



LEARNING ANALYTICS OF A MOOC WITH A TERMINAL EFFICIENCY OF 22.35%

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Introduction

On November 4, 2012, The New York Times declared 2012 as the year of the MOOCs (Massive Open Online Courses), due to the impact that they represented in the process of teaching and learning (Pappano, 2012). Since their inception in 2008, this new modality of sharing knowledge has positioned itself between the tastes and preferences of those interested in continuous education.

However, it was in 2012 when a great tsunami offer of MOOCs took place (Hennessy, 2012); soon they became present through different education platforms. From then on, the way of transmitting knowledge, collaborating and learning has been extended through these courses, which did not replaced the original method; the presence of MOOCs does not imply the role of universities with their face-to-face format is obsolete. Rather, MOOCs can complement the educational offer for those who seek additional material to strengthen their professional career, update knowledge, and acquire learning about areas of interest or even for those who seek access to preparedness beyond high school education (Billings, 2014; DeSilets, 2013).

This paper presents the results obtained when calculating the terminal efficiency for 12 MOOCs offered between 2013 and 2014 by a well renowned Latin American University. The results obtained indicate that some of the MOOCs offered by the University have a terminal efficiency above 6.5% which is the average recorded in the literature (Jordan, 2014); however, one of the courses reported an atypical terminal efficiency when 22.35% of the joined participants completed the course, fulfilled the course's activities and obtained the declarative of achievement. The detailed analysis for the MOOC that had an atypical terminal efficiency is presented: for this course in particular, a description of the participant's characteristics, of the technological resources used and of the tools and teaching strategies implemented by the academic staff is included. Finally, the findings suggest that to evaluate the success of a MOOC it is necessary to generate metrics other than those employed in the evaluation of *face-to-face or hybrid courses*.

Reducing dropout through learning analytics

According to their definition, the courses offered through the use of technology, housed in an educational platform, not linked to a formal registration at a certain University, with no deadline to register and no penalty for abandonment, are regarded as massive open online courses or MOOCs (DeBoer, Ho, Stump & Breslow, 2014). To conceptualize them, each of the terms “course”, “online”, “massive” and “open” have been redefined and reinvented on a number of occasions, hence, it is difficult to offer a fully covering definition.

Usually when using the terms “massive” and “open”, it means that the course will be available to any person showing interest and self-motivation to register. However, these terms usually do not refer to the fact that in the same way, MOOCs may experience massive departures of participants at any time; most of the times these terms are not linked with desertion. It is valid to say that who registers as a participant in a MOOC is an individual, self-motivated for learning and that the reasons for self-motivation among participants will vary in origin and over time. Due to this component of variability and the fact that participation depends only on them and not on the University who teaches them, when measuring the MOOCs’ success it is necessary to pay special attention to how the parameter is calculated. In addition, this new method opens the door to be creative in the generation of new metrics to evaluate them (Jordan, 2014).

Terminal efficiency

Terminal efficiency as the percentage resulting from dividing the number of participants who received the declarative of achievement from the educational platform, divided by the total of registered participants (EduTrends Report, 2014). Jordan (2014) calls this same statistical *completion rate*, and sets that it will be equivalent to the ratio between the total numbers of participants that met the criteria of the course for the declarative of achievement with respect to the total number of registrations.

In the research done by DeBoer et al. (2014), the authors also estimated the completion rate in this same way; however their conclusions suggested that it is necessary to redefine the way in which the MOOC achievement is measured. Ho et al. (2014) also suggested the need to rethink the metrics in the MOOC’s calculation, taking advantage of the different types of information generated by these kind of courses; for example, the number of accesses to certain video or the number of downloads of certain document.

According to Jordan (2014), the average total number of participants at a MOOC is around 43,000; of this amount, 6.5% complete the course. She also establishes that there is a negative correlation between the total number of participants who complete the course and the length of the same; that is, when the duration of the course extends, the number of participants who complete the course decreases. This gives rise to the explanation of the following key concept within the theoretical framework.

Dropout rate

The term dropout is widely used in Latin America to refer to the abandonment of school as a multifactorial situation experienced by unrolled students. In the case of online education, there are many factors that can influence the decision to leave the virtual learning space, including the level of required prior knowledge, the lack of certain necessary skills to take the course on a self-directed way, a change in the layout, a decrease in the level of self-motivation or the loss of confidence at achieving the expected result (Milligan, Littlejohn & Margaryan, 2013).

Billings (2014) mentions among the disadvantages of MOOCs the fact of not having sufficient information to identify the cause by which less than 10% of participants enrolled in the courses comply with all activities and finish it. Among the possible reasons that she mentions are the required improvement in the design and implementation of the MOOC, uncertainty on the recognition of the acquired learning (by universities and employers) and low adaptation to the registered e-learning model.

On the other hand, Ho et al. (2014) estimate the dropout rate as the complement to the percentage of active students in the platform; defining the latter as the ratio between the number of students who have been active on the course during the last week and the total of registered participants; in addition to the above, the authors mention that the dropout rate will be equivalent to the attrition rate of the course in the given period. As a result of their research, they found that about 35% of the total of records in a particular MOOC never check the contents of the course (momentary motivation to registration); only 50% of the remaining 65% of records who sees the course's content, access the first activity assigned within the course.

Research project

The main objective of this research project was to evaluate the terminal efficiency of the MOOCs offered by one of the universities of greater recognition in Latin America and leader in providing distance education; the following sections will describe the context of the research, the applied instruments, the dimensions of analysis and the participant population. Possessing an extensive infrastructure to offer online programs, the offering University of the MOOC under study, is a pioneer within the private universities in Latin America. This educational institution is governed by five values; Innovation, Global Vision and Teamwork are three of its values related to the proposed avant-garde offer of massive open online courses.

The MOOCs offered by the University through Coursera cover different areas of study; they correspond to the area of Mathematics, Physics, Innovation, Entrepreneurship, Latin American Culture and Strategic Educational management, to name a few. The experience of the involved personnel in the design and implementation of the MOOC in conjunction with the position of leadership that the University occupies could be two major factors of influence on which the terminal efficiency rate relies and even had an outstanding higher level than the

average reported in other research when the calculated terminal efficiency was of 22%; however, the foregoing has not been proved statistically.

Research instruments

As already mentioned above, in this document the definition for terminal efficiency corresponds to the percentage resulting from dividing the total number of participants who received from Coursera the declarative of achievement among the total of registered participants (EduTrends Report, 2014). The source of information is the panel of statistical analysis that Coursera offers on its Dashboard.

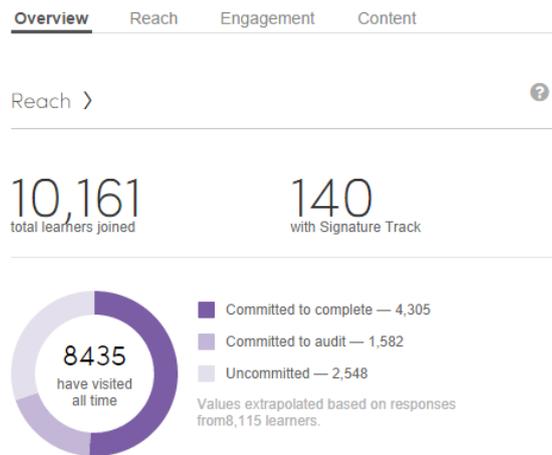


Figure 1. Dashboard of the learning platform Coursera

Since the data required to estimate the terminal efficiency is provided by Coursera, the same criteria was used for all the courses, the methodology has been standardized and the source of the data is validated. The aim of this paper is to compare the terminal efficiency among the MOOC offered by the University; however, we also present a breakdown analysis of the atypical course by type of declarative granted, in order to submit a detailed analysis of the information collected.

Population and sample

The maximum total number of enrolled participants in the courses will be used for the calculation of terminal efficiency, being this total of people made up of those who signed up and never performed any activity (registration was the result of a momentary motivation), those who were only reviewed the course content without performing any activity, those who carried out some of the activities and those participants who meet the criteria required to obtain the declarative of achievement. In the research published by DeBoer et al. (2014) and Jordan (2014), the authors conclude that there is a need for new metrics to evaluate the success of the MOOCs, this because of the difference with respect to courses in traditional mode there is a high dropout rate among participants of the massive and open online courses. For the atypical case studied, the terminal efficiency is calculated with respect to participants who remained active during the complete course, as the above mentioned authors propose it.

Results

Between January 2013 and summer 2014, the University under study and Coursera, in conjunction, received 209,871 requests to participate in their 12 MOOCs. Academic authorities of the University indicated that on the August-December 2014 term, the academic institution had around 95,000 students formally enrolled in all the educational programs offered; taking this statistic as reference, the total amount of participants in the offered MOOCs approximately equals to 220.92% of the total number of students enrolled in the institution. From the perspective of strategic positioning the University is implementing, the main goal of reaching not physically attainable markets has been covered successfully; also it is fulfilling a social commitment to share knowledge at the same time it takes position as an innovative University in teaching-learning processes.

The findings presented below have been organized in the following manner: first there is the analysis of terminal efficiency for the 12 MOOCs offered by the University between January 2013 and summer of 2014 is presented; subsequently, the characteristics' analysis for the participants of the MOOC whose terminal efficiency was the 22.35%; and finally, we present the technological resources, tools, and educational strategies of the MOOC with atypical terminal efficiency.

Comparative analysis between MOOCs

Mathematics, Physics, Innovation, Entrepreneurship, Latin American Culture and Strategic Management Education are some of the disciplines of study that encompasses the contents of the MOOCs offered by the University and studied for this research. In equal magnitude of diversity is the rate of terminal efficiency calculated for each of them, results showed rates from 1.2% to the 22.35% (Figure 2). It is important to mention that the average terminal efficiency for the MOOCs offered by the University is 4%; percentage equal to the documented by the Graduate School of Education at the University of Pennsylvania in their recent research on MOOCs (Penn GSE, 2013).

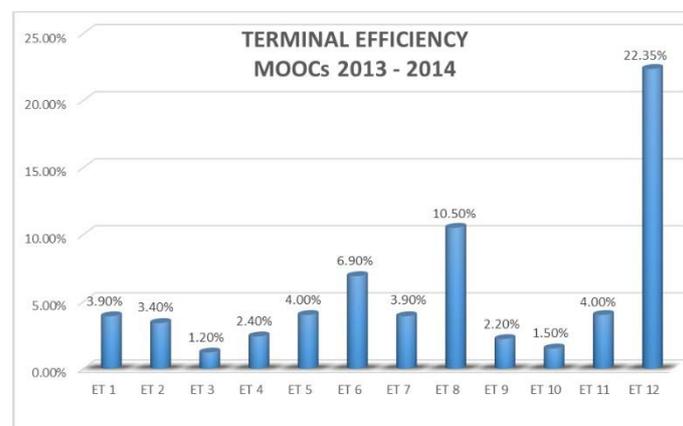


Figure 2. Rate of terminal efficiency with respect to the registered total per course

Leaving aside the atypical case, the terminal efficiency calculated for the rest of the MOOCs is between the interval of 1.2% and 10.5%; it is important to point out that the courses with the lowest and highest terminal efficiency correspond to the two courses with the higher amount of participants: MOOC 3 records 35,901 and MOOC 8 with 24,262 participants registered. However, although it seems that a 1.2% of achievement for MOOC 3 is a low rate, when this percentage is multiplied by the total number of participants at the course, the quantity of 431 participants meeting Coursera’s achievement declarative is obtained.

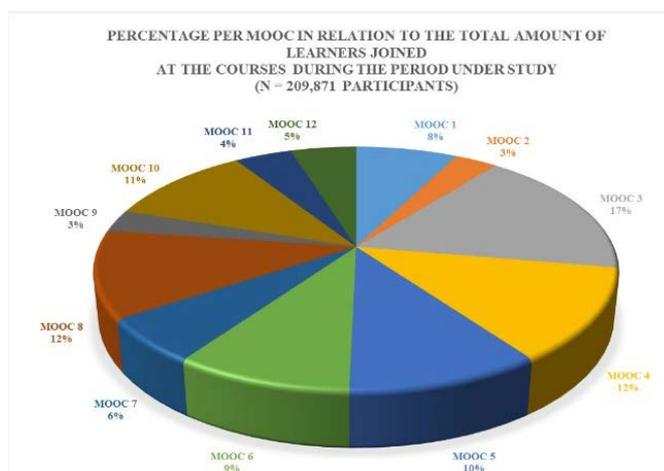


Figure 3. Percentage of enrolled by MOOC with respect to the total of MOOCs offered by the University

In the specific case of the atypical course that had 10,161 as total amount of enrolled participants (MOOC 12), 2,271 were awarded with the declarative of achievement; 506 participants received declarative of normal achievement and 1,765 participants received declarative of achievement with distinction. It is important to mention that for this course in particular the required criteria to receive the declarative of achievement with distinction included the participant’s compliance with all assigned activities and also a final average equal to or higher than 90; to obtain the declarative of normal achievement instructors set a final average equal to or higher than 70 and below 90 and the submission of all the activities. With the above information, it can be concluded that with respect to the maximum total of enrolled participants, 17.37% of them presented a high level of commitment to the course attaining the declarative of achievement with distinction; 4.97% of the maximum total of enrolled participants obtained the declarative of normal achievement (Alemán de la Garza, Sancho-Vinuesa & Gómez-Zermeño, 2015).

In recently published studies, one of the most common issues is the urgent need to define new ways to measure the success of the massive open online courses. Both in the article published by DeBoer et al. (2014) as well as in the one published by Jordan (2014), they concluded that a better metric for determining the rate of compliance (statistically equivalent to terminal efficiency) is to consider the percentage of declaratives of achievement with respect to the registered population that remained active throughout the duration of the course. The learning platform Coursera offers the data of total number of students who were visiting the course’s page; for the particular case of the atypical course (MOOC 12), 8,435 participants

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were registered as continuously active. Redefining the terminal efficiency as the percentage of enrolled participants who obtained the declarative of achievement with respect to the total of continuously active registered participants, the calculated terminal efficiency is 26.92%. It is also possible to calculate the dropout rate, for this course was of 16.98% since 1,726 records showed no activity in Coursera (see Table 1).

Table 1: Descriptive statistics of the course with atypical terminal efficiency

Total amount of enrolled participants	10,161
Total amount of continuously active participants	8,435
Total amount of enrolled participants with declarative of achievement	2,271
Terminal efficiency with respect to the total amount of enrolled participants	22.35%
Terminal efficiency with respect to the total amount of continuously active participants	26.92%

Characteristics of the participants: The atypical MOOC

The reported characteristics for the participants of the MOOC with an atypical terminal efficiency are calculated from the survey that was part of the registration process to the course. Some of the descriptive statistics obtained are: 39.82% are male and 60.18% female; 38 years old is the participant's average age; 65.58% of the participants reside in Mexico and 34.42% outside Mexico. Also, 74.38% of participants have as main professional activity *Teaching / Pedagogical Technical Advisor* and 56.13% work at a *Public School*. Finally, 69.99% of the survey's participants identified themselves that the main reason for participating at the MOOC was the desire to upgrade within the models of strategic educational management. See Figure 4.

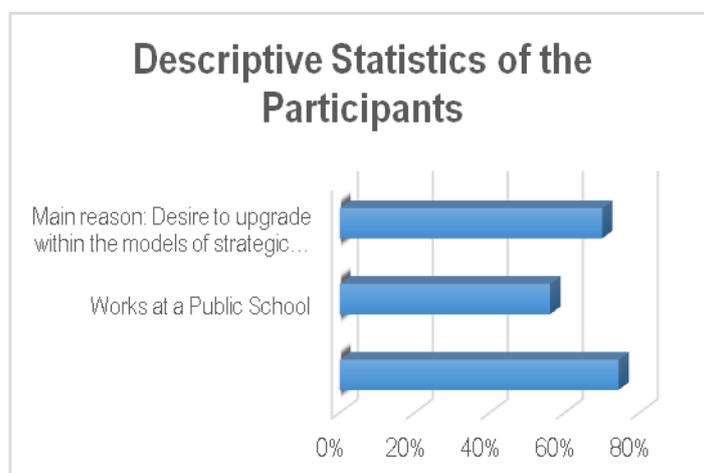


Figure 4. Descriptive statistics of the MOOCs' participants

It is important to note that for the specific case of the atypical course, a 98.04% of respondents in the survey expressed their intention of completing the course; this can be taken as an attitude of commitment since they hoped to receive a good learning experience. That same survey shows that 36.81% of respondents expressed as one of their main expectations to get a certificate of participation at a course taught by the University. This result can be used as an estimate for the institution's market positioning.

Conclusion

The educational platforms have led universities from different countries to adopt the philosophy of sharing knowledge free of charge or at a symbolic cost when a validated certification is expected. The reasons leading to these universities to offer MOOCs are part of positioning strategies, of attracting national and international talent for projects of educational innovation and social commitment, to name a few. However, there must be parameters to evaluate success. In the case of the MOOCs, an example of these parameters is the terminal efficiency rate, statistical employed by one of the leading universities in Latin America, and determined as the percentage of students scoring the declarative of achievement with respect to the maximum total number of registrations.

Within the statistical analysis, the 209,871 participants of the MOOCs offered by the University between January 2013 and summer of 2014 was broken down. The analysis made for the terminal efficiency minimum and maximum rate in relation to the number of participants enrolled at the MOOCs showed that a low terminal efficiency expressed as a percentage is still attractive to the academic authorities in terms of total amount of participants. Descriptive statistics of those who were registered in the course of strategic educational management were reported; among the most noteworthy findings is the terminal efficiency rate of 22.53%, higher than reported by other courses at the same University, or even above the reported in the literature (Jordan, 2014).

Derived from this research, some future research is proposed to further expand the knowledge base of how to increase terminal efficiency in a MOOC. One of the suggested future researches is the statistical validation of the correlation between the initial intention and the terminal efficiency rate. A concern about proving it statistically arises due to the fact that instructors and academic staff were involved during the design and implementation stages on motivational and tracking activities for participants. Resources were allocated to keep updated announcements and to procure a pleasant and enriching collaboration through virtual communities. Also, unlike the proposals of Jordan (2014) and DeBoer et al. (2014), we propose to calculate the terminal efficiency of MOOCs considering only participants classified in the platform as “committed to complete” and “committed to audit”, with the intention of debugging the database of registered participants by eliminating the participants that the educational platform reported as “uncommitted”, this because they have been identified as participants who reviewed a low percentage of the course’s content and also did not carry out the activities assigned.

Thus, we concluded that to evaluate the success of a MOOC, it is necessary to generate learning analytics metrics other than those employed in the evaluation of face-to-face or hybrid courses. We can see that the massive and open online courses have generated great expectations because of their potential to change the relationship between students and teachers, the Academy and community in general. This research presents important points, unlike documented literature, one of the studied MOOCs presented a terminal efficiency higher than the average. With this information we seek to expand the knowledge base of how

to increase terminal efficiency in a MOOC, and in this way have an impact on their quality and contribute to the improvement of education and the offer of MOOCs.

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