Video and Course Content Discussion on Massive Open Online Courses: An Exploratory Research

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Abstract - This paper deals with the ways in which Massive Open Online Courses (MOOC) participants use course related forums and the contribution of those forums to the learning experience of their virtual students. We focused on the comparison between, on one hand, video content provided by the course organizers and on the other hand, the content provided by user discussions in the forums. Our methodology frame is based on natural sociological inquiry. Video Lectures, as well as the most active forum threads and their posts were collected during a 6 weeks long xMOOC that took place in fall 2013 on a well-known MOOC platform. Content analysis was performed and the study concludes that the forum included a very high level of interactions involving mostly course related exchange of information amongst students, placing this course at the intersection between a constructivist MOOC (cMOOC) and a classical information transmission based MOOC (xMOOC).

Index Terms – forum, Learning Experience, learners' behaviour, MOOC, mMOOC.

INTRODUCTION

Massive Open Online Courses (MOOCs) allow huge numbers of students to participate in distance learning whenever, wherever and as intensively as they wish. The first MOOC was launched in Canada, in the province of Manitoba in September 2008 [1]. Since then, the number of MOOCs has grown substantially and experts now distinguish two types of MOOCs: cMOOCs that are based on connectivist approaches [2] and xMOOCs relying on classic information transmission [3]. The number of xMOOCs has recently soared, with the creation of platforms such as Coursera, Udacity or EDx, where the world's most renowned universities offer courses in areas as diverse as programming languages, business, science or arts. If cMOOCs have been somewhat researched [1, 4, 5], there is a lack of literature dealing with xMOOCs.

The problems that are often associated with online learning, are the limited quantity of resources and materials supporting the learning experience and the lack of interaction with instructors [6, 7]. These shortcomings can be compensated by the opportunities offered by forums within the MOOCs' environment. These kinds of tools might fit perfectly with today's learners who demonstrate a much greater level of autonomy and self-organization than the traditional offline students [8]. Some researchers observe a phenomenon of emergent learning which can be defined as "learning which arises out of the interaction between a number of people and resources, in which the learners organize and determine both the process and to some extent their learning objectives, both of which are unpredictable" [9]. This learning could emerge thanks to forums which provide interesting patterns of interaction, where students engage with the course material and with each other [7].

This paper focuses on the forum of one specific MOOC course, to study and analyse its content in order to better understand the patterns of interactions among learners and with instructors. We want to examine what forums bring to an xMOOC course and what outcomes they provide. The first part of the paper is dedicated to a literature review about MOOCs and forum use. Then the methodology is explained before proceeding to the results.

LITERATURE REVIEW

MOOCs are defined as large-scale online courses [6]. MOOC "integrates the connectivity of social networking,

the facilitation of an acknowledged expert in a field of study, and a collection of freely accessible online resources [10].

I. cMOOCs and xMOOCs

MOOCs have been categorized either as cMOOCs or as xMOOCs. xMOOCs are based on behaviourist type of pedagogy and on the transmission of information [3, 11]. xMOOCs, like the AI-Stanford (Stanford Artificial Intelligence Laboratory), show a more individualistic approach to learning [12]. This is the model chosen by the elite US institutions [13]. By contrast, cMOOCs are grounded on the interactions among learners and are considered as based on connectivism [2] where social meaning is created by learners' engagement and participations [6]. cMOOCs provide students with the possibility to get a sense of feeling treated as individual, as they are mainly supported by some "form of discussion, encouragement, and an understanding of an individual student's needs" [11]. However, for some researchers, this distinction is not so clear and there is still a gap in the literature in defining the types of MOOCs [14].

II. Forums' dynamics

Online class participation and collaborative learning are decisive to student success and satisfaction [15]. Interactions among peers, rather than interactions with instructors, are linked to higher satisfaction, more high-level knowledge discussions and a potential stronger sense of community [16]. Research indicates that the more students demonstrate positive sentiments about the instructors, the teaching material and the assignments, the more likely they will be to successfully complete the course. But when these results are examined in more details, the positive sentiments appear to have a smaller positive effect on the probability of completing the course than on the probability of the student "partially" completing the course [17]. These contrasting results by Adamopoulos [17] could not be explained in a satisfactory way, but the same research also revealed that the difficulty of the course, and its duration in weeks had a negative effect on student retention. Other studies showed that not participating to forums leads to worse performance, and even to failure, however participation in forums does not necessarily lead to an improved performance [18, 19]. Another study showed that the more activities students do, the more likely they will be to complete the class. However, this increased probability of completion flattens quickly. On average, 70% of the students who go through all the activities are likely to pass the course. On a total of 110 activities in one class and 130 in another one, skipping only 10 activities decreases the probability rate of completing the class by 25 points [20].

Therefore, the online interaction of students is seen as a key indicator of their learning outcomes. Social interaction is based on the ability for people to project their personalities into the group and to develop a sense of community [21], defined as feelings of connectedness among participants and as commonality of learning expectations and goals [22]. Research showed that the main reason for why students respond to posts was to help other participants [23].

Seeing that others struggle as well, helping each other throughout the learning experience and sharing successes are powerful motivators. In a survey assessing the forum activity of one class, which included 8244 threads and more than 65,000 posts and comments, 71% of the 4429 respondents found that their peers' evaluations and comments were helpful (vs 1% who found them unhelpful). These forums were especially active around class deadlines [7]. However, a significant number of the learners seem to interact with the class only after it ends [24].

A study revealed that the top 5 contributors of a forum were accountable for 43% of posts, while on another forum, the top 5 contributors were the authors of 21% of the posts [23].

III. Forum content

The variety of posts reflects the diversity of the students' body. Threads cover very different topics such as course content, questions and their answers, and organizational issues [24]. But this huge diversity may cause some trouble for participants. The number of threads can become overwhelming and generate a feeling of loss for participants who feel less confident to voice their opinions [25]. Therefore, there should be a trade-off between having enough participants for an active forum and having too much participation that makes participants feel overwhelmed [22]. Large volumes of data generated in forums make it difficult and challenging to be up-to-date with the content [14].

Student participation may increase when the discussions are not led by instructors [26, 27]. Results seem to be conflicting between studies showing that more peer interactions generate higher academic performance [28, 29] and others concluding the opposite: students with high grades tend to read less of the forum contents, than those with lower grades [24]. The same study also showed that students who handed-in the lowest number of assignments used the forum to find study partners and used non-English words. These findings suggest that forums would be more effective if they included mechanisms to help students form study groups and that this would help make courses more accessible for non-native English speakers [24].

IV. Forum activity and drop-out rate

MOOCs experience very high drop-out rates of about 90% on average [30, 31], with the highest completion rate observed at 19.2% [32]. Previous studies indicated that the activity in forums drops considerably as the course progresses [33]. One study, for instance, found that 75% of

the students dropped out within the first 3-week units' period: before the half of the course. In the same study, it was observed that the decrease of the forum activity occurred at the same rate regardless of whether participants dropped out or not, which means that the rate of participation decreased at the same pace for those who completed the course as for those who did not. It also revealed that there seems to be no relationship between the number of active threads and the percentage of course completion [20].

A study found out that the main reasons for high drop-out rates were time issues (for 68.9% of the sample). Other significant reasons that were mentioned covered mainly the lack of attractiveness and suitability [34].

One might conclude that there are two categories of learners, those who complete courses and those who drop-out. However, research identified five types of engagement: (1) learners who mainly watch lectures, handing-in few assignments (2) people who primarily hand-in assignments, viewing few lectures (3) those who balance the watching of lectures with the handing-in of assignments (4) learners who primarily download lectures, handing-in few assignments (5) and lastly those who show a very low activity. Ninety percent of the learners who balance their activities are forum readers, indicating that a vast majority of the most engaged students are on the forum [24].

Finally, the analysis of forum content indicates that drop-out rates would be minimized if online courses were moderately difficult, did not require a heavy workload and were spread over less than eight weeks [17].

METHODOLOGY

I. Natural Inquiry field

Our methodology approach is based on natural sociological inquiry [35]. The first ethnographic methods used for social network analysis have been discussed by Stenger and Coutant [36].

MOOCs are not limited to pure "text" data. In our study, we had to deal at the same time with videos and forums' content. We therefore had to adopt a natural inquiry field approach with a mix of written and visual data.

This paper can be categorized as participant focused as it studies aspects related to the learners participating in MOOCs [14]. We focused on the perception of forum members in order to better understand the learners' experience with MOOCs.

Our natural inquiry field approach can be considered as "non-influencing" on the social virtual "classroom" space. We chose to analyse a 6 weeks course taught on a well-known MOOC platform in fall 2013. One of the authors, interested in the subject, attended this class, but she did not attempt to influence, in any way, the natural processes of the forum, nor did she ask any question or post related to our research. She participated as a usual learner. This study can therefore still be considered as non-participant ethnographic observation [37].

Analysing a natural inquiry field within a social virtual space without informing the participants or the authors of the course might pose an ethical dilemma. We therefore decided to collect the data only after the course ended. It was a way to ensure the respect of the social dynamics among participants.

II. Method

Ethnographic methods have been adapted for the online world and social networks. The "Netnography" method, which is an adaptation of ethnography to study online communities [38,39], was applied for data collection and analysis. As mentioned, one researcher was an active participant and experienced this course as a typical learner. This provided the opportunity to experience and analyse the forum content in relationship with the content and structure of the course, as usual learners may experience them when watching the lectures, handing-in the assignments and posting on the course forum.

III. Data Collection Process

56 video lectures as well as 9303 forum threads including 1 to 752 posts with a total of 24'874 posts were collected, after the 6-week long course offered in fall 2013 on the well-known MOOC platform.

To make it easier for participants to navigate throughout the forum, course instructors had divided threads into 5 categories: "General Discussion", "Lecture Discussion", "Weekly Assignments", "Course Material Errors" and "Technical Issues". Table 1 gives an overview of the number of threads in each category.

TABLE 1. OVERVIEW OF THE QUANTITY OF DATA

| Unit | Discussion Forum | | | | |
	General Discussion	Lecture Discuss-ion	Weekly Assign-ments	Course Material Errors	Tech-nical Issues
pages	14	7	353	1	2
threads	335	81	8825	12	50

We decided to focus on the most active threads. In order to select them, we had to decide whether our selection criteria would be the highest frequency of tags, of posts or of views. Tags are chosen by the author of a thread and can be enriched by any other participant. They are placed at thread level and relate to themes covered. Posts indicate the number of interactions within a thread. Finally, views count how many times participants read the content. As we wanted to focus on the activity from the participants' side, we chose as a selection criteria the number of views as a post with a high number of views impacts more participants than a post with a low number of views. Through our course experience, we observed that some threads got very few posts but a lot of views. We assumed

that some individuals read content information when they found it relevant or interesting even if they did not post anything in response.

As a threshold for our data collection, we decide to set at least 20 views to select a thread (except for the assignment category which was far more active, and where we set the threshold at 100 views) Finally, we collected a database of more than 1500 A4 pages, written in 8-point size font, including also some pictures and graphs. It included 1409 threads out of the 9303 threads of the original data, representing 15.1% of the total. As explained, these threads can be considered as the most active of the forum. It is important to note that this subset of the complete forum content was used for content analysis. For the information not related to the content analysis, we used the complete dataset from the forum website, regardless of the number of views, as we considered that the thread activity was not relevant for these specific analyses.

IV. Analysing Procedure and Validation

The content of the forum was analysed and counted using an open source text analysis software, named "Tropes v8.4 English" [40]. This program counted the frequency of words in the file made of all the collected posts, it was also used to count themes, by regrouping words into semantic equivalents. These findings were compared with the on-going observations made by the "learner" participant and with the videos and reading content of the course. We finally conducted a cross-member validation to ensure a higher reliability of our findings.

RESULTS

I Forum interaction and type of MOOC

There were 9303 threads created for the entire course, corresponding to 24'874 posts. From these, 10 threads were created by assistants or instructors, most of them coming from the teaching assistant and only one of the two main instructors contributing to the forum. This represents only 0.11% of all threads. Teaching assistants or instructors created 507 posts, which represent only 2.04% of all posts. There were mentions from students such as: "it does feel the students are leading the course, not the staff". This clearly shows that, beyond the lectures and assignment, which correspond to what falls under the definition of xMOOCs (information passed, in the classic form, from instructor team to learners [3]), most of what happened in forums would falls more under the definition of cMOOCs format (exchange of information amongst participants based on connectivist approaches [2]). We therefore state that MOOCs such as this one, where there are lectures given by instructors and teaching assistants, with a high level of forum usage, can neither be classified as cMOOCs nor as xMOOCs, as they are more of a "mixed MOOCs" type. We recommend calling them "mMOOCs" that we will define as: "Massive Open Online Courses, which include a mix of formal lectures, of a transmission of information in the classic form, and of connectivist exchanges amongst course participants, with limited course staff intervention". We will even refine our definition by specifying that by "limited course staff intervention", we mean "when less than 10% of all posts are due to staff". Figure 1 below shows the configuration of what we called "mMOOC" compared to that of an xMOOC and of a cMOOC.

FIGURE 1: CONFIGURATION OF mMOOCs COMPARED TO cMOOCs AND xMOOCs
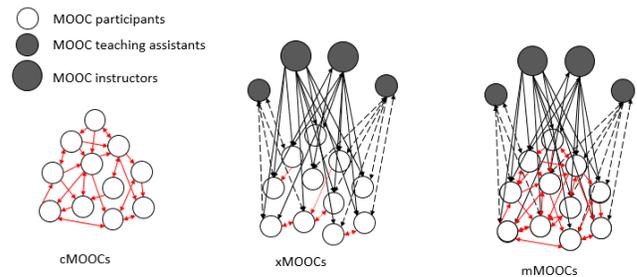
Looking at the top posters (see table 2, below), we noted that the top 10 posters contributed altogether 1911 posts, corresponding to 7.7% of all posts, and the top 100 posters contributed 17.3% of all posts. This enables us to say that this was a balanced MOOC where, although there were some top contributors posting much more than the other participants, these only posted a limited proportion of all posts, leaving a lot of room for other participants to express themselves. Our findings show for example a far lower level of concentration on the top contributors than the study of Coetzee *et al.* [23].

TABLE 2: TOTAL NUMBER OF POSTS FOR THE TOP 10 CONTRIBUTING PARTICIPANTS

Poster rank	# of posts/ Comments	Poster rank	# of posts/ Comments
1	701	6	123
2	542	7	52
3	154	8	31
4	101	9	50
5	119	10	38

II. Completion rate

Regarding course participation, the organizers stated that there were "37'000 registered participants", explaining that there were "9'000 active forum participants and the rest lurking and being in the course in other ways". However, there were no other mention of numbers that could help us verify if participants' behaviour to this MOOC was comparable to what was stated in literature, namely that there is a very high attrition rate of about 90%

[30], 19.2% being the highest completion rate observed [32]. Conveniently, in this MOOC, most of the assignments (except for the assignment of week 4) required participants to post their results either directly by inserting them in the forum, or in the form of a url, on the course forum. By looking at the number of assignments posted every week, we were able to follow the evolution of the number of people still actively participating in the course. These numbers have been graphed on figure 2 (week 4 has been omitted as it showed a sharp drop, but the assignment did not have to be posted on the forum and therefore, week four's numbers were assumed to not be representative of the number of assignments actually handed in).

Based on the information that there were 37,000 participants registered to this MOOC, we were able to calculate the completion rate of this MOOC by week (figure 3) and conclude that the final completion rate was 1.31%, which is much lower than the average 10% cited by Rayyan et al [30].

FIGURE 2: NUMBER OF ASSIGNMENTS OFFICIALLY HANDED IN BY COURSE WEEK

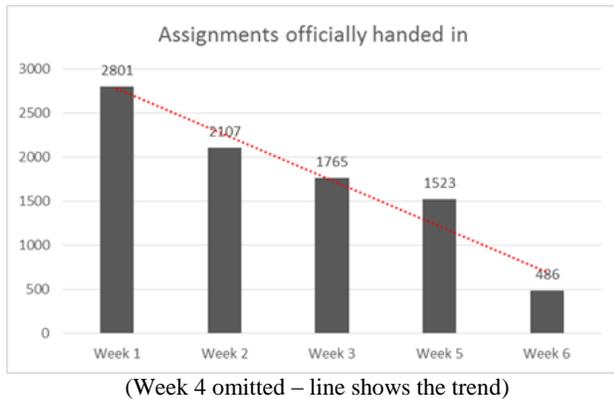(Week 4 omitted – line shows the trend)

Figure 3 shows a steady decline between weeks 1 and 5, but a sharp drop of the completion rate from 4.12% to 1.31% between week 5 and week 6. It is surprising to note the number of participants who seriously completed all their assignments between weeks 1 and 5, to suddenly give up at week 6, when there was only 1 assignment left for participants to receive their completion certificate. We can hypothesize three possible explanations: 1) participants were not at all interested in a completion certificate and therefore, the cost of dropping out was low to them, 2) the last assignment was too difficult to complete, either because of technical issues, or because of knowledge issues and 3) participants tend to complete assignment when they find them interesting, and don't complete them when they are not interested in them.

FIGURE 3: COMPLETION RATE OF COURSE BY COURSE WEEK.

(Week 4 omitted)
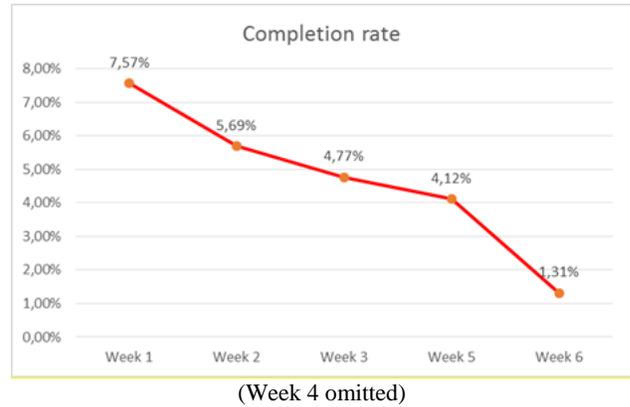
III. Engagement

Lastly, course statistics show 3,367 participants posting, which is around 9% of the registered people. Each poster contributed on average 7.4 posts. Yet, in reality, taking out the top 100 posters and their posts, each poster not among the top 100 contributed 6.3 posts. This clearly shows that there was a very different level of engagement among the participants: 2 participants contributing almost 5% of all posts, with 621.5 posts each on average, 4 participants contributing almost 2% of all posts, with 125.25 posts each on average, 94 participants contributing an additional 10.3% of all posts, with 27.31 posts each on average, the teaching team contributing 2% of the posts, the remaining 3'297 posters contributing altogether 80.6% of the posts, with 6.3 posts each on average.

IV. Content analysis

The word category that was far most used (4,919 times) is "game" which sounds normal as it is the subject of the class. Learners were exchanging tips about games and discussing their experiences in gaming. We can add to this the 1,413 times that the category of words related to "learning" was discussed, as well as the 1,197 times where the "course" category and 743 where the "video" category were used. Learning and course are also the main focus of the course. Counted as a single word, "learning" was the most used (1,308 times). Discussions about learning covered the participants' learning experience and the ways to improve learning with the methods presented in class or other tools. For instance, opinions like "*the more individualized and self-paced learning can be, all the better to keep learners motivated*" were exchanged. This means that most of the discussion taking place in the forum was really focused on the content of the course.

Participants also posted about their learning experience (the word "experience" was used 491 times) and learning outcome were considered, for instance, as "fun", "great", "different", "new", "interesting", but also "hard" and "difficult". Participants felt that the class presented challenges (186 occurrences). Some attributed the

challenges to the very nature of the MOOC ("*some posts hardly got any replies*" or "*motivation can wane if learners do not see personal meaning and relevance*"). Discussions on the subject involved also the role of the teachers (word used 317 times).

Then people mostly talked about time related issues (2,378 times). Some timing references were used to position events in a timeline. But more interestingly, other references were applied to constraints and time pressures. For instance, "*Do you have any thought about where to start?*" or "*The amount of time they have to spend on learning is limited.*" Or "*I was unable to catch up until these weeks*".

V. Discussions on assignments

The assignments were a big part of their concerns (cited 852 times). Participants discussed the relevance and the added-value of the assignments. For instance, assignment 3 was evaluated as "*quite vague with little integration with other course activity*" or assignment 1 was "*really good because it induced us to think more about the components of a game that helps us to learn about the game.*"

Lectures (203) were also evaluated by forum participants. They were assessed as "inspiring", "interesting", "not focused" or "providing no example", for instance.

Some learners were complaining about assignments because they felt that they were designed more towards research needs of the instructors than towards enhancing their learning abilities. They started to mistrust the course and their staff as they were feeling like lab rats devoted to obscure experimentation goals. Course instructors reacted to these criticisms at week 5, by explaining, in one of the videos, how each assignment from the previous weeks, related to the lectures of the weeks.

The forum allowed the learners to exchange their feelings and potential solutions to some problems (309 occurrences) which were observed. Problems concerned mainly the class, the assignments and games. In particular, the voting system and the "down vote" feature were highly debated (117 times). "*Forums are made to be participatory and cooperative*" and "*receiving down votes could be discouraging*". Again, the course instructors immediately addressed this concern by taking out the down voting option.

VI. Language issues

Another problem was also highly discussed: the language (269 times) and the mastery of English skills (169) (for instance, "sorry for my English".) Also, in this category, the ways to learn another language is included. The participants solved these language issues by themselves by, on the one hand, starting to post threads in other languages, such as Spanish, for example, thus *de facto* excluding the teaching team from the interactions, but on the other hand, by creating Facebook groups not only in

English, but also in other language such as Spanish or Portuguese. Scandinavians also created their own Facebook group.

VII. Exchange of ideas and collaborative dynamics

Learners discussed the ideas exchanged in the forum and about their opinion on that (668 times). One participant, for instance, stated: "*I like the idea of playing the music faster if you are in danger.*" Or "*what a great idea for a lesson!*" and "*interesting thoughts about 'thinking like a criminal'!*" The opportunities associated with this forum or advice concerning other forums were quite frequently discussed (569 times). Participants posted links to redirect their classmates toward other forums or to other threads of the course's forum. They commented the opportunity of participating in terms such as "*it is easy to get lost and overwhelmed with forums when becoming quite busy*" or "*you have been an amazing resource in this forum!*" People even felt emotionally involved in the forum. They "wanted to send a goodbye before the forum locked up" and they thanked specific participants by citing their name.

We could deduce the collaborative dynamics from the number of thanks (819) which was relatively high. Learners thanked the other participants for their comments (211), their feedback, their sharing of ideas or advice. They offered help or asked for help (215 times). They were also grateful for the teaching material or the additional information provided (249 links or 212 books' references were recommended or discussed) or of suggestions about new games that were provided by their classmates. YouTube is the most mentioned destination for recommended links (262 times). People used the forum to ask and answer questions (309 occurrences) from other participants. There were also debates around discussions (302 times) put forward by some of their classmates. "It has given extensive rich" and even "fascinating discussions". Participants "felt 'part of' (207 occurrences) a community of people who love games" or "part of the class", although they seemed to be thinking more in terms of group (216 times) than in terms of community (136 occurrences).

VIII. Top contributors

Amongst the top contributors, the first six were extremely heavily involved in the forum, individually posting between 123 and 701 posts or comments over the entire duration of the course. They all live in an English mother tongue country: 2 in Australia, 3 in the US and 1 in English speaking Canada. 4 of them were in teaching or training development professions, 1 was a researcher and the last one was a retired engineer. They seemed to see their contribution for different purposes: the top poster clearly saw himself as a substitute for the teaching team, addressing each of his posts to a specific participant in a nominative way, responding to questions, encouraging or

congratulating his class mates. His importance was acknowledged by other participants: "*this class would not have been the same without him*". The other top poster were mostly clearly looking to make the most of this course, seeing their participation in forums as the best way to do so and clearly stating that "*this forum is a wonderful place for us to pursue individual extensions of our own interests and learning*". Along the course, posters and even more so top posters, developed a real relationship, talking to one another on a one to one basis, congratulating each other. During the last week, top poster 2 wrote to top poster 1: "It is lonely without you there :)". They even sometimes exchanged email addresses to continue their conversations out of the forum space. For example, top poster 2 exchanged email addresses with top posters 1, 4 and 9.

DISCUSSION OF RESULTS AND CONCLUSIONS

This research shows us clearly that what was, *à priori,* defined as xMOOC, built on the traditional information transmission format, is in reality a mix between an xMOOC and a cMOOC; which is built on more constructivist theories. This is even truer when one looks at the content analysis of the posts, as most of the discussions evolved around the content of the course and really represent an added-value to the lecture format of the course. Moreover, the top contributors accounted for a lower percentage of the total of posts than previous research. Thus, we have proposed naming this type of MOOC a "mMOOC", which we defined as "including a mix of formal lectures, passing information in the classic form, and of connectivist exchanges amongst course participants, with less than 10% of all posts being due to course staff". We have also proposed in figure 1 a representation of how a mMOOC compares to cMOOCs and to xMOOCs.

Furthermore, we can conclude that in such a mMOOC, forums give quite a good feel of what is shown in the videos as well as on the participants assessment on both the course content as well as on the assignments and on the quality of the videos. Consequently, it is important for course instructors to monitor the forums in real time, as this allows them to either correct any misunderstanding arisen from the lectures, or to correct any potential conceptual mistake, which happened in this MOOC when the down voting system was taken out, or when the instructors better explained how assignments fitted with the course content.

We also found out that the completion rate of this MOOC seemed surprisingly low (1.31%) compared to numbers stated in the literature [30, 32]. This result is even more disappointing, given that the analysis of forum content indicated a high sense of community and connectedness amongst participants. This is contradictory with previous research by Garrison *et al.* [21] and Rovai [22]. Yet, it would be interesting to complete this study by

capturing, through a questionnaire, the connectedness and sense of community perceived by the students.

For future research, we think that it would be relevant to extent these kinds of analysis to more examples of MOOCs in order to verify the validity of our findings. Studying new examples of MOOCs should allow some comparisons in order to find out the key success factors in managing MOOCs effectively. It would also permit to verify the dynamics of MOOCs in order to test the suggested categorization, with three types of MOOCs: cMOOCs, xMOOCs and mMOOCs.

Finally, in our content analysis, and with the word counting methodology we used, it was sometimes difficult to make a clear distinction when learners were speaking about learning in a sense of their experience with the course or in terms of education issues, as it was the topic of the class. For future research, it would be wiser to use a course on a topic which has no relationship with the education sector.

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