



E-learning and face to face mixed methodology: Evaluating effectiveness of e-learning and perceived satisfaction for a microeconomic course using the Moodle platform

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ABSTRACT

The use of Information and Communication Technologies in higher education has proved to be very effective in different educational environments. A less explored area is their application for evaluation on-line, since it is a different process, with specific components. This work describes a methodology that combines the assessment with multiple choice tests through the virtual environment Moodle and the evaluation by using traditional classroom exams. The proposed mixed methodology ELFF (E-Learning and Face to Face) was implemented during the academic year 2010–2011 in the subject Microeconomics: Markets and Competition in the European Union of the double degree in Law and in Business Administration and Management, to assess complementary aspects of the knowledge acquired. The obtained results show that it clearly promotes the participation of students, increases their motivation and improves their competence and so, their performance in terms of qualifications.

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1. Introduction

The educational value of virtual environments is well known in regard to the transmission of information and interactive participation, either in real time, via video conferences or other alternative systems, or by means of forums, chats, and others ways open to involvement non-simultaneous of participants (Duart & Martínez, 2001; Duart & Sangrá, 2000; UE, 2000).

The less explored field of the on-line evaluation presents challenges that, in our opinion, should be undertaken. Its differential aspects with the transmission of information and interaction are many and of a different nature, so the use of virtual tools with this target is more complex. It has specific characteristics, and some advantages and disadvantages compared with the use of the traditional ones (Baeten, Kyndt, Struyven, & Dochy, 2010).

In this paper we present a proposal to evaluate the subject Microeconomics: Markets and Competition, of the second year of the double degree in Law and in Business Administration and Management. This is the E-learning and Face to Face Mixed Methodology (ELFF), which combines traditional assessment by classroom exams with evaluation through virtual environments, by tests with multiple choice answers, that have the advantage of the immediate

correction of mistakes, to offer students the opportunity to review their results in order to improve their knowledge (Hartwell, 2010).

The high level of abstraction of the microeconomic concepts is commonly recognized as one of the major difficulties to learning it. Because of this, in many cases, the students come to know the concepts in isolation, without ever getting to understand which is the role of each piece on the general gear. Thus, they are able to recognize the parts, without comprehending the mechanism of the machine as a whole. It is common that students do not realize of the essence of the relationship between the pieces and the function that each one is playing in the microeconomic model, that is to say, it is usually difficult to them to achieve the conceptual relating knowledge, which is so important to improve understanding of Microeconomics. And one of the main objectives for a teacher is that its pupils get it, to achieve a general understanding of the subject. We think that our proposal may contribute to this.

This work is structured starting with the presentation of the proposal system and the design of the assessment, distinguishing two parts: the face to face and the on-line, and differentiating what is intended to evaluate with each of them, as well as the procedure of qualification. We also present the details of the tests for the on-line evaluation and we describe how we have qualified them. Being aware of the importance of self-satisfaction and students' feelings, we have consulted their opinions about the method, which we show briefly to complete this paper. We end with some conclusions and suggestions for improvements in future applications.

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2. Material and methods

As we said above, Microeconomics is characterized by an elevated conceptual component, often with a great level of abstraction, which is the basis to learn Economics (Lopes dos Reis & Martins, 2010; Martín Caraballo & Segovia González, 2010). It also requires an analytical component, which serves as structure to these concepts, and the geometrical tools that allow seeing them. These three elements constitute the supports to teach the subject, and their combined use is very useful to achieve the target of transmission of the knowledge with solidity and fiability. But its diversity supposes some difficulties for teaching, because we must use simultaneously the mathematical analysis and the graphic representations as support to the concepts, and for evaluation and qualification. A proper assessment should consider these differential aspects and allow the teacher see the level acquired by each student on each of them.

Because of this, our proposal consists of three parts: 1. The face to face evaluation, to assess the capability of reasoning, that must be demonstrated by developing analytical expressions and solving problems related to mathematical microeconomic matters, and also the ability to appreciate some situations and their reflection in the corresponding graphs. 2. The on-line evaluation, which focuses on very specific conceptual issues, which are the main features of the discipline that we deal with. We will refer to the development, evaluation and qualification of a multiple choice test in a virtual environment and its application to a subject of Microeconomics, since it is a discipline characterized by a notable component of detail and abstraction. But, for the same reason, we think the procedure would be equally valid for Macroeconomics. 3. Finally, we must choose the weighing of the two parts to get the final grade.

2.1. Design test

In the actual structure of teaching, we distinguish the expositive sessions (theoretical or magistral classes) from interactive sessions (practical or cases resolution classes, with the direct participation of pupils, that requires a major implication). To apply ELFF methodology, for each unit of the program that we develop in the expositive sessions, we elaborate a set of “n” questions of multiple choice, with four alternative answers, but only one correct. These questions, which correspond with worked concepts in the unit, once introduced in the section “Issues” of the Moodle platform, constitute the material for the design of the interactive test. The number “n” of proposed questions is at the discretion of teachers. Moreover, we must take into account that on being answered in a virtual environment, outside the classroom, the students will have access to the information that they consider appropriate and they will be able to communicate with each other.

2.2. Design of the evaluation

Considering all the foregoing, we decided to prepare, for each unit of the subject and for each pupil, a test of 10 questions randomly chosen among the 40 of the database. Thus, we can reach nearly 850 million of different questionnaires (specifically 847,660,528). This is a fundamental matter, because it grants, almost one hundred per cent, that each student must answer a different test, since the probability that two of them are identical is very small. Additionally, using the option of Moodle platform, we shuffle the questions and the answers, which will be in a distinct position in each questionnaire. When we introduce the questions in the virtual platform we assign a score to each, and the responses are measured in percentage terms: the value of the right answer is

the 100%, and wrong answers can be valued, also in percentage terms, with negative scores, being possible penalize more some answers than others. In our case, all questions were scored with 1 point, so that the right answer sums 1 point to the qualification, and we have selected a uniform penalty of 50% for each wrong answer, which subtracts 0.5 points.

Moreover, these questions were grouped in the database according to clusters, i.e., for each test, we divided the matters under consideration in 10 blocks with different contents, and we have developed 4 questions for each one of the contents. These questions were what have built the database. Thus, our database consisted of 40 questions, related with 10 different aspects of the subject under discussion, and each of these aspects was developed in 4 questions, which have been formulated with similar level of difficulty. However, the difficulty level can vary between blocks.

Subsequently, we prepared the Moodle platform program to include in each test 1 question from each one of the 10 clusters of 4 questions, at random. Thus, the resulting questionnaire was composed of 10 questions, each from a different thematic area. This ensures that each student will be evaluated with a different exam but balanced in content, taking in account in each and every one of the tests all the aspects of the theme. In our opinion, this system combines the basic criteria of efficiency (all tests are covering all the main matters) and equity (all tests are balanced in content and level of difficulty for all students).

2.3. Online evaluation

Once set up the questionnaire, we design how to run it. First, we agree with pupils a date and a time environment (2 h) for conducting the test. Although it is probably better to make the proof in a classroom where each pupil has a computer with internet access, we choose facilitate solving in the environment that students preferred, being aware of that this means that they can consult references and/or have assistance to answer. We try to prevent copies or cooperative resolution of the exam by setting only one attempt to choose the right answer and by limiting the time to do the questionnaire to a maximum of 20 min after opened.

Summarizing: students will have to answer a test of 10 multiple choice questions, 1 question from each one of the 10 clusters of 4 questions, selected at random. In different questionnaires it could be repeated any question but, if so, it will not be located in the same position, nor has ordered the responses in the same way. Each question has only one correct answer which is worth 1 point, and 3 incorrect, that subtract 0.5 points. The test can be answered from any location with internet access, but in the day “d”, between the hours “h” and “h + 2”, and there is only one attempt to answer every question correctly. By pressing the key to start, the countdown begins from 20 min to answer, and even if the test is not complete, when the time finish, the program automatically will close and will send the questionnaire for evaluation.

Given that students can communicate and transmit information about the test content, they have an aversion to be the firsts to start the process, since the firsts are in a situation of disadvantage: they lack the data to which their peers can access by answering the questionnaire later, because they could collect information from those who have done it before. Although this matter is minimized by the structure of blocks of the test, that we have explained above, we have established an additional mechanism to minimize the advantages of “moving into second”, by hiding the feedback about the correct answers and scores until the process was fully completed and the questionnaire was closed for answering.

Therefore, students received no feedback until all of them had completed the all of test. That is, each student solved its questionnaire and sent it to the Moodle platform for evaluation, but he did not know if he had failed or succeeded nor the grade earned until

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