



Exploring New Ways to Increase Engagement in Full-Path MOOC Programs

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Abstract. This work presents an innovative framework with the aim to elicit engagement and motivation from learners on massive open online learning environments. Specifically the idea is to propitiate a learning ecosystem for a strong academic motivation and engagement. The proposed framework relies on the importance of creating engaging experiences before, during and after the finish of a course to increase learners' participation and reduce drop-out rates. This work presents a compelling idea in the universe of Massive Open Online Courses (MOOCs) and it is particularly relevant within full-path MOOC programs, where the perseverance and consistency from the student is quite important to finish a series of courses. The proposal intends to expand the efforts of the learning design team to achieve pre and post-course engagement, where engagement take the form of an ongoing community of learners, high value content and personalized follow-up. This work presents the first experience with interesting results. Authors are starting to identify positive experiences and it is hope that in the future more programs will start opening some of their contents as an open community outside the MOOC to create a long-lasting sense of belonging from the learners and new ways of promoting the courses to potential learners.

Keywords: Interaction analysis · MOOCs · Engagement · Learning ecosystem

1 Introduction

At present it is common to read about a group of Massive Open Online Courses (MOOC) that provide special competences to the student, as an example it is possible to identify the Nanodegrees (Udacity), Specializations (Coursera) or MicroMasters, XSeries or Professional Certificates (edX) [1]. Moreover, it is interesting to know about groundbreaking ideas that propose unbundling higher education through the use individual MOOC courses as components of a degree [2, 3], or suggestions to a self-defined career paths based on a series of courses from top-class higher education institutions and the required competences for a specific job position [4]. All of these programs, considered as an evolution of the MOOC movement, have something similar: A group of courses with a common subject. It is unavoidable to think about the high dropout rates from a single MOOC course and how it will spread and get worse with a series of four or five courses [5, 6]. Based on this scenario, it is necessary to

think in new ways to elicit engagement from the students and at the same time try to promote the programs to potential learners interested in a common topic.

In this sense, several educational institutions are exploring into different ways to make effective use of the huge volumes of data generated by Virtual Learning Management systems and MOOC platforms. The objective of the use of the data is to improve the performance of the students, provide better personalized experiences, reduce drop-out and increase engagement. Research groups are making use of the Educational Data Mining (EDM) field of study. The EDM, an interdisciplinary approach, uses statistics, data processing, machine-learning, information retrieval techniques and recommender systems methods to improve the teaching-learning experiences [7]. Different works in literature present experiences using the Educational Data Mining (EDM) for strategies like: detection of usage patterns, classify participant learning styles, to recommend the best courses combination, to group students with similar performance, among others [8, 9].

In terms of engagement, authors in [10–12] explore on the inclusion of cooperation activities in a hybrid pedagogical approach to MOOCs, taking into account the current limitations of MOOCs and the different reasons that trigger a potential drop-out. Moreover, there are interesting studies in literature [13, 14] about the use of learning analytics to identify the high drop-out and low approval rates from learners. In terms of learner engagement, Kuh et al. [15] defined the term as a two-fold condition. The first one is depicted by the amount of effort and time learners put into their self-study and learning activities. The second condition of learner engagement is identified on how the teaching institution deploys its resources and organizes the learning activities in order to induce learners to participate in the proposed activities. The efforts from the institution lead to the experiences and desired outcomes from the learner such as satisfaction, persistence, learning, and finally, course completion and certification. Both conditions represent study fields based on the data analysis, and are based on the context and progress of each learner.

In this sense, this work presents the experiences using the Full Engagement Educational Framework (FEEF) [16, 17]. The presented example in this work is based on a common theme: “the Development of Android Applications”. In this sense, it has been identified that the learner has an eager interest in the topic, which is the first level of engagement, then it is possible to identify the engagement on the course itself, this is related to the tasks, contents, and learning activities within the learning environment. This work presents the first successful experience results from the “MicroMasters” specialization in the edX platform titled: “Professional Android Developer”. For this, the work is organized as follows: Sect. 2 presents a literature review and related work. Then, Sect. 3 describes the identified FEEF framework, following with results and findings in Sect. 4. Finally, in Sect. 5 conclusions are presented with a lookout for future work.

2 Related Work

The creation of virtual communities around a common topic, but especially in the context of e-Learning, is a well explored topic in literature [18, 19]. In this sense, the work by Barab [20] clearly identifies that there is an evident gap between a real community of learners and a group of individuals learning collaboratively, enrolled in a common virtual space but without a genuinely sense of belonging. Overall, the learning experiences have been improved through the creation of a community of learners. Moreover, according to Hlavac [21] social communities can be classified into either Passion or Trigger Event Communities. In a Passion Community, people join because it addresses things that speak to their deep needs and ideals. In seeking community, they look to engage and interact with like-minded individuals, as well as hearing new information around this topic on the other hand Trigger Event Communities are related to specific events like the life of parents with kids or a specific holiday in the year. In this sense in order to create real engagement it is necessary to involve participants in real Passion Communities. This concept is particularly important in MOOCs because in general, a good amount of the participants of MOOC courses are professionals that are looking to update their knowledge and improve their career with specialized content.

In terms of engaging experiences, the work by Malthouse and Peck [22], highlights that the most engaging experiences in media content that can be applied to a learning scenario are related to prepare content that fulfills and fits into the learners' lives.

Finally, In terms of online frameworks related to MOOCs, it is possible to find in literature interesting proposals for frameworks intended for educators to describe and design MOOC courses with a provided format [23], to improve the learning outcomes in MOOCs based on a methodological approach with different learning strategies [24], and a framework to take into account accessibility issues in the different phases of a virtual learning project [25, 26]. Moreover, there is a need to have a framework that encompasses the different actions that need to be taken to maintain and increase the engagement from the learner in MOOCs while at the same time provide tools to help measuring, collecting, analyzing and reporting of data about the learners and their contexts in order to perform specific actions to enhance the learners' engagement.

3 Framework Description

The aim of the Full Engagement Educational Framework (FEEF) depicted in [16, 17] is to provide a complete learning experience that will last before, during and especially after a MOOC course is finished. This framework is composed of different strategies to identify specific target audiences in order to create engaging experiences through valuable and interesting content based. Moreover, the main idea of the framework is to classify learners in the following groups: Potential Learner, New Learner, Low-Activity Learner and Active Learner and then move the learners to the next group, increasing the participation and providing personalized follow-up with a strong use of learning analytics. The different strategies are planned to increase learners' activity and create a long-lasting relationship through high content value and a sense of belonging in an active community.

The identified Full Engagement Educational Framework (FEEF) [16, 17] is composed by the following relevant components:

- An online community with open forums to discuss MOOCs topics and specific topics not tied to the MOOCs contents
- Production of edutainment content to create engaging experiences
- A blog to publish the high value content produced to targeted audiences
- Distribution of content to enrolled learners
- Distribution of at least 20% of the MOOC content as open tutorials
- Social media channels for content distribution to increase the reach to targeted audience beyond enrolled learners
- A strong component of Machine Learning based on Learning Analytics in order to scale the solution and provide personalized messages for each learner.
- Specific segmentation of the different types of enrolled learners with the aim of providing targeted communication to take them to the next level of engagement and course participation.

Figure 1 presents the process followed using the framework to move learners from the main categories: (Potential Learner, Low Activity Learner and Active Learner).

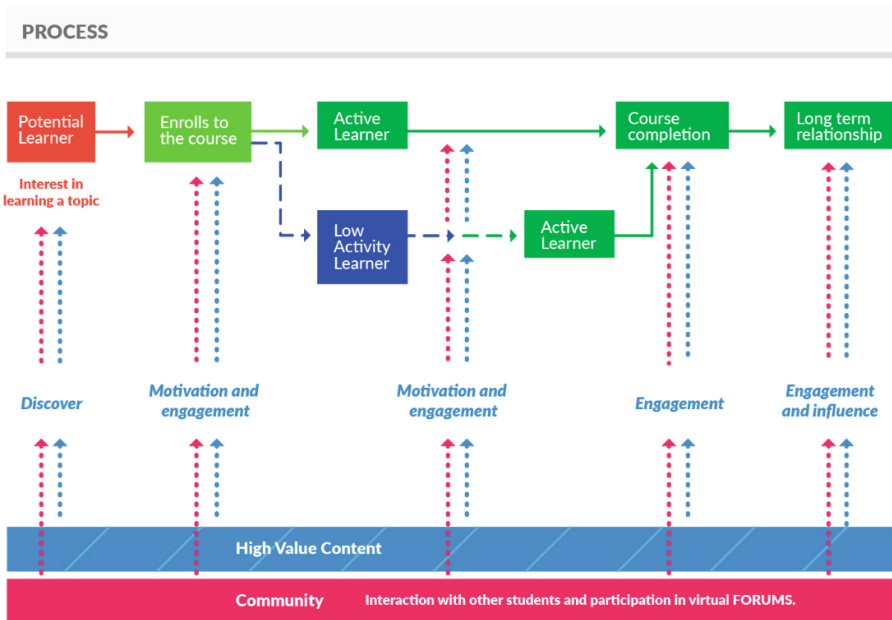


Fig. 1. Process to move learners using the FEEF

In order to identify each of the phases of the learner life-cycle (pre-MOOC, MOOC, post-MOOC), two use cases of a participant enrolled in a course are presented.

The first use case is related to a self-pace enrollment course. In this kind of courses the learner is able to start the course at the beginning of any new week. This particular case presents the potential drawback that the students are enrolled in different weeks, and have different progress within the course path, in this sense it is difficult and inefficient to the instructor to send global reminders unless the learners of a specific week are grouped. Taking into account the first use case, it is possible to identify that in the pre-MOOC phase, the waiting time for the learner to start the course is minimal. In this sense, it is important to mention and consider as part of the pre-MOOC phase the high amount of learners that enroll on a course and actually never log-in to start the learning experience. The second phase of the participation cycle is the learning experience within the MOOC, this phase involves the specific duration of the course and the different activities planned by the teaching staff. The post-MOOC phase begins after the end of the course, in the case of a full-path MOOC course, the organizers are interested in the persistence from the learner and will be crystallized if the learner continues to the next course and finally finish all the scheduled courses.

The second use case is defined with a group of MOOC courses with a previously defined starting and ending date. In this sense, the courses have fixed dates and all the learners will try to complete the course at the same pace. For this use case it is possible to identify that in the pre-MOOC phase, the learner could be enrolled to the course several weeks before the beginning of the learning experience. During this waiting time several scenarios can happen, including a loss of interest from the learner in the course topics or the emergence of new time-consuming tasks that will hinder the participation of the learner in the course, leading to a potential drop-out. The MOOC and post-MOOC phases are similar to the first case, with the goal to motivate the learners to complete each of the courses that are part of the full-path program.

In both use cases, there is a Potential Learner group, these learners are exposed to the open content available through online communities with a common topic. The goal of the different strategies is to motivate a Potential Learner to actually enroll and start the course. Then, the learner will be classified based on the amount of activity performed within the course, the learner will be moved to the “Active Learner” or the “Low Activity Learner” groups (see Fig. 1). With the help of personalized notifications inside and outside the virtual learning environments, the learner is encouraged to enjoy the content provided in each learning unit. At the same time, an automatic and personalized follow-up is envisaged with the use of machine learning techniques. Finally, when the learners complete and approve a course the efforts are focused to the enrollment in the next course in the path, creating a long-lasting relationship.

4 Experience Description and Findings

The experiences presented in this work were prepared by Galileo University within the edX platform with the MicroMasters specialization titled “Professional Android Developer”. This specialization has the following five courses:

- Java Fundamentals for Android Development
- Android App Development for Beginners

- Professional Android App Development
- Monetize your Android Applications
- Android Developer Capstone Project: Building a Successful Android App.

The first experience running this full-path MOOC program was performed using the first use case depicted in Sect. 3, this experience was defined as a self-paced modality and reached more than 30,000 enrolled participants within one year making use of the FEEF approach [16, 17]. Following the first experience, a second installment was planned using the second use case approach described in Sect. 3. In this second experience, the courses were offered online with fixed cohorts with specific begin and end dates in order to test the FEEF with the most used scenarios to run MOOCs.

Following the FEEF process, an engaging community for the aforementioned specialization was prepared. The name of the communities is: Android Developers. The community, part of the full engagement educational framework as an open blog component, was prepared following the seven principles proposed by Wenger et al. [27]:

1. The communities are designed for evolution with dynamic and updated content.
2. Facilities for an open dialogue between inside and outside perspectives.
3. Participation is encouraged at all levels, from starters to professionals.
4. The interaction was developed with public and private community spaces.
5. The communities have a focus on value.
6. There is a combination of familiarity and excitement.
7. The communities have a rhythm related to the publication of contents and interaction.

The discussion forums are the heart of the community, thus all questions and answers are done through the community. The communities provide blogs, high quality content and videos related to the topic of the courses. It is important to mention that the community resides outside of the MOOC platform, but is fully integrated with it through cross-references, short videos from the MOOC published as open content and interesting content useful for every person interested in the topic, even if it is not part of the courses.

For this experiences, specific engaging actions were identified for each of the three phases of the learner life-cycle: pre-MOOC, MOOC and post-MOOC. The proposed engaging experiences are intended to take the participants from a very low interest in pursuing the course at a specific time, to an increased level of engagement that will enable the learner to gain real interest in the topic and invest more time to learn in the near future.

Related to the pre-MOOC and MOOC phases, the teaching staff prepared engaging and informative content to periodically send notifications (internal using the platform notification areas, and external using e-mail messages) to keep the learners interested and informed even if they enrolled in the course several weeks before the start of the course.

It is important to mention some of the main results achieved using the FEEF Framework approach [17]. In this sense, Fig. 2 presents a country based distribution from participants in the open community blog of the MicroMasters on Android

Development (<http://androiddeveloper.galileo.edu>). It presents a monthly average of 13,000 visitors, with an average session duration of more than three minutes, an equivalent of reading at least two posts in each visit. In practical terms, it is possible to identify that there are learners enrolled in one of the courses that are still visiting the blog contents. Moreover, it is high probable that new visitors exposed to the content and invited to visit the MicroMasters home page will enroll to one of the courses. Figure 3, presents the top channels of distribution and a daily session average of 500 visits, the most important channel is represented by the interaction from social networks.



Fig. 2. Data Analytics for MicroMasters on android development, distribution of participants in blog based on country of origin

Specifically, using the PTAT (People Taking About This) metric, which represents the number of unique people that created a story about a page or on a page via different actions as the following: Like to page, Like to post, content sharing; Mentions, tags, event registration; Comments on the wall, retweets, answer to a poll. For the particular case of the Android blog, the monthly average PTAT is 10,000. Reaching an average of 50,000 viewers per week, and with peaks of over 200,000 viewers per week.

The experiences performed making use of the FEEF approach provided as a result a 20% of participants in the Active Learners group. Furthermore, the percentage of New Learners transitioning to Active Learners is 49%. The results from New Learners that became Low Activity Learners are the 51% of the participants. Overall, it is possible to affirm that 40% of enrolled learners keep engaged with the Android topic independently of their level of progress in the MOOCs.

The Full Engagement Educational Framework [16] has proven to create long-lasting engaging experiences, moving learners from being inactive to low activity and then to higher activity learners within the MOOC.

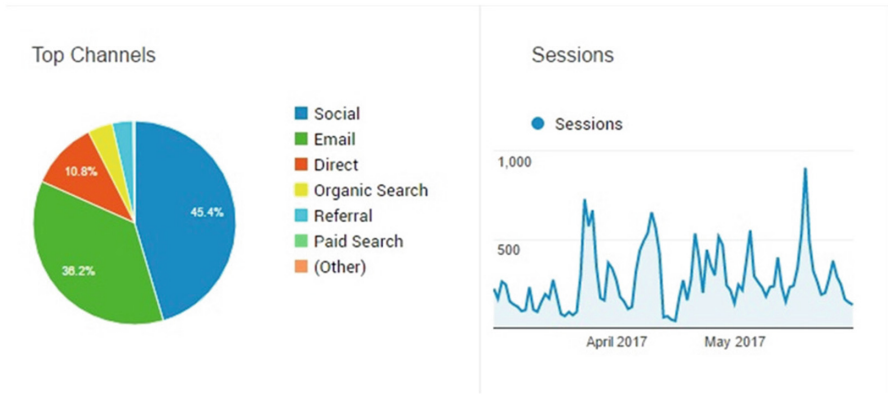


Fig. 3. Data Analytics for MicroMasters on android development, top channels of distribution and daily session average of 500 visits.

Additionally, it is important to mention that an important fact is that the community is fully open, and will remain open after the end of the course so the learners are able to browse through it without login, and also is possible to participate into it without being member of a MOOC in order to create a live and growing community to enhance the post-MOOC phase. Actually, for the common configuration of MOOCs, the discussion forums represent an internal learning activity, but the proposed suggestion to MOOC platforms is to provide open access to general topic discussion forums to all participants, so that the content and contribution will not be lost at the end of the course. The common case is that, even the enrolled learners are not able to review the discussion forums once the expiration date of the courses has passed. In this sense it is advisable to provide an open space to involve learners, potential and future learners, and the public in general to make use of the interesting discussions and questions resolutions of topics of general interest. At the same time, internal forums to discuss particular aspects of the course and methodology should be taken into account.

5 Conclusions and Future Work

Nowadays the MOOC movement brings together thousands of learners around a common topic for a short period of time. However, for fixed-time cohorts, the learner's experience may last several weeks since the enrollment, creating a long waiting time that could be enhanced by creating engaging experiences. On the other hand, for self-paced MOOC courses, the learners are starting the learning experience every day, and they could feel alone or without attention if they do not get the appropriate follow-up.

In the particular case of the aforementioned MicroMasters, the first editions were performed as a self-paced course, but now the courses are having fixed starting dates, with small timeouts in order to have cohesive groups. In the particular case of

specializations with more than three courses, it is convenient to define a specific deadline in comparison of a self-pace modality.

This work presents a thought-provoking work to evolve the MOOC conception to a wider scope through the use of engaging experiences with the help of an external community and the use of a Full Engagement Educational Framework (FEEF) in the context of virtual learning but especially for MOOCs. The FEEF is based on the use of communities of learners, active interaction and high value content to motivate the learners to start, finish and approve a MOOC course, while at the same time giving the learner the opportunity to be part of a strong and long-lasting community. Authors are starting to identify positive experiences and it is hope that in the future more programs will start opening some of their contents as an open community outside the MOOC to create a long-lasting sense of belonging from the learners and new ways of promoting the courses to potential learners. The future work envisages the inclusion of a strong component based on machine learning using successful experiences results in order to provide automation with personalized follow-up messages to learners.

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