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OPTIMAL TIMING IN ONLINE TASK DEADLINES: WHAT IF STUDENTS PROCRASTINATE (A LITTLE)?

Abstract

This article analyzes the distribution of deadlines for task delivery in an online learning continuous assessment framework. It looks for the optimal task delivery distribution, understanding *optimal* as that which allows students to maximize their performance. This empirical application is based on students enrolled on a modular subject in a Tourism Management master's program, and the results show that continuous assessment, uniformly distributed throughout the course, leads to better performance than concentrating the evaluation on the second half or even on the last two thirds of the course. For the sake of flexibility in students' task delivery a slight delay of less than a day can be tolerated.

Keywords: online learning; task deliveries; optimal performance; continuous assessment.

1. Introduction

Online instruction has emerged as a mode of teaching and learning and a relevant, useful complement to traditional teaching (Tesone, 2004; Tallent-Runnels et al., 2006; Eraqi et al. 2011; Lu & Chen, 2011; Carter & Emerson, 2012; Yan, 2013). In fact, distance education is now a familiar element in higher education and it continues to expand rapidly (Bures et al. 2000; Liu, 2012; Robinson, 2011; Rovai, 2004), becoming a ubiquitous practice as a result of the spread of the Internet (Larreamendy-Joerns & Leinhardt, 2006; Alegre de la Rosa & Villar Angu, 2011; Villalustre Martínez & Del Moral Pérez, 2011). Although the Internet should not be considered a panacea for all situations (Eynon, 2008), it has afforded distance education extra appeal, either because it opens up unexplored instructional methods, such as just-in-time learning (i.e., educational programs tailored to workers) and corporate training (Oblinger, 2001) or because it deals more effectively with the limitations that have been attributed to distance learning (Mudge, 1999; Thomas, 2000; Murray, 2003).

It is no wonder that universities often see investments in and developments of online programs as indicators to the outside world that they are on the cutting edge of educational strategies. Therefore, the use of online technology conveys the message of educational innovation (Ham & Davey, 2005; Larreamendy-Joerns & Leinhardt, 2006). In this regard, educators have sets of Internet based tools at their disposal, and a science of learning and teaching that brings about a change in the teacher-student relationship at the university level. This alteration might affect who is educated, what they experience as education, who educates, and what the very practice of education itself means (Larreamendy-Joerns & Leinhardt, 2006). Consequently, as the Internet is having a

notable effect on the way of teaching and learning (Bennett & Marsh, 2002), when the Internet is chosen as the principal delivery vehicle it implies important challenges for the design of active learning (Hutchings et al., 2007). While the Internet favors “convenience” (in terms of study location or time, one can learn at his or her own pace, one can work on the course anywhere one has computer access) and is less expensive (there are no travel and housing costs), it has limited social face-to-face interaction, the instructors never know whether the students are learning what the instructors are saying they should be learning, it forces the instructors to keep up with new technologies (traditional instructors might have a difficult time trying to adapt to the new environment), and the student must have a strong discipline and be self-motivated to complete the tasks set during the learning program (Bennett & Marsh, 2002; Larreamendy-Joerns & Leinhardt, 2006; Hutchings et al., 2007).

Despite this trend, and the increasing proliferation of online education, both synchronous and asynchronous (Chen et al., 2005; Jereb & Smitek, 2006; McGugan, 2002), empirical investigations into this delivery method have lagged (Kerr et al, 2006). Along this line, assessing student learning in an online environment is one of the main challenges faced by educators (Hartnett, 1999).

In line with Kennelly et al. (2011), this article looks into the features that explain the optimal, performance-maximizing distribution of task delivery (the sequence of assignments the students have to submit) in an online framework in tourism education. In other words, the aim of this article is to detect the temporal pattern of task delivery that leads students to their optimal learning performance, understanding *optimal* as that which allows students to maximize their grades. While the previous educational trends are not an exception in this realm (Lominé, 2002; Lugossi, 2010), attention to the role

that new technologies play in education in tourism is scarce (Cantoni et al., 2009). To fulfil this objective, the paper is organized as follows: the next section examines continuous assessment in an online learning framework. The third section describes the research design with the method employed and data used. The fourth section presents the results and the fifth section the conclusions and implications.

2. Continuous assessment in online learning

According to Kerr et al. (2006), online learning refers to student learning achieved in formal university courses, in which all instruction occurs online using the Internet. It means that student assessment has to be implemented online, or at least, a major percentage of the final grade comes from online evaluations. Assessment is a process that uses information gathered through measurement to analyze or judge a learner's performance on some relevant work tasks (Hill, 1997). In an online learning environment, Rovai et al. (2008) stress the fact that assessment is the first element that must be prepared. In this regard, a meaningful assessment tool that monitors student progress in an online learning environment enhances the learning process (Fenwick & Parson, 1998; Wolfe, 2004) and, according to Rosenkrans (2000), in an online learning environment, assessment should be a continuous process.

Rovai et al. (2004) indicate that the assessment principles that serve as guidelines for student assessments in a traditional learning environment remain the same in an online course, but in an online environment the way these principles are implemented changes. For instance, an important difference between the traditional classroom and online assessments is that in online programs most of the students are already in the workforce as full-time professionals. Thus, they can demonstrate the acquisition of competences through the use of work-related projects (Rovai et al., 2004). Note,

however, that according to Kearns (2012), there is a scarcity of research analyzing the types and distribution of online assessments that instructors use. They include both convergent and divergent assessments (Nicolay, 2002). Convergent online assessment implies a series of questions with a set of pre-defined possible answers (e.g. multiple-choice exams). Divergent online assessment encompasses some activities to be solved in which a number of responses can be correct (e.g. problem-solving activities, essays, group assessments, project-based assessment, presentations). Also, in online courses, students can take part in online discussions through chats or forums, so the instructor can track the student's participation and grade it. Swan (2001) identifies discussion, papers, other written assignments, projects, quizzes and tests, and groupwork. Arend (2007) detects discussion, exams, written assignments, experimental assignments, problem assignments, quizzes, projects, and presentations. Gaytan and McEwen (2007) find that online instructors prefer projects, portfolios, self-assessments, peer evaluations, peer evaluations with feedback, timed tests and quizzes, and asynchronous discussion. In this line, Rovai et al. (2004) stress that online students should be assessed by a combination of participation in online discussions, submitted tests, portfolios, and individual and group projects and performances; of course, these tasks will be submitted directly to the teacher online.

Rovai et al. (2004) emphasise the fact that students must know the due dates for each assessment task at the start of the course so that they can manage their time. However, at this point a crucial question emerges: in this continuous online assessment; what is the optimal distribution of task delivery? As Ariely and Wertenbroch (2002) suggest, the later the deadlines, the greater the opportunity to learn the most about the topic before submitting the papers; however, the later the teacher's feedback will arrive,

and following Pérez-Martínez et al. (2009), the gradualism in the assimilation of a subject's knowledge advocated by continuous assessment is somewhat lost. Accordingly, Gaytan and McEwen (2007) recommend setting regularly paced assignments and provide timely feedback. Therefore, in this empirical application, we examine the performance of the students and its variation depending on the temporal pattern of their task delivery. As they can choose from a uniformly distributed series of tasks (i.e. evenly spaced deadlines) -which is the one suggested by the instructor- to any other task submission distribution, the analysis will allow us to determine the pattern that produces optimal results in term of student performance.

3. Research design

3.1. Methodology

To reach the objective of detecting the optimal distribution of tasks, we rely on regression analysis. We regress student i 's grades SG_i on three dimensions: a “pseudo-skewness” (PSk_i) measure, the number of “procrastinated days” (PD_i) and “in-advance days” (IAD_i) for student i . The resulting expression is as follows:

$$SG_i = \alpha + \beta_1 PSk_i + \beta_2 PD_i + \beta_3 IAD_i + \varepsilon_i \quad (1)$$

where ε_i is the error term which is assumed to be normally distributed.

The pseudo-skewness measure is obtained through the formula

$$PSk_i = \frac{\sum_{t=1}^T d_{it}^3}{T \cdot \sqrt{\left(\sum_{t=1}^T d_{it}^2 \right)^3}} \quad (2)$$

where d_{it} is a variable that reflects the days left to the final day of the course for student i and task t . Note that this expression is the traditional formula for skewness except for the fact that we consider that the mean value is the final day of the course, as we are

interested in knowing how dispersed or clustered the deliveries are (from the left) to the final day. The closer the deliveries are to the final day, the larger the PSk_i will be; and the more disperse the deliveries are, the smaller it will be. “Procrastinated days” (PD_i) is a variable measuring the average number of days the students have delayed the delivery of their tasks and “in-advance days” (IAD_i) measures the average number of days the students have advanced the delivery of their tasks.

3.2. Data

The empirical application is based on a sample of 59 students enrolled on the modular subject *Marketing and Market Research in Tourism* in the Master in “Tourism Management” from *Instituto Universitario de Postgrado* (IUP). We define a modular subject as a course that is taught intensively for a shorter period of time than a full-term course, in such a way that the modular courses contained in the master’s programme are taught consecutively rather than simultaneously. We analyze the delivery of six tasks with evenly spaced deadlines over the thirty-six days of the course.

Each task consists of an activity in which a real-life tourism scenario is presented and a series of questions are required to be answered. These are open questions in line with the divergent online assessment approach (Nicolay, 2002). The tasks were designed to be similar in terms of difficulty and complexity, and were evaluated numerically from 0 (worst grade) to 10 (best grade). The grades of the six tasks were averaged out to obtain the final grade of the modular subject.

The information was collected from the system as the exact dates the tasks were submitted were registered. Then, the average number of days each student delayed the submission of his or her tasks (“procrastinated days”) and the average number of days

each student advanced the delivery of his or her tasks (“in-advance days”) were computed.

In this course, teachers indicate the deadline for each task; these deadlines are the dates on which the students should submit their tasks. However, these dates are for guidance only rather than mandatory. They are fixed just to remind the students that if they want to follow the normal pace of the course, they should not procrastinate with regard to their task deliveries. Ultimately, students can deliver their tasks before or after the deadline for each task without any penalty.

4. Results

The use of the regression model allows us to get a notable explanatory power for the student grade (see Table 1): the adjusted R-squared stands at about 75%.

[Insert Table 1 about here]

Regarding the individual parameters, we observe that the skewness is significant and negative, meaning that the closer the deliveries are to the final day, the lower the student grade turns out to be. In line with Ariely and Wertenbroch (2002), students that accumulate their submissions at the end of the course are missing the feedback the teacher would have provided if they had delivered them previously on a regular basis (the feedback from the first submission could have been used to ameliorate the second submission, and so on). This result reinforces Pérez-Martínez et al.’s (2009) statement that continuous assessment allows gradualism in the assimilation of knowledge and, therefore, better grades are obtained. Note that we get a positive significant parameter for the squared skewness, although, as we can see in Figure 1, its effect is negligible for the operative range of sample.

[Insert Figure 1 about here]

Concerning the “procrastinated days” average we find a significantly positive coefficient, and for the square of procrastinated days a significantly negative parameter comes out. These results indicate that, up to a certain point, a delay can be tolerable. This grades-enhancing flexibility is in line with the results by Moscardo (2009). Specifically, Figure 2 shows that up to day four the grades increase, and after this point they start decreasing. Delivery in advance does not have any effect at all.

[Insert Figure 2 about here]

5. Conclusions

Online learning represents an environment with a huge positive potential in graduate and postgraduate courses (Coll, 2007; Gunn, 2006). This fact is shown by the feasibility of continuous assessment in this context. However, a topic that deserves special attention is the distribution of task delivery in order to implement continuous assessment in a modular subject. This is characterized by a usually shorter but more concentrated task delivery schedule compared to non-modular subjects.

This article analyzes certain features that explain the optimal distribution of task delivery, understanding *optimal* as that which allows students to maximize their performance. The results show that continuous assessment uniformly distributed along the course, i.e. continuous assessment with evenly spaced deadlines, leads to better performance than concentrating the evaluation on the second half or even on the last two thirds of the course (this is evidenced by using a pseudo-skewness measure). Note that, by looking at the results, a slight delay in task delivery can be accepted; in particular, for a thirty-six-day length, a delay of four days (for all the tasks as a whole) can be allowed as the optimum is then reached. However, this does not imply that a

systematic delay in the task delivery improves performance; it is important to take into account that the four-day delay is to be distributed among the six different tasks the students have to submit during the thirty-six-day period. Therefore, as it only represents an average delay of less than a day per task, this delay found in the sample should be considered more for the sake of flexibility (the teacher can be somewhat flexible) than to justify any departure from the uniformly distributed deadlines.

Finally, this empirical application should be taken as a preliminary study that explores the effect of task delivery patterns on students' performance, whose results must be considered as a first step into the analysis of this relationship. Therefore, the outcomes obtained should be tested and reinforced through different and larger samples, and ideally, with many distinct courses across the tourism discipline.

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Table 1. Effect of skewness and “(non)procrastination” on grades

	Equation 1	Equation 2
Skewness	-1.537 ^a (0.143)	-1.510 ^a (0.139)
Skewness ²	0.001 ^a (0.0001)	0.001 ^a (0.0001)
“Procrastinated days” average	0.208 ^d (0.120)	1.018 ^c (0.438)
“Procrastinated days” average ²		-0.135 ^d (0.070)
“In-Advance days” average	-0.612 (0.533)	-0.318 (0.538)
Constant	18.74 ^a (0.381)	17.90 ^a (0.572)
R-squared	0.765	0.785
Adjusted R-squared	0.741	0.757
F-statistic	32.55 ^a	28.52 ^a
Log likelihood	-71.44	-69.41

a=prob<0.1%; b=prob<1%; c=prob<5%; d=prob<10%.

Figure 1. Effect of skewness on student grades

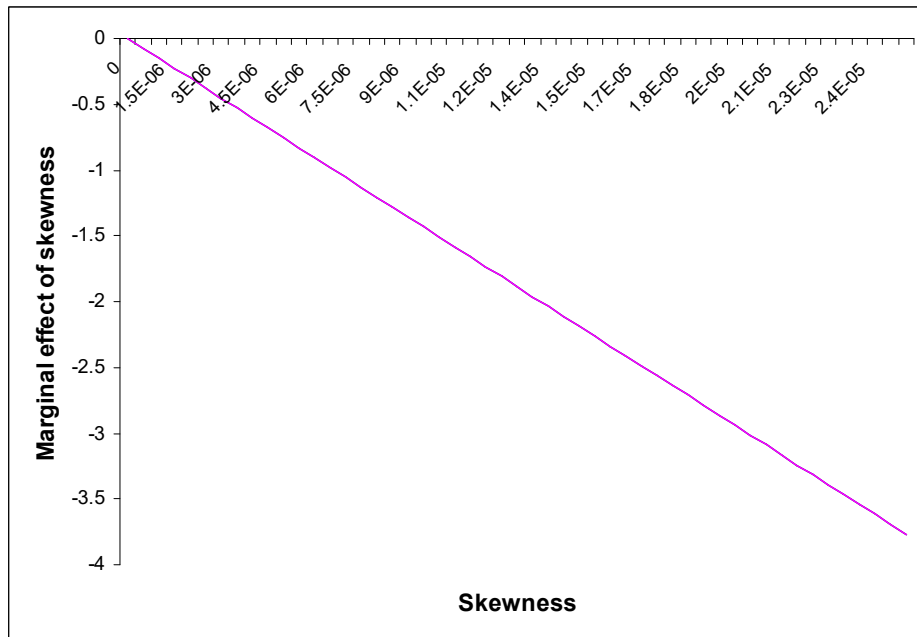


Figure 2. Effect of procrastination on student grades

