Pacing through MOOCs: course design or teaching effect?

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ABSTRACT

Despite the original tenets about openness and participatory characteristics of MOOCs [1], the majority of MOOCs are delivered in a semi-structured asynchronous way bridging the strong structure of traditional courses -signposted by lectures, tutorials/seminars and activities/assignment deadlines- and open courseware in which student are able to select their own learning paths and goals. Looking at the activity of students in three different MOOCs delivered on the Coursera platform, we considered the effects of different course design to observe variations in the way students pace through the courses. The analysis (in progress) suggests that the course design and the mode of teaching strongly influence the way in which students progress and complete the courses. However, more research needs to be done on the individual variations and on the supporting mechanisms which could be put in place to scaffold students' development of their own learning paths and matching their intended goals.

Keywords

MOOCs, learning design, behavioural analysis, learning

1. INTRODUCTION

Following Gartner's hype cycle [2], MOOCs are currently in the 'sliding into the trough' phase, quickly moving into a consolidation stage, which should lead to the establishment of best practices. This is evident also in the research domain, in which MOOCs have taken centre stage in the recent LAK and Learning@scale conferences. Despite the hype of big data in education and the potential associated with the ability to collect and analyse large amount of information about students' learning behaviours, one of the biggest limitation in the field are the lack of systematicity in the creation of MOOCs –perhaps with the exemption of the limitations of the various platforms- and the lack of strong collaborations leading to sharing data across the sector. As mentioned in [3], at most, researcher might have access to a few MOOCs to analyse; this is echoed in the recent call for a special issue of the JLA (Siemens) to open up and describe large datasets in order to enable research. Yet, the biggest limitation in many published works is a full description of the context, i.e. the course design and philosophy behind it -which is the first stage of any data mining process in the industry-standard CRISM-DM model [4].

Even though the philosophies behind the MOOCs movement range from the instructivist (xMOOC, [5]) to the social-constructivist (cMOOC, [6, 7]), a key assumption is that most MOOCs are built as a 'course': normally there is an instructor/facilitator, a set of resources, activities, support and other participants; content can be curated by instructors or shared among participants. As Cormier [8] put it, a MOOC is 'an event' which provides an opportunity for participants 'to connect and collaborate' and to 'engage with the learning process in a structured way'. But, if it is an *event* and it is *structured*, then the way in which *it* is designed is fundamental and the design is what trumps the teacher role and/or presence. From an academic development's perspective, not only the way in which elements and components are selected and structured makes a difference, but also the philosophy of teaching behind how the course should be delivered drive the learners' experiences.

2. DIFFERENT COURSE DESIGN

At our university, a large, public, research-intensive university in Australia, one of the key reasons to enter the MOOC space was to be able to experiment with pedagogical innovation, learn from it and bring it back to mainstream (i.e. what we do on campus). The selection of courses to be delivered is driven by the awareness of a different target audience, disciplines and the ways in which academics imagined the best ways of teaching a course at scale. Here we only refer to the first 3 courses completed: INTSE (Introduction to System Engineering), LTTO (Learning to Teach Online) and P2P (From Particles to Planets -physics) which are broadly characterised in the table below.

Table 1. Overview of courses

	INTSE	LTTO	P2P
Target group	Engineers	Teachers at all levels	High school and teachers
Course length	9 weeks	8 weeks	8 weeks
Total videos	110	224	98
Total quizzes	10	22	42
Assignments	7	3	2
Forums	54 (14 top level)	105 (17 top-level)	63 (15 top-level)
Design mode	All-at-once	All-at-once	Sequential
Delivery mode	All-at-once	Staggered	Staggered
Use of forums	Tangential	Core activity	Support
N in forum	422	1685	293
Tot posts	1361	6361	1399
Tot comments	285	2728	901
Registrants	32705	28558	22466
Active students[1]	60%	63%	47%
Completing[2]	4.2% (0.3% D)	4.4% (2.4 D)	0.7% (0.2%)

1. Active students are those appearing in the log; 2. Completing are those who achieve the pass grade or earn Distinction (D)

At the surface all three course lean toward an instructivist approach in which the content is essential. However, the educational developers supporting the design ensured that each course was characterised by a mix of content, activities, support tools and evaluation. There are some key differences by design: the way in which content is released; the way in which the course is taught; the function of activities and forums. In INTSE and LTTO all content is released at the start all together, however in LTTO the teaching occurred in a staggered way with regular announcements and feedback videos in response to the top voted comments in each week. P2P used a sequential release of content every week with a staggered delivery and interaction. The activities focus on self-test in INTSE and P2P, while in LTTO these had a teaching function structuring personal development and reflection in the forums. Finally forums were not the focus of the course in INTSE, but had an important role in LTTO and as support in P2P.

3. RESULTS

3.1 Patterns of activity

As it can be seen from the charts some patterns are quite evident. For the P2P course (figure 1), which was designed and delivered on a week-on-week basis, the darker diagonal shows that students are following the course in a linear fashion. LTTO (figure 2) shows a tendency to follow activity along the diagonal. However, this pattern is reduced by individuals who jump between sections/components in the same week (earlier in the course rather than later). In the INTSE (figure 3), patterns are a lot more diluted: in the use of content (videos) the stronger patters occur in the first week, last week and in part across the diagonal. The forums don't seem to have a time-based dependency and the quizzes follow the diagonal and are more frequent in the last week of the course, it is evident that the majority of students tend to follow a fairly linear pattern. Further analysis will be required to test the significance of these patterns, but this early visualization clearly suggest that there is an interaction between the design and delivery of the course and that despite the freedom of determining their learning paths, students like the pacing provided by instructors.

3.2 'Ontrackness' and dedication

In their analysis [3] 'on-trackness' is defined as 'the degree to which students cohere with the recommended syllabus'. Similar metrics have been used in learning analytics as signals for possible support/interventions in order to reduce dropout (i.e. attendance, timely submission etc.). In sequential courses this is simple to identify, however when all the material is available at once, this could be less meaningful. Figure 4 shows the patterns in the three courses by mapping the weeks in which a resource is expected to be used (i.e. design) and when it was actually used. Once again the linear pattern around the diagonal for P2P clearly show how participants follow the course week-on-week; in INTSE and LTTO the videos use are more scattered with quite a few participants looking ahead in the course, but this is not reflected in the quizzes/acitivities and the forums As well as the overview of ontrackness, we have started to consider other metrics, which will require further modelling and analysis. *Dedication* is defined as the regularity of engagement. Given a time period T and the distribution of activity during T, dedication d is the ratio of activity and course length. *Assiduity* is a measure of the patterns of activity over time and it is characterised by the skewness and kurtosis of the distribution of activity. Looking into individual distributions of activity and the relations with other measures will provide a better insight on the individual preferences and how these are related to the teaching and course design.

4. CONCLUSION & DIRECTIONS

Bearing in mind the differences in the cohorts of students taking the courses taken into consideration, which leads to a limited ability to draw conclusions, the striking similarities between the patterns of engagement in the different MOOCs suggests that the method of teaching/delivery is a key element in the way students take a MOOC. The structure of the MOOC 'event' has got a strong impact in the way students engage, but more analysis is necessary to determine the level of flexibility afforded.

At the group level it is apparent that student follow the pace of the course as set by the instructors, however many questions remain open about the effectiveness when it comes to achievement levels. In particular, the goals/intents of students might not be to complete the course and therefore the skipping behaviours could be aligned with what they want to achieve and hard to relate to the measure of success of a MOOC. In fact [9] argue that we need to review and reconceptualise what we mean with student success in this space. More analysis, especially at the individual student level will be necessary to extract meaningful insights.

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