Basic actions to reduce dropout rates in distance learning

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ABSTRACT

Today's society, which is strongly based on knowledge and interaction with information, has a key component in technological innovation, a fundamental tool for the development of the current teaching methodologies. Nowadays, there are a lot of online resources, such as MOOCs (Massive Open Online Courses) and distance learning courses. One aspect that is common to all of these is a high dropout rate: about 90% in MOOCs and 50% in the courses of the Spanish National Distance Education University, among other examples. In this paper, we analyze a number of actions undertaken in the Master's Degree in Computational Mathematics at Universitat Jaume I in Castellón, Spain. These actions seem to help decrease the dropout rate in distance learning; the available data confirm their effectiveness.

1. Introduction

Over the past few decades, there has been a dramatic upsurge in online education. This is supported by the following facts: every year the number of students in this type of education increases by around 5%; during the 2016/2017 academic year, the MIT (Massachusetts Institute of Technology) offered more than 2300 distance courses, with over 200 million visitors; and the University of Harvard has 360,000 foreign students following this type of course. There is no doubt that universities that wish to use new technologies to increase their visibility and teaching quality must try to keep up with the world's leading universities (see Harvard University, 2016; MIT, 2016; Sein-Echaluce et al., 2009).

These methodologies are breaking old barriers, which were insurmountable in the past, such as distance and the difficulty of instantly disseminating and exchanging knowledge. The creation of virtual learning environments opens a window to the world for the dissemination and design of efficient methodologies for conveying knowledge, as well as being an economically sustainable option.

One of the strengths of the Master's Degree in Computational Mathematics (MUMC) at Universitat Jaume I (UJI) in Castellón is its online enrolment system; in fact, more than half of the students enroll in the distance course (see Castañeda, 2016). Particular care must therefore be taken with the "teacher–student" relationship in this group, mainly in terms of the learning process and its evaluation. However, the implementation of such a procedure in the Spanish university system has certain drawbacks that prevent an optimal praxis of this methodology in distance learning groups.

An important aspect that needs to be considered in distance learning is the high percentage of students who drop out after starting their studies. The National Distance Education University (*UNED – Universidad Nacional de Educación a Distancia*), a Spanish state university that was created in the 1970s, has for years monopolized distance education in Spain. However, it did not offer 100% distance education, since a face-to-face system of office hours was also organized. In the nineties, the Autonomous Community of Catalonia created the *Universitat Oberta de Catalunya* (UOC), incrementing the options for distance education. But the growth has been exponential during the last decade, thanks to institutions like *Universidad a Distancia de Madrid*, *Universidad Internacional de Valencia*, *Universidad Internacional de La Rioja* and *Universidad Isabel I* among many others. The UNED has published some data (see De Santiago, 2011) that may be useful for examining the reasons why many students drop out after their initial enrolment; this is the case when students who enroll for a whole academic year do not re-enroll the following year. The UNED has identified this particular group, since the vast majority of students who drop out do so within this context.

The analysis was carried out as a result of changes in the curricula that took place after 2010. It can be clearly observed that the weak point of distance education is the high dropout rate. Table 1 shows these percentages for a number of degree programs. Very high rates are observed in all the subjects, whether sciences or humanities.

In the case of MOOCs, Chapman, Goodman, Jawitz, & Deacon, 2016 suggested performance monitoring indicators to detect the level of engagement of participants, since it is a good predictor of learning success, while DeBoer, Ho, Stump, & Breslow, 2014 pointed out the

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Table 1
Dropout rates after initial enrolment for UNED degrees in 2010, according to De Santiago (2011). Studies marked with * correspond to data of the year 2008.

Degree	Dropout rate
Chemistry*	64.5%
Mechanical Engineering	61.6%
Electrical Engineering	60.5%
Physics*	59.7%
Industrial Electronic and Automation Engineering	57.1%
Mathematics*	55.8%
Philosophy	46.6%
Economics	45.9%
Political and Administrative Sciences	42.1%
Geography and History	40.3%
Social Education	38.0%
English	35.9%
Psychology	33.5%
History of Art	31.2%

existence of other important unmeasured factors for this success.

The most significant fact that can be observed is that the dropout rate is one of the main concerns of many national European education systems. For instance, Oppedisano (2009) relates graduation rates in European countries to the policy of open admission. Also, the report European Commission (2015) reviews the definitions and policies of study success across Europe, proposing strategies at multiple scopes (funding, organizational, staff, etc.). Regarding Spain, Rué (2014) relates the dropout rate to the interaction between university and society at the social, cultural and economical levels, and the report CRUE (2014) provides with descriptive statistics of the situation.

In this work, our aim is to design and analyze the implementation of a number of guidelines that allow us to effectively unify a high-quality teaching methodology and the use of new technologies in distance learning. The intention is to guide the relationship between teacher and student, establishing a clear, coordinated and evaluable method of action to make any changes that might be needed to improve the learning experience. We will focus on the analysis of the dropout rate to establish patterns of behavior at all levels that allow us to decrease this indicator.

2. Dropout rate

This indicator supplies annual information about the number of students who leave their degrees with respect to the number of students initially enrolled. The precise definition of this indicator varies from one institution to another.

At UJI, the formula used to compute this rate is as follows: the percentage of students in an entry cohort C enrolled in the degree program in the academic year X-2 who have not enrolled in that degree in the years X-1 and X, over the total number of students in entry cohort C who started said degree program in the academic year X-2. The academic year X is the academic year for which the calculations are made.

"Dropout rate" indicator = (V1/V2)*100   (1)

where

- V1 = Number of newly enrolled students who enrolled in academic year X-2 but not in X-1 and X.
- V2 = Number of newly enrolled students for the academic year X-2.

In Fig. 1, the dropout rate according to the formula (1) is given for the MUMC. The percentages corresponding to the 2011/2012, 2012/2013, 2013/2014 and 2014/2015 academic years are not considered statistically significant, due to the low number of students in those years. The only statistically significant value is the one corresponding to

the 2015/2016 academic year.

Fig. 2 shows dropout rates at UJI per academic year and for different levels (undergraduate degree, master's degree, online master's degree). It can be observed that on-campus (i.e. not online) undergraduate degrees have a slightly higher dropout rate than master's degrees. This may be explained, among other factors, by the lower level of maturity in terms of personal development, as well as the fact that those courses are four times longer (the duration of an undergraduate degree in the Spanish system is four years, whereas a master's degree only lasts for one year). In addition, it can be observed that the online master's program has a higher dropout rate than that of the on-campus master's program. Among other reasons, this may be due to the need for more specific learning material or a suitable Internet connection (which cannot currently be assumed for everyone in Spain), or the difficulty of distance learning, etc.

Regarding the 2015/2016 academic year, the only year for which we consider the data to be significant, the difference between the rate for the MUMC and the average rate for all other master's courses is negligible (25% vs. 22%). Among other possible factors, inherent to the nature of disciplines, Table 1 leads us to ponder on the difficulty of distance learning, in the case of scientific and technical subjects, as an important explanatory factor.

As pointed out in the introduction, the dropout rate is one of the main concerns of many national European education systems. Therefore, it is important to study and analyze it, as well as to implement actions to improve the current rates. In this regard, in the following sections we will outline some guidelines that should be adopted to reduce the dropout rate.

3. Methodological guidelines to reduce dropout rates

3.1. Initial contact

The opening of the new semester is a decisive moment for establishing a link between teacher and student. It is a distance learning student's first point of engagement with the subject. For this reason, it is recommended that the teacher should set up an in-person or virtual joint session on the first day of the semester, if possible with all the students. This session should motivate the students with regard to the content of the subject and establish guidelines for the relationship between teachers and students in order to involve all students in the subject, including those who could not even attend this first session. One feasible proposal is to broadcast (and record) the session by videoconference. It is essential that distance learning students should feel part of the subject from the beginning. The date and time of this first session should be agreed upon with all those involved in order to ensure the greatest possible number of participants.

3.2. Tutoring

The gateway to the course for distance learning students is the subject's "Virtual Classroom". This space should be used to provide news, announcements, useful and/or recommended teaching material, etc. An additional effort should be made to keep the Virtual Classroom up to date, since it is the only means of contact with the subject for distance learning students.

Office hours, both virtual and face-to-face, are essential to ensure that students do not stop learning their subjects. Teachers should be aware of this, as it can be an effective way to attract students' attention and interest. In the case of virtual office hours, a pre-set weekly schedule must also be provided in order to be accessible to students. Virtual office hours may be based on answering questions by e-mail, but they could also be carried out by videoconference or some other means, depending on the available resources (the reader is referred to Gregori & Martínez, 2017, for further information).