VIDEOS FOR LEARNING PHYSICS: LABORATORY, YOUTUBE

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Abstract

The education is currently entering the era of the media world. Video learning is a media that combines audio and visual messages, language, procedures to help understanding of a learning material.

Recent studies show that students are more receptive to this type of learning material if the person explaining the practice is another student. Therefore, in the recordings, the voice (and occasionally the face) is that of a student. Obviously, the video is designed with the supervision of the teachers involved in the educational project. This project is being applied since 2015/16 course in Engineering studies of the University of Girona. The results show an increase in the degree of previous preparation of the laboratory practices. Videos favors the flipped classroom method.

Usually, media learning involves the reduction of the lecture methods. However, in our case, this method has not replaced the traditional method of having a written practical guide for reading. These guides continue to exist as a complementary material.

On the other hand, youtube videos are selected to specify certain contents and applications of Physics in the classroom or as flipped learning. In the first case, the objective is to complement the teacher's explanations. In the field of Physics, reproducing some experimental assemblies in the classroom presents great complexity or are costly. In the second option, the videos are complemented with questions to prepare classroom sessions.

Keywords: Teaching Innovation, Flipped classroom, Laboratory practices.

1 INTRODUCTION

It is shown by many previous studies ([1], [2] and [3]) that when the student, and in particular the university student, is the protagonist of his learning process, the results he obtains are deeper. The student, in this way, not only acquires a knowledge based on memory but he also develops competences. Therefore, it is very interesting that teaching is focused not on what teachers teach but on what learners learn, in this line, these most active methodologies can help to achieve a more relevant learning [4]. One option is applying video learning [5]. Likewise, these active methodologies involve the reduction of traditional lecture methods [6].

One of the most popular trends in education in this active methodologies is the flipped classroom [7]. Flipped classroom is a pedagogical approach which means that activities that have traditionally taken place inside the classroom take place outside the classroom and vice versa [8].

The flipped classroom environment ensures that students become more active participants compared with the traditional classroom. It is a blended learning approach; face-to-face interaction (when student is asked in class to show the degree of in-depth achievement) is mixed with independent study via technology (students are introduced to content at home by watching pre-recorded videos).

Traditionally, the topics corresponding to scientific-technical studies have an important part of laboratory practices. In our case they represent 20% of the subject mark. To carry out the laboratory practices, the students had to read the script of the subject and take it prepared to carry it out without help. The role of teachers should be only for tutoring, but given the fact that the students did not do any previous preparation, the teachers had to explain how the practice in question was carried out. The evaluation of the practices was carried out at the end of the subject when all the practices were evaluated by an eminently practical exam.

In recent years it had been observed that the students' interest in preparing this part was decreasing alarmingly, reaching the highest percentage of students who presented the blank exam. The concern of the department's teaching staff led to the placement of a new methodology to try to make the students more active in a part of the subject that, a priori in the case of technical studies, should be of great interest to them.
2 METHODOLOGY

In order to develop this student-active teaching methodology, they were developed a video, of a maximum of 5 minutes, corresponding to each of the laboratory sessions. The videos not only explained the theoretical part of the practice, but also the experimental procedure and the data analysis through real experimental data obtained in the laboratory. Teachers therefore became simply companions in the process of carrying out the practice by the students, helping punctually in doubts students could have throughout the lab work process. Video learning has been also applied to non-laboratory sessions. Since recent studies [5] show that students are more receptive to this type of learning material if the person explaining the practice is another student, videos were developed by students through both: a grant and academic recognition credits.

It was decided to make a variation of the flipped class methodology. Given the eminently practical character of the sessions (since they are lab work), instead of evaluating the knowledge acquired at the beginning of the session, the assessment is carried out at the end of the session through an online questionnaire.

3 RESULTS

3.1 Quantitative results

As it can be seen in Figure 1 and Figure 2, corresponding to the time evolution of marks percentage in subject Fundamentals of Physics 1 (corresponding to Mechanics and Thermodynamics), and Fundamentals of Physics 2 (corresponding to Electromagnetism and Optics) student marks have improved significantly.

![Figure 1. Marks evolution in the Physics laboratory sessions (Physics 1)](image)

Although the best results were given the first year of implementation, and although this methodology is being developed only since three years ago, the trend seems to have been stabilized with many hopeful results. The percentage of students who suspended this part of the subject has reduced from 44% to 4% and from 40% to 2% in Fundamentals of Physics 1 and 2 respectively. This large reduction in the percentage of students with a score of less than 5 is due to the fact that the assessment is done at the end of the session, so the number of examinations delivered with no response (zero score) has been reduced to number of students who do not do the laboratory session.

In addition, not only the number of students approved has increased, but also the marks have improved significantly, for instance the percentage of marks higher than 8.5/10 has increased from 1% to a 49% (Fundamentals of Physics 1) and 63% (Fundamentals of Physics 2) in the last year.
3.2 Qualitative results

On the other hand, it has also been realized a poll to the students to learn their perception of this new teaching methodology. As it can be seen in Figure 3 students value the new methodology very positively, with 80% of them considering it useful when preparing practical sessions. The evaluation method has also been valued very positively.

![Figure 2. Marks evolution in the Physics laboratory sessions](image)

![Figure 3. Marks evolution in the Physics 2 laboratory practises](image)

This method it has been adapted to non-laboratory sessions this academic year. The analysis of data will be performed after finishing learning process and its assessment.
4 CONCLUSIONS
It has been seen that with this methodology, the students, unlike before, read and study the practice before the lab session, therefore work autonomously in the laboratory. It has been achieved that they are more proactive in their learning and it has been proved that being more proactive in their knowledge has made their academic results improve in a very remarkable way.

In addition, the degree of satisfaction with this methodology has proved to be higher than 90%.

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REFERENCES