Improving MOOCs' Perseverance and Completion Rates Using Best Practice Design Principles.

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Abstract

The high dropout rates remain a key argument of many critics of the MOOC (massive open online courses). A range of 5 to 10% is often mentioned in the scientific literature as the percentage of participants who complete a MOOC.

The experience at TÉLUQ for Ulibre's MOOCs has shown excellent performance in term of "persistence / perseverance" of the participants, which were about three times better than the average rates of other MOOC providers with over 33% of certification.

Ulibre's high commitment, great participation to the discussion forums and high certification rates are not due to chance, but are at least in part the result of a set of best practices and simple design rules that we have shared in this paper.

1. Introduction

The problems of dropping-out and low completion rates are well known in distance education. In a distance learning university such as TÉLUQ, we see student retention difficulties in our way, although at higher retention levels on average than in MOOCs.

Indeed, the central problem of MOOCs, from their origin and even today, remains one of dropping-out and lack of perseverance. Although many argue that completion rates are not the best way to judge MOOCs [Ho & al, 2015], the high dropout rates remain a key argument of many critics of the MOOC general approach in scientific literarure and popular press.

According to a recent study by the edX Consortium [Ho et al, 2015], 17% of registered participants performed half of the course, and only 8% received a completion certificate. Moreover, the results vary depending on the domain. For computer and science MOOCs only 7% of students receive a certificate. But the rate is higher for humanities (14%) or social sciences (11%). A range of 5 to 10% is often mentioned in the scientific literature as the percentage of registered participants who complete a MOOC [Daniel, 2012].

That said, we will share the experience at TÉLUQ for Ulibre's MOOCs. Particularly to discuss the excellent performance of our MOOC courses in term of commitment of the participants, which were about three times better than the average rates of other MOOCs.

We do not believe this to be due to chance, but rather that we benefited from early experiences, good and bad, of the first creators of MOOC that helped us apply a set of best practices and simple design rules.

We do not either claim to have found the solution to all MOOC dropout problems. Our goal here is to share our experience and provide some quantified observations that might prove usefull to other MOOC designers.

2. MOOC, the essentials characteristics

But before we go any further, we need to define the essentials of MOOC: massive open online courses. Massive is definitely the main characteristic, without a massive number of participants, a MOOC becomes simply an open online course (OOC), so nothing very new.

By their massive aspects MOOCs have the merit to allow interesting statistical processing of users' data, which is a big advantage over traditional "small audience" online courses.

But how massive a MOOC should be to be called a MOOC? In our view, the criterion should be that there is enough data collected from users in order to perform valid statistical analysis. Without going into detail, there should be several thousands of participants considering the usual dropout rates. This shows the importance to get dropout rates down.

The invisible part of MOOCs is the massive collection of data on the behavior of students. The MOOCs platforms are recording every participant's click, answer or comments. We are talking about big data and the results will be used to improve the next generation of MOOCs using learning analytics [Koller, 2012]. We recognize here a common practice of Web 2.0 « the Google like process » of exploiting the data of its millions of users to improve the results of its search engine. Here, user data is a goldmine.

The secondary characteristics of any good MOOC are threefold: First, free access can have dramatic effects to increase the number of participants and the quantity of users' data. Free access also means flexibility which is probably the greatest asset of online courses. So, anyone, at anytime and anywhere in the world can have access to the courses, insofar as he or she has a device connected to the Internet with a browser and enough bandwidth. A second important characteristics of MOOCs is the rich and frequent interactivity. Finally, the ease of usage and the ease of learning favored by the abundant use of video contents.

3. How to explain MOOC's Low Retention Rates

There are several explanations for the low retention rates of the MOOC's until now.

First, it takes only a few clicks to be registered for a course on a MOOC platform. Therefore, the MOOCs attract a large number of lurkers and many enroll in courses for which they do not have the prerequisites. We should understand that many participants enroll in out of curiosity. Moreover, many people that enroll in a MOOC never return to it (no-show). In the literature, one often mentions the figure of 50% [Jordan, 2014] for these no-show enrolled people. Probably, a lot of them realized that they lack the time required to take a course.

Another reason is that some participants do not want to complete a program or a course. They are looking for a limited number of new knowledge and do not necessarily seek accreditation. Some prospects "shop" their MOOC. There are also auditors who simply browse courses without doing the quizzes or the assessments [Reich, 2014].

Some researchers have suggested that many participants classed as dropouts are still participating in the course in their own way [Onah, Sinclair & Boyatt, 2014]. Other researchers proposed to calculate MOOC completion rates as the percentage of participants who enrolled in a MOOC with the intention to get a certificate of completion [Reich, 2014].

Quite contrary, the fact that the vast majority of MOOCs does not award either diploma nor academic credit may explain in part the lack of commitment for many participants. By the way, verified MOOCs where participants paid a fee to verify their identity (but still do not earn academic credit) have shown more commitments from their participants. So, in mean 35 % of verified participants have received certificate of completion [Leong Son, 2015] but these participants represents less than 2% of all enrolled participants [Ho et al, 2015].

In addition, the large number of participants in a MOOC forbid individual pedagogical support monitoring by tutors, so there is almost no assistance to less motivated or less autonomous ones.

4. The Ulibre's experience

At the end of 2013, the TÉLUQ MOOC's pilot project was launched. It was to become the Ulibre portal in fall 2014, launching its first two courses based on the open source software platform Open edX [OPEN EDX, 2016].

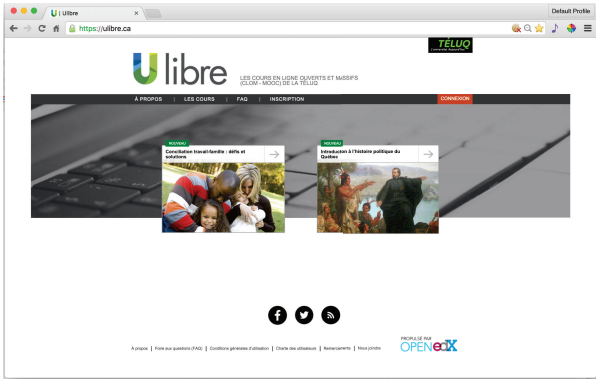

Figure 1 - The Ulibre Web portal with its two first MOOCs

Like any design process, it is always a question of decision making. These decisions are based on the desired goals and one of those goals was to foster the perseverance of the participants, particularly in view of the poor performance of MOOCs in this area [Jordan, 2014].

Based on the emerging body of literature on MOOCs, best practices reports and the professionnal experience of the project team in online teaching (TÉLUQ is the distance university of Québec since 1972), we designed the pedagogical scenarios of our MOOCs, realized a large number of instructional videos, and created learning assessment online materials.

5. Methodology - The Ulibre's design guidelines for MOOCs

5.1 Topic of the course

The first criterion to be considered is the topic of the course itself.

Basically, there are two kinds of MOOCs courses: the introductory courses which are accessible to a wide audience and the highly specialized courses that rely on the wide dissemination of the Web to create a sufficient cohort of interested students.

For our first experience with MOOC, we have choosen the formula which in our view would have the greatest public interest. Furthermore, we wanted to test our capacity to retain participants and increase their completion rate. We have therefore opted for courses not too specialized to remain interesting for a large audience, distributed on all continents in the francophone international community.

We finally opted for a general public course on the Québec's history (Introduction à l'histoire politique du Québec) abreviated IHPQ and a more professional oriented course in human resources management about work-family balance (Conciliation travail-famille) abreviated CTF. Furthermore, this choice would allow us to compare the two different customer bases of these courses.

5.2 Choice of the teacher

We determined that the teacher should be available, good communicator, comfortable in front of camera and all the material had to be available upon a free creative common license.

We believe that the communications skills of the teachers are important, maybe critical to the MOOCs success. However, more investigation should be done.

5.3 Duration and student's workload

At the outset, a criterion that seemed to us very important was the duration of the course. Several studies about experience have shown that the dropout rates were increasing with the duration of a MOOC [Jordan, 2014], [Mock & Vazquez-Cognet, 2014], [Haber, 2013]. Kathy Jordan reported a negative correlation that reflects the

fact that a lower proportion of participants have completed courses of longer duration [Jordan, 2014].

The results of experiments in the field show that beyond a month, the dropout rate increases sharply because of the lag between the commitment required on the part of learners and their limited availability and lack of time [Jordan, 2014], [Mock & Vázquez-Cognet, 2014]. To improve persistence, it seems best to create two four-weeks MOOCs rather than a single eight-weeks MOOC.

There were also advantages in terms of costs and development efforts for a short MOOC. We finally opted for duration 5 to 6 weeks.

Another important criterion, is the student's workload. Since, MOOCs mainly attract graduates and lifelong learners with full time job and family, students workload should be setup for their active lives and their lack of time [Leong Son, 2015]. Ulibre is not an exception with 63% CTF and 57% IHPQ of university graduates and between 60% and 78% of active workers.

Thus, we have fixed the workload to be about two hours a week. That said, the courses also contain a large range of optional readings and an extensive webography which can make motivated participants work for many hours.

This brings us to a decision between session based courses (scheduled) or self-paced (always available) courses that are more flexible. Although it's still debated, the session-based course appeared most likely to lead a greater commitment from the participants. Accordingly, the two MOOCs have been divided into weeks, 5 and 6 weeks respectively.

Finally, we gave an additional two weeks at the end to allow latecomers to complete the course.

5.4 Completion certificate

It has been established that even weak form of recognition, like completion certificates can improve commitment [Leong Son, 2015].

The participants who complete the assessment activities with a mark of 60% or more receive a certificate of completion. It is noteworthy that participation in assessment questions is not required for the courses, but it is required for obtaining a certificate of completion.

Moreover, successful participants to the CTF MOOC can potentially earn continuing education credits awarded by the CRHA (Ordre des conseillers en ressources humaines agréés), a professionnal association.

5.5 Pedagogy

The pedagogical bases of MOOC are active learning (learning by doing), fine granularity for teaching activities, interactivity with participants and mastery learning [WIKIPEDIA, 2016], [Glance, Forsey & Riley, 2013]. MOOC's are mostly focused on behaviourist methods of teaching and transmissive pedagogy.

MOOC's platforms are trying to put emphasis on interactivity rather than serving as a digital resource management system like the majority of traditional learning management platform (LMS) [Kauffman & Kauffman, 2015].

MOOCs also offer a bit of social learning in the form of discussion forums.

In a nutshell, nothing very innovative, other than, perhaps the MOOC's emphasis on interactivity and the finer granularity of the activities.

That said, we think that the ultimate promise of the MOOCs will emerge from the learning analytics which can be used to personalize teaching for each student [Norvig, 2013]. The term refers to educational platforms that can adapt themselves to each learner and propose optimal training route. This is called data driven pedagogy.

5.5.1 Category of MOOC

A first design decision was the choice of the category of MOOC, either an xMOOC or a cMOOC according to the nomenclature proposed by Stephen Downes and published on the blog of George Siemens [Siemens, 2012].

Recall that cMOOC (with c for connectivist) has a student-centered pedagogy favoring the generation and sharing of knowledge among participants without an omnipotent teacher and proper assessment if not self-evaluation and peer review. We tend to see the cMOOC more like a community of practice than a classical class.

On the other hand, the so-called xMOOC or knowledge transfer MOOC (with the "x" in reference to exponential describing the massive participation or maybe the word eXtension) follows a more traditional transmissive pedagogy.

For this first experience with MOOC, we opted for a more traditional xMOOC approache, which also represents the vast majority of existing MOOCs.

5.5.2 Rich interactive experience - video and interactivity

We made the choice of video as the main support for content.

It has long been established that text-based instruction is perceived more difficult and demanding more efforts than video-based instruction. There is also a significant difference in motivation between the two [Choi & Johnson, 2005].

The lack of attention and the typical multitasking behavior of digital natives require that we chopped up long lecture, favoring short clips, also a common practice. Therefore, we sought to limit the length of videoclips[Guo, 2013], [Schaffhauser, 2015].

Then, we have also attached importance to reducing the granularity of activities. We have focused on numerous videoclips interspersed with exercises. This choice promotes immediate active practice from the participants

and adapts better to the participants' availability and ability to concentrate.

In this regard, the MOOCs provided by Udacity are exemplary. Often at the forefront of MOOC's technology and business model, Udacity's course content is chopped into small segments of 1 to 4 minutes with often a lot of interactivity [UDACITY, 2016]. This format is a lot more digestible that the one hour and half long filmed courses of the OpenCourseWare (OCW) initiative in the late 1990s.

That said, we need to focus on more interactivity with participants. We must avoid the passive viewing of videos even if they are short durations.

Indeed, for some time we known that "traditional lecture mode" does not work as well as an "interactive engagement mode" [Hake, 1998]. A recent study confirms that active learning increases student performance in science, engineering and mathematics [Freeman et al, 2014].

In many ways short videoclips accompanied by exercises automatically evaluated to check the understanding of students, that is an active learning strategy, represent a significant improvement over many courses currently taught in classrooms where a three hours long lecture provoke students to half-listen, surf the Web, tweet, write SMS or chat on their smartphones.

Over and all, the Ulibre's team opted for a small number of activities combining short videoclips, multiple-choice questions (MCQ), self-corrected essays at the end of each module, additional readings and participation in forums.

5.5.3 Evaluation

Given the massive nature of MOOCs, the only types of evaluation that can be performed « automatically » are rather superficial. The learning assessments in a MOOC are mainly achieved by online tests (multiple-choice questions or MCQ) automatically graded but also by auto-grading or peer assessment where each participant rate the other participants.

The difficulty of activities and assessments is increased gradually during time in order to promote commitment, avoid discouragement, and favor the Foot-in-the-door (FITD) technique. Essentially, FITD or social compliance procedure states that the more someone goes along with small commitments, the more likely she feels willing to continue with larger commitments [Burger, 1999].

Another design decision was to exclude the use of the peer review, which despite its proven pedagogical qualities was likely to increase the dropout rates as reported by experience feedbacks [Jordan, 2014], [Onah, Sinclair & Boyatt, 2014].

5.5.5 Participants' support - initiation, discussion forums and newsletters

The support to participants is one of the weakest parts of any MOOC.

Like many other MOOCs, we decided to start the courses with a first week module called "Course presentation and platform overview". This short module includes: an overview of the course, a guided tour of the technical platform (in our case the student module of Open edX), a small quiz that can serve as appetizer or pre-test to assess the participant's initial knowledge, a survey to establish the participant profile, a first discussion forum ("Hi there!") where the student is invited to introduce herself / himself and a small section called "To succeed, organize your time!".

Since the large number of participants, individual human pedagogical support is not practical in free MOOCs. Unlike in commercial MOOCs, in free MOOCs, the participant has not the possibility to pay for individualized support by a human tutor. Support will generally be transferred to the community via the discussion forums.

The discussion forums are integral parts of the MOOCs' platforms. They are places of interaction and exchange essential in this type of course although, as a rule, the participation to forums is not assessed. Discussion forums are also where participants are invited to comment on the course, to ask questions about the quiz or technical issues.

The forum "Hi there!" where participants were asked to introduce themselves seems important to help with the meet-and-greet, melting the ice and create interaction between the participants. Futhermore, as social media show everyday, people are quite willing to talk about themselves. That said, our previous experiences have shown that a discussion forum without any management is going in all directions, often aimlessly. So we opted for a discussion forum moderated by a community manager or facilitator.

In order to keep the contact alive with participants, we have also added the sending of a weekly newsletter. In this email, the facilitator announces the contents of the new module and looks back on the main events of the previous module. Futhermore, these emails are added to the "News & events" section of the MOOC.

This weekly email lets you share information with participants to try to make them want to be involved in the forums. This is also the way to answer general questions raised by several participants. This weekly reminder by email has a steering function to discover new content and stimulates perseverance. Writing newsletters is a animation activity which can affect a greater number of participants than the animation of the discussion forums as such. It is therefore essential to bring them great care.

To counter the dropping out, we must allow each participant to know where he is in his learning. In this regard, it may be interesting to know that the Open edX platform provides a dashboard that helps the participant to know is progress.

6. Results

We now look at the results obtained by Ulibre on the perseverance and certification of participants.

Firstly, we have to define "active learners". In the case of Ulibre, active learners designate participants who have answered most of the introductory survey, but not necessarily completed this survey of twenty-six questions.

We believe that the active learner definition we used is more demanding, than in many other studies where active learners are simply "coming back" participants, in contrast with the "no-show" who never return to the course after their initial enrollment [Ho et al, 2015].

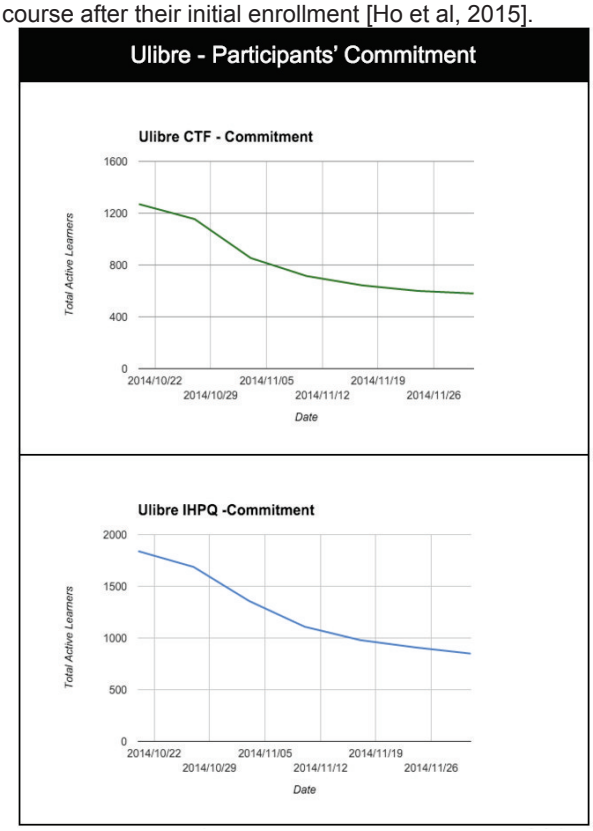

Figure 2 - Evolution of participants commitment in the two MOOCs

Consider the MOOCs' participation curve (figure-2) throughout the life of the two courses. We notice a characteristic S-curve (sigmoid), reflecting a slow drop at the beginning and then accelerated stall until an inflection point after the 2nd week, then we see a gradual slowdown in the dropout rate until the end of course

MOOCs' Participants Commitment	Ulibre CTF	Ulibre IHPQ	[Jordan , 2014]	[Ho et al, 2015]
% Active Learners	54 %	65 %	54 %	53 %
% Active Learners Certification	33 %	35 %	9.8 %	9 %
% Enrolled Participants Certification	18 %	23 %	6.5 %	5 %

Table 1 - Persistence rates in Ulibre compared to the literature average

Nonetheless, for Ulibre we count about 60% of active learners (CTF 54%, IHPQ 65%). This is an excellent result when you look at the literature which reports only 30% of active learners these days (70% of non-active or no-show) [Hill, 2013]. Thus, Ulibre lies clearly at the top of the range for the participation of learners in its both MOOCs, CTF and IHPQ.

Even more important, both Ulibre's MOOCs show respectively certification rates of 18% (CTF) and 23% (IHPQ) for enrolled participants since these rates are reported on the number of enrollments. That means more than 33% for certification rates, if we rather consider the "active learners".

We have to compare these numbers against 6.5% and 5% respectively for enrolled participants and 9.8% and 9% for "active learners" in two recent studies [Ho et al, 2015] and [Jordan, 2014].

Another interesting measurement is the participation to the discussion forums. Once again, Ulibre's MOOCs distinguishe themselves with a participation rate of 51% for active learners (or 28% of enrolled participants) with an average of 2,4 comments by author for CTF's MOOC. The rates are 45% of active learners (29% of enrolled) with a same average of 2,4 comments by author for the IHPQ's MOOC. A statistic found in the literature reveals as fewer than 10% of all students enrolles posted in discussion forums [Zhang, 2013].

7. Discussion

Ulibre's high commitment and certification rates are not due to chance, but are the result of a set of best practices and simple design rules that we have shared in this article.

For example, a major constraint is the « lack of time » of the typical participants to a MOOC. In order to solve this problem many simple design rules may apply: limit the MOOC's duration to about one month, ask for a manageable workload, use primarily video content, reduce the granularity of activities, give an additional two weeks for latecomers.

Other design rules in order to improve motivation and involvement in work are: apply the foot-in-the-door technique, favor short videoclips, put emphasis on interactivity and active practice, give immediate feedback, offer certificate of completion, favor the participation in discussions forum using the "Hi there!" forum's trick, moderate the forum, send a weekly email.

That said, there could be some bias. One possible bias would be that these MOOCs were particularly easy to complete. We do not believe that to be the case, at least not compared to MOOCs in similar fields. For instance, 20% of the MOOCs assessments where open questions that required participants to write short texts which are not considered particularly appealing by participants.

The proposed MOOC's design was a pretty important change for TÉLUQ where traditional courses make little use of video content, the text being privileged. In TÉLUQ's usual online courses there is almost no interactive tests automatically graded or peer reviewed. All the corrections being made by human tutors in general. From the experience of verified MOOCs one can conclude that even a small financial commitment can raise MOOC's certification rates to over 50% [Ho & al,

2015]. That appears to be an easy and convenient way to improve commitment. Should payment become mandatory?

The answer is most likely to be no. Indeed, such a policy can substantially reduce the number of enrollments and the amount of users data. Moreover, mandatory fees are contrary to the openess spirit at the origin of the MOOCs' concept. Finally, we can argue that payment means a stronger commitment and the participants who have made that commitment are more likely to persevere and get certified.

8. Conclusion

We have shown that MOOC designers can improve the commitment and completion rates of MOOC's participants by using best practices and simple design guidelines.

Current MOOCs, including Ulibre's MOOCs are confined in the transmission of knowledge and neglect the much needed shift towards competencies. We think that competency-based learning will be a catalyst for change in the economic model of higher education.

Leaders show the way. Recent MOOCs from Udacity introduce competency-based learning with concept maps, along with project-based learning approach using digital portfolios [UDACITY, 2016].

In future work, we propose to explore competency-based learning and the gamification of the learning experience in order to increase the commitment of the participants.

Very much in the spirit of data driven pedagogy, another promising avenue will be the tracking of participants behaviour and participation to predict future dropout [Kloft & al, 2014]. The effective prediction of dropout allows the possibility of intervention automatically or by a human tutor.

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