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Students' active role on the assessment of learning results in blended-learning environments in Engineering in Spain

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Abstract. In this paper we present an assessment experience with students, based on the use on Information and Communication Technologies (Hereafter ICTs). This process has been developed in the framework of the Research project I+D+i EDU2009-08758, in which one of the main research areas is that of assessing learning in university context, and, more specifically, in the field of Engineering degrees in Spain. The main objective is that of systematize the assessment process carried out in the subject of Computing Systems, already adapted to the European Space for Higher Education guidelines. For this purpose, we have used EvalCOMIX tool, implementing with it several assessment scales that systematize evaluation processes, make students get involved in the process and provide with necessary feedback when required.

Key words: Alternative Assessment, Engineering, E-assessment.

1 Introduction

In the process to adapt educative systems to the European Space for Higher Education in Spain, *assessment methods* get a special significance due to the fact that they will have to both guide and motivate students in the learning process. De Miguel et al (2006) [5] point out that, once competences to reach and their corresponding results have been set, these become the centre of the learning process, but it is also necessary to set adequate teaching-learning modalities and methodologies, together with *criteria and assessment procedures* that allow us to test if they have been actually acquired. Gairín et al [7] indicate that the use of competences entails four different interactive components:

“*Competence description, description of activities where competence will be shown, instruments or means to assess competence and criteria or standards to judge*

competence” highlighting that traditional assessment procedures do not meet the requirements demanded by the assessment of new contents and the new role of students in university learning processes. In this sense, Calatayud [3] points out that it is not possible to innovate in the teaching-learning process without a parallel innovation in assessment procedures, since students will not change the way they learn if the assessment system is not adapted to their learning as well. Calatayud [3] also emphasizes that assessment is a process that must be done in a continuous way, not being and end in itself, but having as aim the improvement of a learning process which will be conditioned by the information relevant in each case. Information taken from the assessment process can be interpreted and translated into value judgments to propose improvement plans and take decisions. Therefore, assessment is a good opportunity to boost students’ learning process ([12], p. 3).

To promote assessment, different adequate assessment systems have to be used to boost a fruitful long-term learning ([8], p.10). Pérez Pueyo et al ([14], p. 439), indicate as adequate ones the *feedback* during the learning process, which enables an improvement; self-assessment and peer-assessment, together with a serious reflection on the process.

As a consequence, the *participation of students in the assessment of their learning* is given much more importance. Their participation will contribute to promote three requisites for any good assessment process: to be motivating, continuous and formative ([2], p. 201). Peer-assessment will also contribute to the self-regulation of the learning process, to the development of critical thinking among students and varied strategies to solve problems, as well as the capacity of students to negotiate, discuss be organized and self-confident in the development of their tasks, facilitating lifelong learning ([11]).

1.1 Learning-oriented e-assessment

The generation of new learning procedures entails as well that new assessment processes have to be born. Santos, Martínez and López [15] point out that we need to overcome the so-called ‘exam-culture’ and start the way towards an ‘assessment culture’, oriented more to the improvement of learning than to a final summative measurement of the process. We thus get new concepts around assessment: learning-oriented assessment, authentic assessment, alternative assessment ([1], [13]).

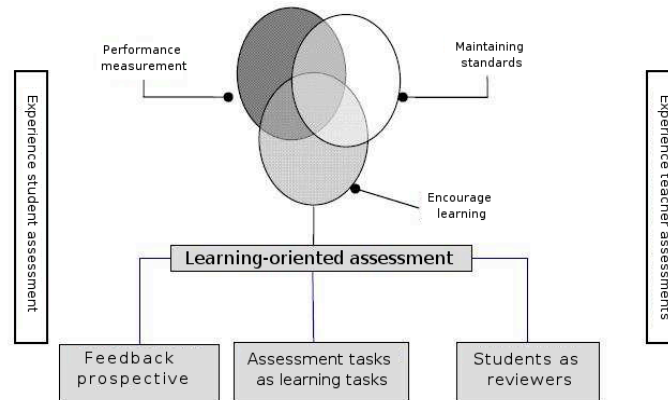


Fig. 1. Conceptual framework of learning-oriented assessment [4].

The three main purposes of learning-oriented assessment are: performance measurement, standards maintenance and learning promotion, which complement each other and contribute to a continuous assessment of the effort, perseverance and interest on results shown by students. Assessment, in this way conceived, is aimed at achieving competences equally set for all students, besides enabling them to develop a professional activity in future and promoting their lifelong learning. In this sense, learning-oriented assessment can be defined as a constant interaction between three different elements: *retrospective feedback, assessment tasks as learning tasks, and students as evaluators*. It is thus expected that students get involved in their own assessment process and become professionals able to self-regulate and update their knowledge, putting it into practice in the development of their professional career by implementing the use of competences [18].

1.2 Assessment through Learning Management Systems (LMS)

At the same time, *Learning Management System (LMS)* platforms have turned into essential tools for learning-management in university nowadays context [9]. They facilitate information storage, sharing and the interaction through the development of tasks and activities. At the University of Salamanca has been put forward a virtual learning space, using Moodle platform, which serves as support to in-class teaching. Using this space, and through a research Project led by the University of Cádiz¹, access has been granted to EvalCOMIX, a tool which allows competence assessment in a blended learning context. In this sense, teachers can design and create different assessment tools as, for example, control lists assessment scales and rubrics. As a

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consequence, not only can the teacher assess students' performance, but also enables students to be an active participant in the process, both in oneself assessment (self-assessment) and in peer-assessment that makes students acquire more autonomy and responsibility in the educational process.

2 Empirical study: methodology

The *objective* of this experience is to systematize the assessment process of students in a basic subject (Computing Systems) in the field of Engineering and Architecture at the University of Salamanca Computing Engineering and Information Systems Degree) [16]. In this study, 17 students out of the 21 enrolled in the subject, actively participated. In-class sessions are used to present basic concepts of the syllabus, using material explanations as support to motivate and make students be more interested. To boost their participation in the learning process, and at the beginning of the academic year, a series of questions to answer in the virtual campus were planned. Questions were mainly related to the historical evolution of Computing Sciences, and they were uploaded to the platform together with weekly tasks and objective tests to self-assess the knowledge of students of the contents dealt with in class. In a parallel way, we planned group work, which aims to boost the competence “*to do things with others*” and is considered to be basic tools to change students' mentality and make them involve in the learning process. The final aim was to get an “*active*” student who decides about his/her own learning process.

Tasks were mainly addressed to reading and commenting articles and bibliography related to the field, thus motivating their interest on the subject, or to preparing a report on a specific topic, what implies a bibliographical search.

Tasks were carried out in groups of three or four students, and each group was suggested four different ones. Each task entails an oral presentation and has associated to it a different assessment instrument.

The involvement of students in the learning process will help them to control their own learning in a lifelong process. Therefore, in two out of four tasks, assessment tools were used by students to carry out self-assessment and peer-assessment processes [6].

Taking into account that systematizing assessment facilitates and gives coherence to the process, and using EvalCOMIX tool [10] we created assessment tools for the different tasks that students carried out in this subject, also guided by a coherent assessment procedure [17]. More specifically, we built assessment scales and control lists for the assessment process.

3 Results

In respect to the *performance achieved by students* through teachers' assessment, both peer and self-assessment, results show evidences on the responsibility with which peer-assessment was carried out, although it was hard for them to carry out their self-

assessment. Nevertheless, it is necessary to emphasize that none of them reflected in their time estimation the period devoted to assessment. As an example, we show marks got in task number 4.

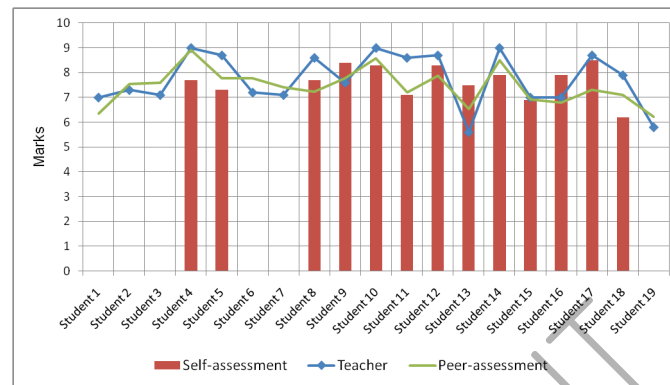


Fig. 2. Marks' comparison in task number 4.

We assume that these results answer to the fact that they did not take this assessment process as a relevant part of the subject, partially due to the use of a new platform, that of Cadiz University platform. This hypothesis can be tested in items 29 and 30 in the satisfaction survey (Table 4), where we can observe that what has been less valued in the subject has been learning through self-assessment.

Assessment in the subject	2010/2011 (n=17)	
	\bar{X}	S_x
26. Group work	4,47	,624
27. Research and search learning	4,25	,447
28. Oral presentations learning	3,94	,443
29. Self-assessment learning	3,35	,702
30. Peer-assessment learning	3,41	,618

Table 4. Assessment in the subject (1-5 scale).

It will therefore be necessary to insist, explain or modify the process in this sense, as we think that it is relevant for students to get benefit from the assessment carried out among peers, what will help, for example, to develop critical thinking.

From the point of view of the teaching team, we think that learning results of students have been satisfactory, and the involvement of all educational members in the learning process has been facilitated.

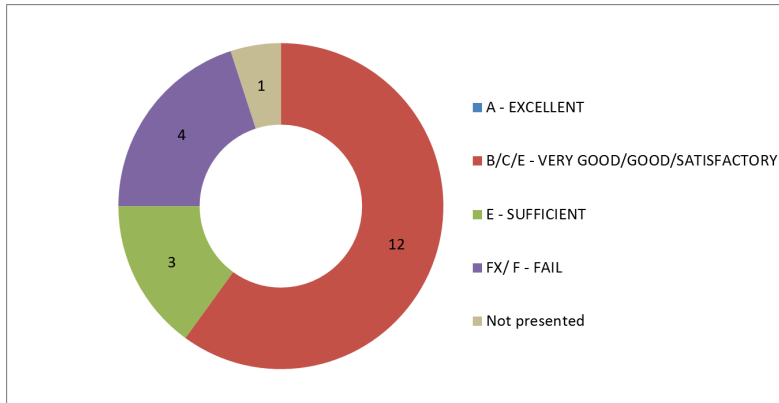


Fig.3. Marks in *Computing Systems* (0 - 10)

Through a questionnaire, we tested the *satisfaction of students* towards the formative process. Once dealt with the activities, we wanted to know the value that students assigned to experience, know how they worked, their assessment on the methodology used, and moreover, we asked them for an estimation on the number of hours devoted to the subject. For this purpose, the questionnaire was organized in seven dimensions: a) *Personal work methodology of students*, b) *Depth in the study of the subject*, c) *Perception of the methodology used*, d) *General satisfaction about the experience* e) *Usefulness degree of several resources used for the subject* f) *Assessment of educational resources used in the subject* and g) *Rough estimate of the number of theoretical/practical hours devoted to studying along the semester.*

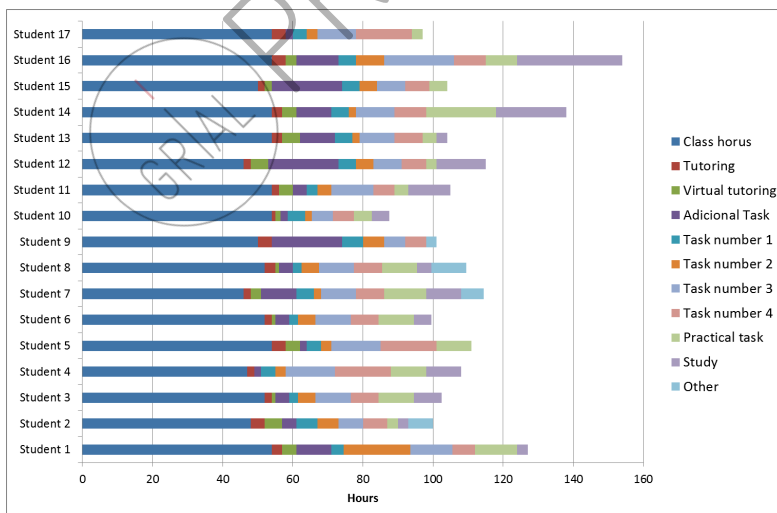


Fig. 4. Estimation of students on the number of hours devoted to the subject.

The analysis of data has given us the following results: firstly, the overall sensation of work excess which is not a reality, but a perception of students derived to the change of attitude and methodology entailed by the European Space for Higher Education.

Computing Systems is a 6 credits, 150 work hours subject, but, on the contrary, estimation data provided by students are always under that quantity (media 110,44; deviation 16,16). Therefore, we think that it is not necessary to delete tasks that have been regarded as appropriate, although it might be necessary to carry out a time redistribution and a higher coordination among subjects, relieving as much as possible that overload sensation.

Secondly, regarding the valuation carried out by students on the methodology used, and as it had happened in previous years, students think that the methodology used is a good one (over 3 in a scale 1-5), and their satisfaction level is also high (over 4,1 in a 1-5 scale).

Besides being the teachers those who value learning results, it is also relevant for students to perceive that they have accomplished those achievements. In this case, the questionnaire reflects that students think they have understood the subject's objectives, which will be useful ($\bar{X} = 4,18$; $S_x = 0,529$) and that attending class has been relevant to understand the subject ($\bar{X} = 4,69$; $S_x = 0,602$), emphasizing the usefulness of the virtual campus (over 3.35 in a scale 1-5), although they have worked with two different virtual campuses at the same time.

4 Conclusions and prospective research lines

Conclusions drawn from this study have been extracted from the whole process of design, implementation and assessment of a specific subject in the field of Engineering and Architecture Degrees in Spain, more specifically, at the University of Salamanca. We consider that the systematization of assessment will help students in the learning process, as it can allow them to access their mark quickly (both that of the teacher and the peers' one), as well as his/her colleagues' marks. This will also give them feedback that helps them to enhance their work and stimulates them to continue their learning process.

Regarding EvalCOMIX, and taken as an instrument to create assessment tools, it presents light problems that get the already complex process of assessment, even more complicated. Among the difficulties spotted, we would emphasize that *Moodle* does not allow the creation of work groups, and that hampers the assessment of each of the students, as the mark is collective even if the oral presentation has been carried out individually. We estimate, as possible handicap for the use of assessment systematizing tools, that of getting the teacher to rely on the tool. In this line, we propose as a suggestion that EvalCOMIX be configured not to allow the modification of instruments that have already been employed by users (students/teachers), and to permit a visualization mode that does not alter percentages assigned.

The process developed in this subject, Computing Systems, has been only an approach to the systematization of the assessment process, but, in any case, we consider that the experience has been positive. We also think that it is necessary to go on deepening in the implementation of competence-assessment processes more

technical and polished in such a way that we can, as teachers, test that the procedure used has been valid and reliable, and that it counts on a high level of satisfaction of students.

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