of projects

In this last phase of the project is not geared to students (unless really necessary) to independently complete the most complicated phase of the project.

2.4.3 Student-centered

Students must assume full responsibility for their own learning. To do these teachers shall make available a forum for regular consultations and all material related to the project moodle classroom so that students do not rely on teachers to learn and know.

2.4.4 Self-directed learning

In the final phase of the project will have the teacher as a mere employee and be authorized to direct their learning.

3. Evaluation

The project evaluation was made through the applications being required to pass the course successfully completed at least the phases 1 and 2, which achieved 100% of the students. On the other hand at the end of the project was carried out a survey to see the opinion of the students whose results are presented in Table 1. The results of the survey include: 100% of students rated the work on this project as very challenging, which motivates them to learn and enjoyed most during this project that if they had made with a traditional methodology. Second opinion regarding the methodology is very good, with all item above 4.

The methodology for the proposed project ***Strongly Disagree* (1) / *Strongly Agree* (5)**	***MEAN***
Motivates me to learn	4.9
Encourages a better understanding.	4.2
It helps me learn more about the subject.	4.6
It helps me to correct misunderstandings.	4.4
Improving my skills.	4.1
It helps me relate the concepts of the subject with real-life situations.	4.8
They enjoyed more than conventional classes.	5
Learned more than standard classes	4.6

Table 1. Survey to Student

4. Results

The results of the project can be summarized in the following points: first, all students exceeded the project 1 and 2 and 75% of students reached project 3. That is, all students were able to file a patent and a trademark, so all students acquire a basic knowledge in the efficient operation of the Spanish Office of Patents and Trademarks. It should be noted that 20% of students made it to the national phase in over 2 countries. Also, the students acquire the skills necessary to find the corresponding

legislation of each country to patent any invention in any country in the world. Therefore, this project served to develop their self-learning capabilities

5. Conclusions

The results described in Section IV show that the main project objectives are met. One of the weakest aspects of the project is its organization due to the high workload that represents for educators. Finally we believe that a project is very encouraging and much room for improvement.

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