MIXING EDUCATIONAL TECHNIQUES: E-LEARNING, FLIPPED CLASSROOM AND THE USE OF SOCIAL NETWORKS. AN EXPERIENCE IN A UNIVERSITY SETTING

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ABSTRACT

This paper describes an experience, in a university setting corresponding to a degree in engineering, of mixing some of the trends in current distance education. It is a mixed learning methodology using the inverted classroom through the combination of learning management systems and social networks services in an introductory course on statistical methods applied to engineering. Finally, it shows the impact on the degree of success that the implantation of the experience has had in those students who have followed the established guidelines against those who have opted for a traditional method.

KEYWORDS

e-learning, Learning Management Systems, Modular Teaching Mini-Videos, Social Networks, Flipped Classroom

1. INTRODUCTION

Advances in information and communication technologies (ICT) play a key role in the development of the university education system: intelligent tutoring systems, multimedia educational platforms and virtual educational environments. These advances have led to the emergence, among others, of the concept of virtual education and Learning Management Systems (LMS). In addition, in recent times, ICTs have enabled the growth of new lines of research applied to technological development in the educational field, resulting in the acquisition of a wide variety of interactive teaching tools accessible through electronic devices such as the computer, mobile phone or tablet (García et al., 2014).

The use of this kind of tools in class favours the degree of interactivity, increases the collaboration between students in their educational process (Cavus and Ibrahim, 2007) and significantly improves the performance shown by the students, developing a sense of connectivity and community that increases the learning capacity of the students (Kok, 2008). This leads to a high motivation and interest in working with these kind of tools (Martín and Serrano, 2009). There is no doubt that these tools are a boost for the educational process and must be incorporated in class, not only as a tool for remote learning, but also to be combined with both face-to-face and non-face-to-face work by the student (Espejo et al., 2018). This kind of applications improve the performance of the educational process and the self-learning capacity of the student, facilitates the self-evaluation of their knowledge and validates the teaching/learning process (Sánchez et al., 2009).

On the other hand, in recent years, countless efforts have been made to improve the in-depth and quality learning, which have resulted in the emergence of various ways of approaching this learning. Among these, the inverted learning model should be noted as one of the most outstanding ones. The inverted classroom (flipped classroom) is a blended learning modality that fits perfectly with the use of LMS systems in class. This approach raises a pedagogical model that proposes the need to transfer part of the teaching and learning process out of the classroom in order to use class time for the development of more complex cognitive processes that favours self-learning.

Along with these virtual tools, it is necessary to provide the students with good material that allows them to prepare the subject. In this sense, the modular teaching mini-videos (MDM), (Letón et al., 2013), turn out to be a very useful teaching resource, characterized by specific elements in terms of duration, support,

methodology, philosophy, format and interconnection (modularity). MDMs have proven to be useful and contribute to the improvement of the face-to-face (real or virtual) moment within distance, face-to-face and semi-face-to-face teaching. At the same time, Social Network services and technologies (SNS) have achieved impressive participation from both students and teachers. In addition, through their mobile applications, they have managed to become a daily habit inseparable from a large number of users. For this reason, more and more authors are proposing teaching methods that include SNS (Celik et al., 2015).

This paper presents the results of the implementation, in a University setting, of a learning methodology using the inverted classroom through the combination of LMS with social network services in an introductory course on statistical methods applied to engineering. The objective is to verify, as far as possible, the benefits that this mixture of teaching practices can have for learning.

2. METHODOLOGY

The proposed experience was carried out in a group of 76 students of the Statistical methods in Engineering subject corresponding to the first year of the Degree in Computer Engineering of the University of Córdoba (Spain). Volunteer students were asked to agree to participate in the experiment and the initial group was divided into two subgroups. A first subgroup consisting of 35 students who participated in the new experience (experimental group) and a second subgroup of 41 students who were given lessons through a classical methodology of Blackboard (control group). The theory and practical contents proposed in both subgroups were the same.

In both subgroups, the LMS platform used was Moodle, in which all the course materials were provided: theory transparencies in PowerPoint format, proposed exercises, additional readings, non-face-to-face self-evaluation activities and face-to-face evaluation activities. The difference between one group and another was the fact that the experimental group was provided membership in a SN group in Telegram and the teaching methodology of flipped classroom was used. In this methodology, each classroom session is preceded by the need of viewing one or several teaching mini-videos, dedicating the face-to-face class time to comment on the visualized material and resolve both questions about the content and questions raised by the teacher and discussed in group. In addition, comprehension tests are carried out in these classes, through the LMS survey module, where the difficulties offered by each theory content are detected, and again resolved in a group manner. The use of Telegram as a SN tool is oriented to the resolution of doubts at the time of the visualization of the MDM by the students, where they themselves are the ones who propose and resolve, in real time, the difficulties they may have.

3. RESULTS

Related to the degree of success of the methodology used in the experimental group (inverted class, MDM and Telegram), the information collected through a survey conducted at the end of the course shows that 92% of students are in favour of use of the MDM, basically because they can visualize the sessions as many times as they want and at the most appropriate time for them. Regarding the inverted class, none of the students had participated in a similar experience and indicate that at the beginning it has not been a simple task and that the time dedicated to the work done has exceeded their initial expectations. They also indicate that the use of the Telegram group has been very useful in the preparation of the sessions.

The descriptive values of the academic results are those presented in table 1. The scores obtained in the practical component are similar in both groups (experimental and control). Otherwise, and with respect to the theory, the means scores are different, detecting a difference of 0.767 in favor of the control group.

Table 1. Academic results

	Experimental group		Control group	
	Theory	Practical	Theory	Practical
Mean scores	6.279 ± 1.981	4.443 ± 2.245	7.046 ± 1.980	4.738 ± 2.751
% of passed	97.21	41.46	85.32	42.86
% not presented	14.3		21.9	

The percentage of passed students in the practical component it is similar, but in the theory it is quite superior in the experimental group with a difference of 11.89%. Finally, the percentage of not presented students is significantly lower in the experimental group.

4. CONCLUSIONS

As shown by the results presented, the implementation of the teaching experience is positive in terms of the degree of satisfaction expressed by the students who have participated.

On the other hand, the number of dropouts (students not submitted for exam) is lower in the experimental group, which may mean an advance on the problem of abandonment in higher engineering studies. Among the authors who treat the causes of the abandonment of this type of students can be cited, among others, the work of Marra et al. (2012).

To conclude, the personal work together with the collaboration in teamwork and participation in group discussions produces an additional workload that is compensated through a socialization of the knowledge acquired, and which results in greater uniformity of the educational levels reached.

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