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Abstract

Since academic year 2003/2004 a series of modifications has been introduced in physics subjects of the Engineering degrees of the University of Alicante in order to achieve a continuous evaluation. The importance of continuous evaluation increases the students' success, in particular in experimental subjects, where the level of abstraction needed for a correct comprehension is considerably high. In this work we have analyzed and evaluated the modifications introduced for the student's continuous evaluation. We have compared results for the last three academic years with the previous ones using the standard evaluation methods. Finally, since the continuous evaluation activities are optional, we have analyzed the evolution of the student attitude to these new proofs and the results achieved at the end of the year.

After analyzing these results, we can conclude that a continuous evaluation increases the student's success in physics subjects. Furthermore, it is important to mention that the student's active participation during the lectures has also increased. In this sense it is clear that a continuous evaluation forces the students to dedicate more time to study the subject.

Keywords
Evaluation methodology, European Higher Education Area (EHEA)

1. INTRODUCTION

In the process of adaptation to the European Higher Education Area (EHEA) many changes have been made in the Spanish University. Some examples are: the changing or reforming of the curriculum, the introduction of European Credit Transfer System (ECTS), reformulation of the teaching-learning, etc [1,2]. One of the most important modifications is the evaluation process. In this sense, in the High Technical School of the University of Alicante, we have introduced more continuous evaluation methods in physics subjects. We have implemented these changes in some degrees: Civil Engineering (CE) and Informatics Engineering (IE). First modifications were made in academic year 2003/2004 and we have analyzed the effects produced in the student's results during the next 4 years.

The methods employed in each degree consist of testing proofs and practical problems that the student has to solve before the main exam. Nevertheless these proofs are quite different for each degree, due to the specific characteristic of each subject. For these reason we have analyzed separately the results for each degree.

Firstly, in the CE degree, the physic subject has 15 hours. We have introduced (academic year 2003/2004) four theoretical-conceptual activities during the year (using test forms) and two partial exams (one in November and another one in June). In the academic year 2004/05, we reduced to 3 test and 2 partial exams (the first one in January and the second one in June). As a result, we have noticed a decreasing of the student's success in June and so more students try to pass the final exam in September, therefore in the year 2005/06 we proposed the first method again.

The marks of test exams account from the 30% of the final subject evaluation, the 50% correspond to the practical activities and the 20% refers to the laboratory experimental work.

Secondly, in IE degree, in order to achieve more continuous evaluation, we have made some modifications from the academic year 2004/05. In this sense we have introduced the following evaluating activities:
a) Two test proofs (TEST).
b) Two practical exams in small groups (less than 20 students) (EP).

Therefore, the subject’s evaluation can be divided in four parts: the last two mentioned before, the main exam (MEX) and the experimental work in the lab:

\[ 0.5 \times \text{MEX} + 0.3 \times \text{LAB} + 0.1 \times \text{TEST} + 0.1 \times (\text{EP}) = \text{Subject's note} \]

Initially, in academic year 2004/05, high percentage of students did not participate in the continuous evaluation, due to the more effort needed. Only the main exam was done for the majority percentage of students. Other changes have been made in order to apply ECTS philosophy into the subject.

2. RESULTS AND CONCLUSIONS

In the CE subject, in the academic year 2003/04, the 91% of the students that participated in the 6 activities, have passed physics subject. The following year, the result was 76% and 73% in the year 2005/06 due to the reasons explained in the last section (the reduction of the activities from 6 to 5). These results are very interesting compared to the previous percentages of the students that passed the subject using only two partial exams.

Table 1. Results of the new methodology of semi-continuous evaluation.

<table>
<thead>
<tr>
<th>Academic year</th>
<th>Students</th>
<th>All activities</th>
<th>Pass the subject in June</th>
<th>Pass in Jun.+ Sep.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003/04</td>
<td>302</td>
<td>53</td>
<td>44</td>
<td>48</td>
</tr>
<tr>
<td>2004/05</td>
<td>284</td>
<td>51</td>
<td>16</td>
<td>39</td>
</tr>
<tr>
<td>2005/06</td>
<td>352</td>
<td>63</td>
<td>29</td>
<td>46</td>
</tr>
</tbody>
</table>

On the other hand, it is important to note that 25% of the students did not participate in any activity of the evaluation method. These results confirm that a continuity in the evaluation process help the students to have success in the physics subject. The percentage is considerable high compared to the results obtained when only one exam was used to evaluate the student task. One important drawback is the high number of student that rejects to participate in the activities, between 25 and 30%, these students prefers only one exam for evaluation.

In order to analyze the success in the adaptation of IE to a continuous evaluation, in Figure 1 we present the average students’ participation in the different activities. As we can see, only 28% of the students participated in all the proofs, 57% of the students tried to participate in some activities but desisted afterwards. It is important to mention the great disaster when we consider the first try to pass the main exam; only 25% of the students have success in their first attempt. Being optimistic, we can remark that this percentage is 30% higher using when we consider the continuous evaluation process.
Fig. 2. Percentage of students as a function of the participation in the different evaluation activities.

Other important aspect to study is the classification of the students who try to pass the main exam at the first attempt (January-February exam) as a function of their participation in the continuous evaluation. These results are presented in figure 2 and show that high number of students (84%) have followed continues evaluation activities. In other words, the students know that if they want to have success in the subject they have to prepare all previous proofs. This assumption is obvious when figure 3 is analyzed. In this figure we can see that the probability of success increase four times if the students participated in semi-continues evaluation.

Fig. 2. Students that participate in the main exam distributed as a function of their participation in continuous activities (all of them, some of them, any of them).
3. RESULTS AND CONCLUSIONS

It is necessary to increase the participation of the students in the lectures, motivating them to take place in all the evaluation activities. The students that participate in the continuous evaluation process are around 33% in CE and 27% in IE. Furthermore the 75% of students that use this evaluation method have success in the physics subject.

On the other hand we have detected some problems in acquisition of initial concepts due to the poor previous studies at high school. In this sense, we have proposed to the University administration an initiation course developed in September during 20 hours. This course has begun in this academic year (2007/2008). We hope that the course help the students to pass the subject (now 50% of students desist in IE before the second month). Other additional problem is the accumulated work (practical and theoretical of each subject). As a consequence, many students pretend to attend the September or December exams avoiding the continuous evaluation. In order to solve this, we are studying to make continuous evaluation activities mandatory. Using this measure, we can expect the students' implication increase and so their. In order to achieve a real continuous evaluation, reduced students groups are needed as proposed in the EEES.

4. REFERENCES
