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THE APPLICATION OF FLIPPED CLASSROOM METHODOLOGY TO ENHANCE THE SITUATED LEARNING

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Abstract

In this work, a specific methodology based on Flipped Classroom and Jigsaw was applied in the subject Thermal and Hydraulic Machines. This subject has been taught in the 3rd course of the Grade of Environmental Engineering for eight years at the Faculty of Engineering in Bilbao (UPV/EHU). Aiming to enhance the situated learning by the individual acquisition of professional skills, the teachers defined learning outcomes according to the competences of the subject, as well as the corresponding rubric for their evaluation. The methodology includes the participation of the teachers using also tutorials, so that the feedback plays an important role and the evaluation becomes more individual. This is confirmed by the increase of the standard deviation of the marks for both, laboratory practicals and seminars, without a significant decrease in the ratio between the students who passed the course and the total that were examined.

Keywords: laboratory practicals, situated learning, flipped classroom, jigsaw.

1 INTRODUCTION

The subject Thermal and Hydraulic Machines has been taught in the 3rd course of the Grade of Environmental Engineering for eight years at the Faculty of Engineering in Bilbao. In the last academic course, several changes were introduced regarding the methodology employed in the seminars and laboratory practicals. These modifications raised from the conclusions achieved from the cooperative work developed between the teachers sharing their own experiences when applying active methodologies in their corresponding knowledge area, subjects and universities. As a result, a specific and effective methodology based on Flipped Classroom and Jigsaw was introduced in the subject Thermal and Hydraulic Machines, which is presented in this work. During the first years teaching this subject, traditional learning methodologies were applied for seminars and laboratory practicals, although being them completely independent one to another. The teachers felt these methodologies were not in concordance with the learning outcomes specified in the subject and/or in the Grade. In addition, the learning process was completely individual and the students were not motivated neither activated during the execution of those teaching modalities.

In recent years, the University of the Basque Country (UPV/EHU) has promoted teacher-training programs in new teaching methodologies and has started processes to review and improve the curricular developments of the Degrees in order to adapt to the demands of the European Higher Education Area (EHEA) [1]. The efforts made to date by the educational community that participate in those training programs allows the UPV/EHU to continue defining the bases for the development of the offered educational model, with a higher added value and that distinguished the UPV/EHU from the rest of the offers of the new EHEA. The model developed by the UPV/EHU, known as “*Irakaskuntza kooperatibo eta dinamikoa*” (IKD), has its center of gravity in student learning. Through active methodologies and with the support of information and communication technologies (ICT), it fosters learning in a multilingual teaching context. The IKD model responds to the need for adaptation and change (design and implementation of new Degrees, adoption of European Credit Transfer System (ECTS), need for innovation ...) and to the emerging demands for training (continuous and non-face-to-face training), aiming new organizational and methodological challenges [2].

During the adaptation of the teachers to the IKD model, several courses were attended in order to be familiar with the new methodologies and to learn how to apply them in classroom. From this self-adaptation process, the teachers selected a subject in which the application of new and active learning methodologies could imply a significant change for the way in which the subject was developed, in terms

academic courses, mainly because of the more accurate evaluation carried out by the Teachers, releasing more responsibilities in the students in their own learning process.

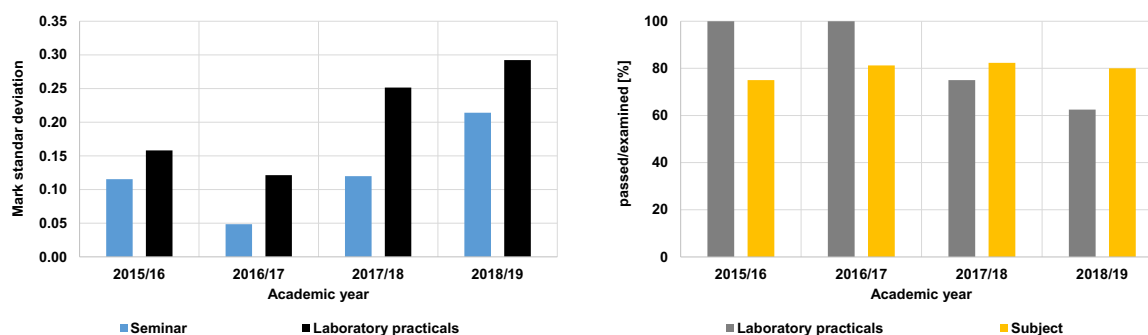


Figure 1. Left: assessment standard deviation for seminars and laboratory practicals. Right: ratio “passed/examined” for the laboratory practicals and the entire subject.

4 CONCLUSIONS

During the last course, the Teachers developed a methodology based on Flipped Classroom and Jigsaw techniques, obtaining the following results:

- The students successfully applied the methodology and the Teachers, in tutorials, felt how they acquire appropriately the concepts of the practicals.
- In general, all the students followed the methodology, in which the interdependence and the co-responsibility plays a very important role.
- This methodology makes possible to carry out a more individual assessment, which was measured in terms of an increase of the standard deviation of the marks.
- Although the marks corresponding to the laboratory practicals were slightly lower if compared to the previous academic courses, the ratio between the students who passed the course and the total that were examined remained almost equal.

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