Increasing MOOC completion rates through social interactions: a recommendation system

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Hugues LABARTHE, Rémi BACHELET, François BOUCHET & Kalina YACEF

LAMOP, obediences@gmail.com

Ecole Centrale de Lille, remi.bachelet@ec-lille.fr

Sorbonne Universités, UPMC, LIP6, francois.bouchet@lip6.fr

University of Sydney, kalina.yacef@sydney.edu.au

Abstract

E-learning research shows students who interact with their peers are less likely to drop out from a course, but is this applicable to MOOCs? This paper examines MOOC attrition issues and how encouraging social interactions can address them: using data from 4 sessions of the GdP MOOC, a popular Project Management MOOC, we confirm that students displaying a high level of social interaction succeed more than those who don't. We successively explore two approaches fostering social interactions: 1) in MOOC GdP5, we give access to private group forums, testing various group types and sizes, 2) in MOOC GdP6, we implement a recommendation system, suggesting relevant chat contacts using demographic and progression criteria. This papers presents our preliminary findings.

Keywords

MOOC, social interaction, completion rate, attrition, student groups, recommendation system, chat

1 Introduction

Massive Open Online Courses are based on distance learning platforms, therefore improving relationship between students is crucial to offering a better learning experience. Over the last few years, hundreds of thousands of students have contributed to discussions (forum posts, private messages, social networks…). Whether these discussions have a specific educational scope or not, it seems that the more the users are contributing, the better their odds to pass the final exam and get the certification (YANG, WEN & ROSE, 2014). However, stimulating these users' relationships raises several issues, the most general one being: how to improve a user-centered experience and facilitate the users' involvement? This paper paves the way towards a novel approach to intensify social interactions between MOOC students through the use of an embedded recommendation module. We present the preliminary work that led to this module, trying to provide answers to the following questions: 1) what is the impact of social interactions between students? 2) what is the best way to allow students to interact with each other?

We study those questions in the context of the GdP MOOC, a successful French MOOC on project management which has already had 6 sessions over the past 3 years, with over 85,000 unique students registered so far. This paper is organized as follow: in section 2, we present the GdP MOOC and innovations from one session to the next. Section 3 analyzes the impact of social interactions in previous sessions of the GdP MOOC and how it supports our choice of grouping students. In section 4, we present a first approach tested on the 5th session of the GdP MOOC, and how the lessons learned help us design a new approach with a recommendation module. Finally, in section 5 we provide a glimpse of that module and how it is implemented in the 6th session.

2 Context: the GdP MOOC

Both the data analysis and the implementation attempts described in this paper are carried out on the GdP MOOC, a French MOOC on project management (cf. Table 1 : main figures for the sessions). The first session (**GdP1**), the first xMOOC in France, was developed from an existing Open Course Ware website (8 editions, 400 laureates from 2010 to 2012 (BACHELET, 2012a & 2012b)). It was set up with almost no fi-

nancial resources using a personal home studio and run by an open team of volunteers. École Centrale de Lille (ECL) sponsored the project, various free Google services were used and Instructure hosted the course on Canvas, an Open source MOOC platform. Enrollment opened in Jan. 2013, and course started in March, offering 2 tracks: Basic and Advanced. An additional "Team project" track helped in recruiting volunteers for the next sessions. This last team track runs on different platforms, and provides no analytics.

GdP2 (Sept. 2013) added a functional analysis course, lasting one more week. It became possible to earn European University Credits (ECTS) by ECL, by taking a webcam (ProctorU) or an on-site table exam (on AUF campuses in 2 developing countries). French startup Unow provided Canvas technical support from this session on. 200 ECL 1st year engineering students followed the advanced track as part of their curriculum.

GdP3 developed webcam and on-site table exams further and doubled the course content. Students had to choose one amongst 7 specialization modules. This was the fifth week of the MOOC, which now started with a 4 weeks long "Core course" curriculum. A peer evaluation algorithm (BACHELET, ZONGO & BOURELLE, 2015) was used to grade advanced track submissions, thus reducing instructor's workload.

In **GdP4**, 17 partnerships with universities were developed and 1500 students were enrolled thanks to their professors. Self-evaluation was added for advanced track submissions and used in the grading algorithm. Bonus were awarded when peer grading was accurate, based on an automatic assessment. A new version of all Core course videos was shot, most of them closed-captioned for accessibility. With a choice of 2 specialization modules, the MOOC was officially 6 weeks long. In **GdP5**, 3 new specialization modules were available and scholarships were created to help students attend the monitored exam. As for **GdP6**, still in progress, figures provided in Table 1 might evolve.

Table 1: Enrollment and completion across 5 sessions of the GdP MOOC

	GdP2	GdP3	GdP4	GdP5	GdP6
Enrolled	10848	11827	19171	17579	23500
>1 quiz in basic track	5711	5899	8120	4842	7537

>1 deliverable in advanced track	1011	705	1197	725	970

3 Identifying factors to associate students

Based on work such as (YANG, WEN & ROSE, 2014), we assumed social interaction is a strong indicator of involvement in the MOOC and of chances of completing it, which means that encouraging social interactions could be a good way to reduce attrition[1]. To confirm this hypothesis, we analyzed data coming from sessions 2 to 5 of the GdP MOOC. We can observe the typical attrition pattern (a "funnel of participation" (CLOW, 2013)) in each session of the GdP (cf. Figure 1 left). We also notice that while the enrollment is increasing, the attrition rate increased as well, and there is an interesting "September effect" of increased motivation, as students in sessions 3 and 5 (starting in September) tend to drop out less than those in sessions 2 and 4 (starting in March).

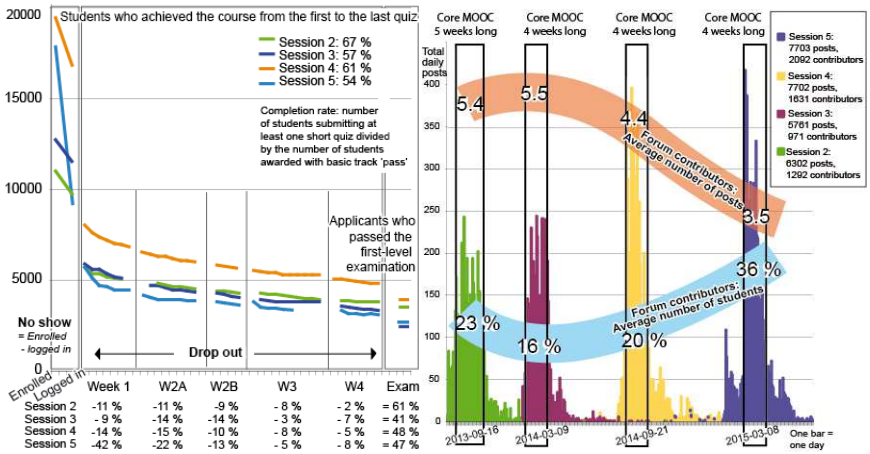

Figure 1: Daily attrition rate (left) and number of posts/students (right) in GdP2 to 5

[1] Of course, not all learners aim for a certification, but it seems difficult to prevent those from dropping out, thus we focus on those who declared wanting to get certified when registering

There appears to be strong social exchanges (cf. Figure 1 right): from GdP2 to 5, with more than 50,000 forum posts and private messages sent by 8,231 of the 61,000 users enrolled (13.5%), but only 3.5% have used both posts and messages. These discussions also take place on social networks, e.g. on the Google+ group associated with the class[2]. A closer look at the nature of these interactions indicates that they have three different functions: socialization, learning reinforcement and sharing of experiences. When comparing those figures across sessions, we see that despite the increasing number of contributors (from the 16% to 36 % who passed the 1st quiz) and the extended period of their activity (core period -/+ 2 weeks), the ratio posts/contributors falls from 5.4 (GdP2) to 3.5 (GdP5). This negative trend seems to be the price to pay for more crowded but untagged discussions. Nonetheless, when analyzing their success, we see that these contributors get up to 35 % more chances to pass the final exam (cf. Figure 2).

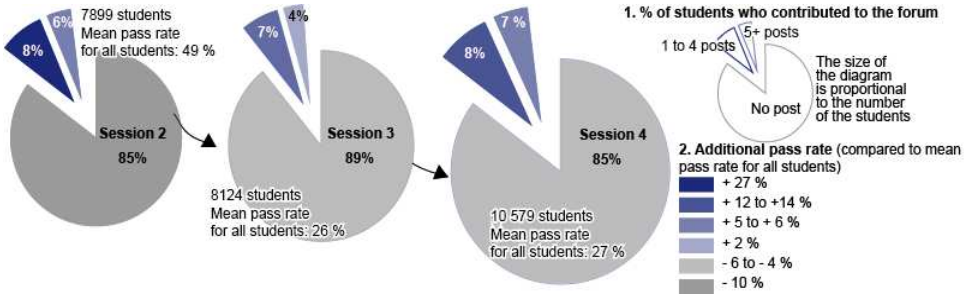

Figure 2: Comparison of forum activity and completion in GdP2 to GdP4

4 Attempts to increase social interactions

4.1 Students groups in GdP5

In parallel with the analyses from the previous section, in the 5th session of the GdP MOOC we tried associating students in small groups. In Canvas, groups provide private discussion pages (forums), wiki pages, and a list of group members with a link to

[2] https://plus.google.com/communities/106082830821352352460

their profiles. A discussion thread visible by everyone explained how to access the groups in and allowed participants to report technical issues. Moreover, 2 threads were created in the private discussion pages: the first one, available from day 1, to encourage group members to introduce themselves and explain their motivations, and a second one, in the last week, to collect a feedback on the feature and students' use of the groups.

In this experiment, we created 34 groups: 4 groups of 50 participants, 10 groups of 10 participants and 20 groups of 4 participants (380 participants overall). 5 criteria were considered: country of origin, study level, age, family status, and previous experience with MOOCs (not only the GdP MOOC - even if we know some previous students return (BOUCHET & BACHELET, 2015)). Those criteria came from an initial research questionnaire filled by the majority of participants. We tried to select a subsample of students as representative as possible from the diversity of students registered. Students could not apply to take part in the experiment, nor refuse to be in a group.

In groups of 4 and 10 students, no more than one person posted a message (or two) in the group discussion. In large groups, up to 9 persons posted in one– but only one person posted more than one message, meaning no real interaction happened. Although the data was underwhelming, lessons could be learned that guided us to change our approach:

1. **visibility of the teammates:** persons recommended to interact with should be very visible and not only accessible through a dedicated page otherwise soon ignored.

2. **visibility of the contacts:** it should be clearly visible when one is being contacted, as even students who tried to interact didn't seem to come back after their initial post.

3. **need for a large sample size:** a larger proportion of the MOOC participants should be included to be able to measure the impact on attendance and/or completion.

4. **need for a large number of recommended contacts:** even in large groups, activity was very low. Making more contact suggestions could give a chance to students willing to interact to find other students also interested. Although the quality of the social interactions is critical, as we cannot guarantee people in a group will be responsive, giving the freedom to contact many peers is the best way to enable high quality interactions.

5. **individualizing interactions:** as private discussion pages looked like the general ones, the interface was easy to understand, but students failed to perceive their additional value, particularly in large groups (no difference in talking to 50 or 1000 students). Therefore we recommend instead letting students form small groups on their own.

4.2 Recommendation and chat modules in GdP6

Previous results and interviews with the pedagogical staff led us to change our approach and to design and implement on Canvas: 1) a recommendation system, 2) a chat module allowing direct interaction with recommended students (cf. Figure 4).

The **recommendation widget** is displayed on the navigation bar on the left side of the screen in a space normally empty. It displays 3 lists: a list of suggested contacts in green, a list of contacts marked as favorite in orange and a list of ignored contacts in grey (A). In each list, other students are represented as a thumbnail showing their name and photo (if any). When bringing the mouse pointer over a thumbnail, it also displays the beginning of their biography (if any) as well as 4 icons: one to send a private message, one to contact them through the chat, one to add them as a favorite and one to ignore them (B). The **chat widget** is shown on the bottom right-hand corner of the interface and minimized by default (C). When a message is received, an icon is added and a sound played (D). Bringing the mouse pointer over the widget expands it, giving access to two tabs: in the first tab (E), the favorite contacts appear and a chat can be initiated with up to 6 of them at the same time. The second tab gives access to a list of previous chats, and one can reopen them to keep interacting with the student(s) associated to that chat (F).

Figure 4: the recommendation and chat widgets in GdP6

Recommendations were provided using data from the research questionnaire (as in the GdP5 experiment) and progress information (in terms of number of quizzes replied to). We used lessons learned from the GdP5 experiment in the following design decisions:

1. **visibility of the teammates:** the location of the recommendation widget allows it to be visible on all the pages one visits: it is thus easy to reach out to others at any moment.
2. **visibility of the contacts:** once a person has been added as a favorite, they are easily accessible through a tab in the chat, and incoming messages are notified through both sound and a blinking icon on the chat interface, which is itself always visible.
3. **need for a large sample size:** over 8000 participants are taking part in the experiment - an increase of one order of magnitude compared to the GdP5 experiment.
4. **need for a large number of recommended contacts:** each student is provided with a set of 100 recommended contacts - of which the 20 first ones are always visible.
5. **individualizing interactions:** through the chat that one can use with one or several contacts, we provide more freedom to students to decide who they want to interact with.

5 Conclusion

Finding both (a) the right combination of factors to use to suggest students other students to contact, and (b) the right way to make them interact with each other, require experimenting various strategies. However we believe stimulating interactions between students is a key to keep students involved in a MOOC and improve the experience for those who enjoy interactions with others. The preliminary results from GdP6 indicate that interactions between students are happening. In the future, we envision using those approaches for a homework as a way to promote their use, as the few messages collected in the GdP5 experiment revealed that the lack of understanding by students of what they could do with those tools was the main reason why they did not use them.

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