

Article

A Virtual Social Learner Community—Constitutive Element of MOOCs

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Abstract: Massive Open Online Courses (MOOCs) have seen enormous growth throughout the last four years. This format has fundamentally enriched the traditional method of web-based teaching and e-learning. Nevertheless, there have always been skeptical voices who announce the “death of MOOCs”. We do not believe in this pessimistic scenario and in this article we will explain how we came to this conclusion. E-learning already existed long before the arrival of the first MOOC. However, e-learning has often shown itself to be merely a source of downloadable learning material, leaving the learner alone in the learning phase. To get through an e-learning program and to actually finish it requires a high level of discipline and motivation. In this way, e-learning has proven itself as a learning method mainly with autodidacts. How have MOOCs changed the landscape of e-learning offers? The evolving MOOC format now combines interactive elements with short video lectures. This is done in a new and playful way with a strong focus on community building. The secret of MOOCs lies in their open accessibility and their incorporation of learning content with social media. The goal of this paper is to describe how MOOCs enforce e-learning activity in a virtual social community—whose importance for learning cannot be over-emphasized. We point out the social learning features currently used in MOOCs and the next steps that must be taken to further improve them. This article is based on the experiences we have made with the MOOC platforms openHPI and openSAP, both powered by the Hasso Plattner Institute in Potsdam.

Keywords: MOOC; e-learning; social community; collaborative learning; gamification

1. Introduction

In 2012, Massive Open Online Courses (MOOCs) hit the headlines. On the cover of the *New York Times* the “Year of the MOOC” [1] was proclaimed. It was in 2012 that many MOOC providers throughout Northern America and Europe started and reached thousands and thousands of people with their first MOOCs within a short time [2]. Professors such as Sebastian Thrun, who founded Udacity [3] in 2012, believed in MOOCs as being a sort of panacea to equality in global education. As already suggested by the word *MOOC*, these online courses are free and open (i.e., they grant access to everybody and do not require any prerequisites). Suddenly everyone could participate in course offerings from Harvard and Stanford professors, which had only been accessible to a few people before this time. Thrun described it as the democratization of education [2]. In Europe openHPI, the MOOC platform of the Hasso Plattner Institute, was the first MOOC provider to initiate this innovative form of e-learning. Furthermore, it was the first platform that offered German courses in addition to those in English.

However, MOOCs faced criticism from the very beginning. Sebastian Thrun himself became one of the most famous sceptics and played around with the business model of Udacity. While still offering

free courses, Udacity also offers so-called nanodegree programs, in cooperation with universities and companies. “At the end of the day, the true value proposition of education is employment”, Thrun says [4]. With these nanodegree courses, offered at a fee, students get a degree which serves them as credential and prepares them for a career at the industry partners of Udacity.

At this point, it is very important to separate MOOCs as an e-learning format from the business model that lies behind it. MOOCs themselves have proven to be very successful as long as they are embedded in a university context or backed by charitable funding. As we show later on, the number of MOOC participants is rising, so we conclude that the need for this kind of educational offer is growing as well. The argument critics often point out, and that should not be mixed up with the MOOC format itself, is that, so far, no working business model has been found to earn money with MOOCs. There have been some attempts made to do this, such as the nanodegree courses we described, but the financial question has not yet been answered satisfactorily. By all means, we want to emphasize that the monetary question must be treated separately from the question of the success of MOOCs as a learning instrument.

Critics have pointed out that learners were left alone because of the lack of help they received, for example from tutors. They argued that this was the reason MOOCs mainly reached people who had already experienced a higher education and who were, consequently, very disciplined. Some critics went even so far as to predict the *death of MOOCs*. At the end of 2013, *The Washington Post* was asking: “Are MOOCs already over?” [5]

We refute this argument, and explain in detail why we believe in the growth of MOOCs rather than in their decline. This paper further points out ways in which MOOCs can contribute to worldwide education, which makes this format so attractive, especially with regard to a fast growing world population. MOOCs can provide an answer to the expected massive growth of students within the next 20 years. Lifelong learning is gaining in significance due to the digital transformation and new job profiles. We can notice a strong tendency in a need for training offerings and advanced courses that can be taken alongside work. This need is increasing and will increase even more in the future. Besides other offers MOOCs are an answer to this development.

When we speak about MOOCs we think of courses which allow an unlimited number of people to learn and exchange knowledge online. This is an educational scenario where the social community of learners handles questions autonomously and the course instructor takes more the role of a coach than that of a tutor. This understanding reflects the ideas of constructionism, where the teacher’s role is not to be a lecturer but a facilitator who coaches students in attaining their own goals. Typically, this self-regulating mechanism of MOOCs works perfectly in a large (massive) group of participants. It might work with a smaller audience as well (e.g., in a business context), if the time frame in which the virtual community comes together is limited. On openHPI, with its several thousand participants in every course, there is no necessity to limit the social interaction to a few hours a day.

Let us first look at some numbers that show the development of MOOCs in recent years. We note an extraordinary growth in the user base for MOOCs as shown in Figure 1 [6]. Class Central recently announced that, in 2015, more people enrolled in MOOCs than in the previous three years. Within one year, the number of participants increased from an estimated 16–18 million to 35 million in 2015. This means that the user base for MOOCs roughly doubled last year [6]. When looking at these numbers one must be aware that all users that ever registered are counted—many of them might be members but are no longer active users of the platforms. Nevertheless, as long as they are registered they receive platform news regularly, such as information about new courses. Unless they unsubscribe they remain potential, active users.

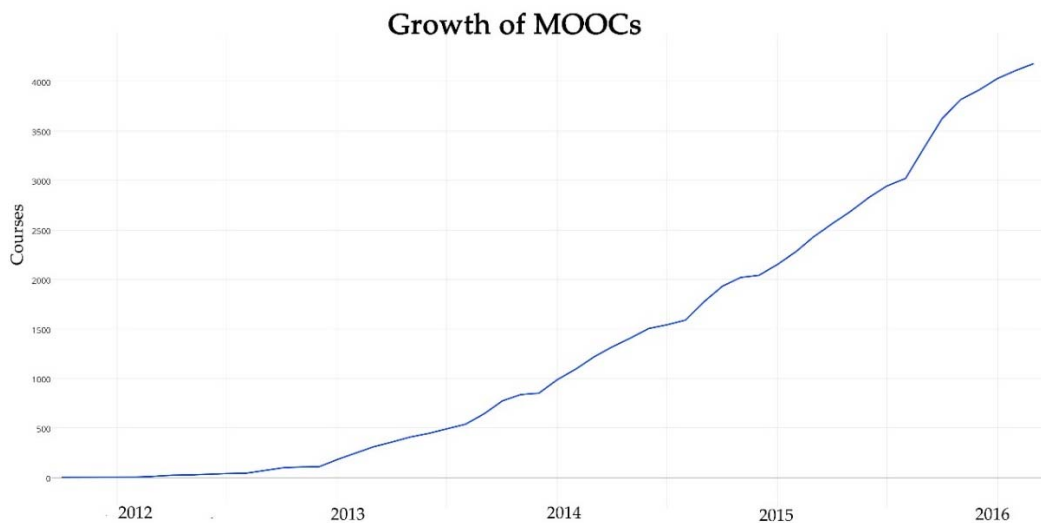


Figure 1. This graph illustrates the significant growth of MOOCs throughout all big MOOC platforms during the last four years [6].

All in all, Class Central counted 4200 MOOCs in 2015, including courses offered by more than 500 universities. The biggest MOOC provider is Coursera with more than 17 million users and over 1800 courses. However, in 2015 for the first time the MOOC market grew faster than Coursera, which dominated this market initially. FutureLearn had a breakthrough year in 2015. The UK-based provider grew 275% and has now overtaken Udacity with 3,641,621 students [7]. As if that wasn't enough, FutureLearn announced a record number of students in one single session of a course offered by the British Council: 440,000 students enrolled in the course preparing them for an English language test [8].

With our own MOOC platforms we recognize the same positive development—the number of users is steadily growing. openSAP celebrated 1 million course enrollments in February 2016 [9]. openHPI recently passed the threshold of 200,000 enrollments. The difference compared to openSAP is based on fewer courses and a smaller team. Additionally, most courses offered on openSAP discuss SAP products and address SAP customers—who are numerous. Just from the mere numbers mentioned above, the argument that the end of MOOCs is near cannot be substantiated. However, even if the trend is positive we must ask ourselves how we can attract new user groups, especially people from all over the world without access to higher education.

In 2012, having launched openHPI [10], the Hasso Plattner Institute MOOC platform, we can refer to the experience we have made with more than 20 courses and with more than 250,000 course enrollments during the last four years. At the moment, more than 120,000 users are enrolled at our platform (i.e., every user takes part in two courses on the average). The interactive online courses on openHPI originate in the HPI IT Systems Engineering curriculum and cover different subjects on information and communication technology (ICT). openHPI courses are offered in English and German. On the one hand, broad basic knowledge is offered (e.g., *Internet Security* or *Learning How to Program in a Playful Way*) on the other hand, IT experts can find advanced courses on several computer science topics such as *In Memory Data Management* or *Knowledge Engineering with Semantic Web Technologies*. Besides openHPI, Prof. Dr. Christoph Meinel, academic director of the Hasso Plattner Institute, and his team launched openSAP [11], the MOOC platform of SAP in 2013. The openHPI team is in charge of the technical support of the platform. OpenSAP is the first European enterprise platform and recently reached the threshold of 1 million enrollments [9].

In this article, we will examine the social character of MOOCs because, in our opinion, the combination of e-learning content with a social platform is crucial for the success of such a course that addresses the masses [12]. These are the research questions we will focus on:

- How are the numbers of MOOCs and MOOC users developing? Do we need to fear a decline of MOOCs?
- Why is the social character of MOOCs so important?
- What kind of social features are used on openHPI and what is their role and significance throughout the course?
- How can these components contribute to a reduction in dropout rates and create a better user experience?
- What overall recommendations can be drawn from the experience with openHPI and openSAP for the usage of social learning features in MOOCs?

2. Materials and Methods

This article is based on the experience we have made with our MOOC platform openHPI and our analysis of user interaction and user structure. At the beginning and end of all openHPI courses we conduct a voluntary survey of the course participants. In addition, many users provide personal data, such as their age, when registering at the platform. Our data set contains more than 30 courses on the platforms open.hpi.de and mooc.house with a total of 281,000 course enrollments. All in all, we can fall back on 120,500 unique learners on open.hpi.de and 10,800 unique learners on mooc.house. Studying relevant literature, research papers, and internet pages complements the facts and ideas presented in this paper.

3. Creation of a Social Community by MOOCs

The creation of a virtual social community is crucial to the quality of MOOCs. MOOCs follow the principle that learning in a group and having a strong and dynamic community that gives you feedback enforces the learning progress of the participants. Known social media platforms, such as Facebook, prove that people like to share things with each other and that they will stay on a platform to get feedback on their posts. One of the typical and, in our opinion, most important features to support social learning in MOOCs is the discussion forum, which we will introduce next.

3.1. Forum/Pin Board

The openHPI forum offers the possibility to ask questions and discuss lecture topics. The idea of the forum originates in the different levels of knowledge that participants usually bring with them to a MOOC. If someone has a question about a course, it is very likely a fellow student is able to answer it. The massiveness of MOOCs (i.e., the huge number of people working synchronously on the same topic) means that users normally have only a short wait in getting an answer to a question.

In the openHPI course *Learning How to Program in a Playful Way 2014* we made an interesting observation. The course was promoted as a *Junior Course* and designed to address mainly students who are 15–16 years old. The evaluation made at the conclusion of the course showed that we have reached our target group (Figure 2), but surprisingly, nearly the same percentage of users was between 40 and 50 years old. The forum threads brought us to the conclusion that a special role allocation had taken place. As Figure 3 shows, whereas the actual target group (15–16 years) asked quite a lot of questions, the adults automatically took on a mentoring role and helped the young participants. This is a good example of how learning communities in MOOCs can work productively and without the intervention of a teacher.

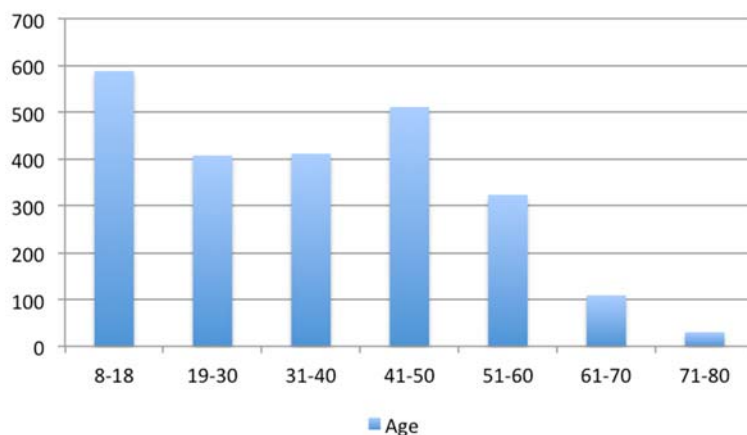


Figure 2. Age structure in the openHPI course *Learning How to Program in a Playful Way*.

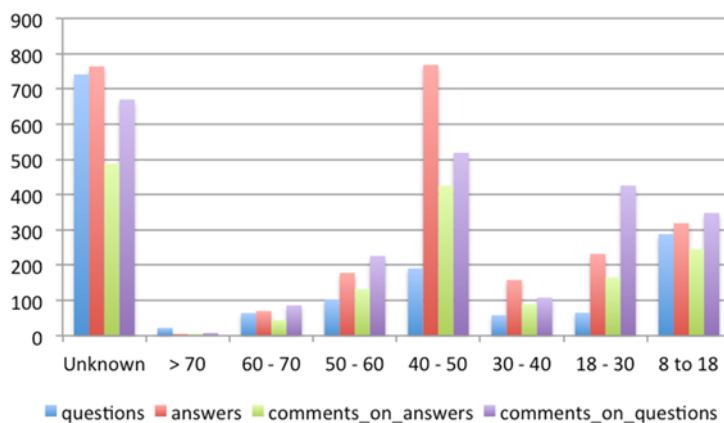


Figure 3. Structure of the forum threads in the same course.

That is in line with an analysis conducted in a set of large Stanford University MOOCs offered on Coursera. Anderson et al. observed that the activity level and the average grade of the student making the initial post is substantially lower than that of the students making subsequent posts. This suggests that “better students are helping out others in the class by joining the threads they initiate” [13].

While the course participants’ activity in the forum has a positive influence on their final results [14], only a small percentage actually take part in the forum on a regular basis. In the openHPI course *Internetworking with TCT/IP* only 20% of the participants posted at least one time in the forum [15]. In a survey conducted among all openHPI users, 27.52 % stated that they used the forum actively [16]. In this context, we must consider that the forum has a useful function also for those who do not leave a post there. If course members need advice on a certain topic they did not understand, they only need to look for answers in the forum. Often an ongoing discussion can be found on just this point. Therefore, by simply reading the forum their problem was solved. Mustafaraj et al. found an analysis of the data from the two iterations of the MIT MOOC *Introduction to Computer Science and Programming* and made an interesting observation. For every active user in the forum there are two passive or “invisible” ones that can be counted by an event tracking database [17]. This shows the important function of the forum also for those users who do not visibly appear in the course.

In the openHPI workshop *How to Become a Successful Entrepreneur*, we had a look at the forum activity of the participants and compared it with their graded quiz performance. Figure 4 shows that those who are most active in the forum (blue and orange group) achieved very good results (mostly more than 80% of the points).

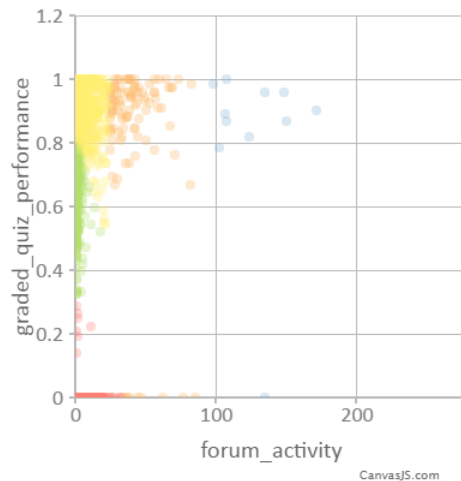


Figure 4. Cluster matrice that shows different activity patterns in the openHPI course *How to Become a Successful Entrepreneur*.

Feng et al. also point out the correlation between the participants’ academic performance and their forum activity [18]. Having examined a course on sociology offered by Shanghai Fudan University, on zhihuishu.com, the researchers found out that students that earn lower scores are less active in forum discussion than those who earn higher scores. Those who replied to existing forum threads earned the best results (see Figure 5).

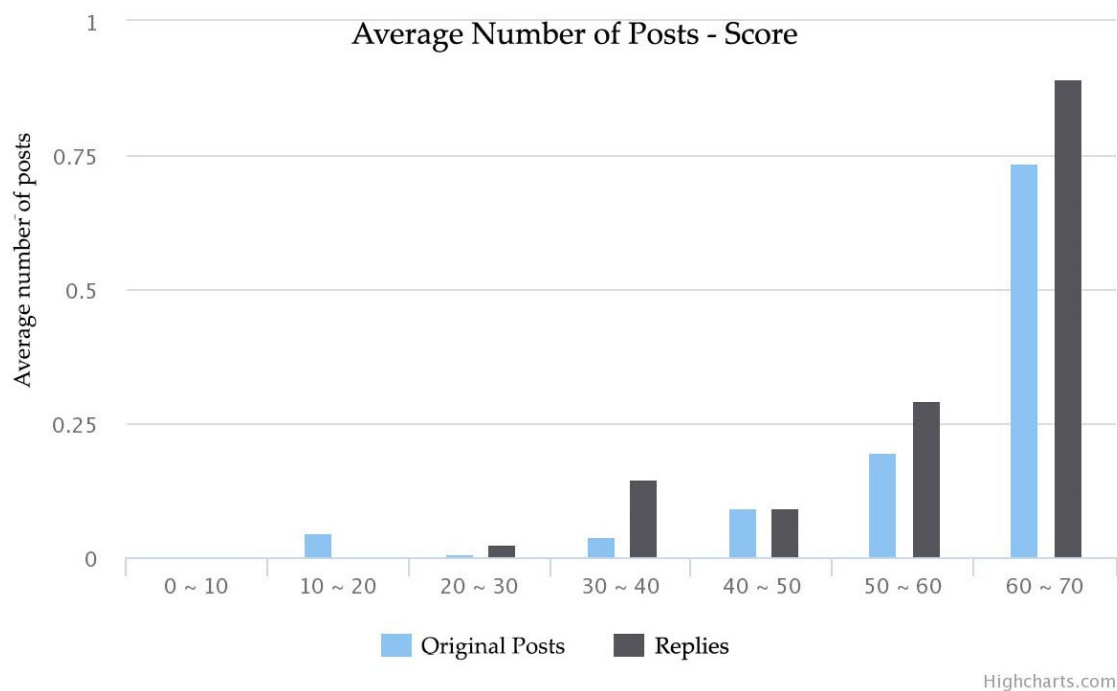


Figure 5. The distribution of number of posts [18].

Given the (1) importance of human interaction as a motivational factor; and (2) the detected correlation between the forum activity and the outcome, we think that getting more people to play an active role in the forum should be our objective. We have already undertaken some steps in this direction in openHPI. The traditional forum was replaced by the pinboard, which makes it easier for the user to ask a question while watching a lecture video. Each video is linked to a pinboard where questions arising from that particular video can be discussed. We think that the pinboard is more

intuitive and easier to use for the learner because it is not necessary to click on an extra page to ask a question. Instead, the user can start right away. Furthermore, participants now have the possibility to vote for a question or an answer if they think it would be interesting or helpful [15]. This feature is used, for instance, on platforms such as tripadvisor [19] or yelp [20]. It offers a good orientation and saves time for the learner in finding an answer. Last but not least, users who asked a question in the forum can mark the best answer as “correct”. Besides these features, many other incentives can be imagined that motivate users to participate actively in the forum. We will discuss some ideas later on in Section 4.

3.2. Why do Learners Enroll in MOOCs?

We cannot look at the social character of MOOCs and their significance without briefly discussing different factors that motivate learners to take part in a MOOC. If an individual’s motivation to join the learning community and to finish a course is known, action can be taken by setting motivating factors and features in the right place at the right time.

To be motivated means to be moved to do something. Someone who is energized or activated, for example to take part in a MOOC, is considered motivated [21]. We distinguish between two types of motivation: intrinsic and extrinsic motivation. Intrinsic motivation has its origin in the human character and our tendency to be curious and willing to learn and develop. This motivation works without any external incentives. In contrast, extrinsic motivation refers to an incentive that can be separated from the activity itself (e.g., a prize provided by a third party). Staubitz describes precisely why some educators renounce extrinsic motivational methods [22]. One main argument against these methods is that students will increasingly lose the intrinsic motivation they had at the beginning. At a certain point, they will only consider courses they can reap the most benefit from and eventually they will not choose a course based on content.

However, for Ryan and Deci, extrinsic and intrinsic motivation are not just opposing terms but may be present at the same time and, additionally, can be transformed from one to the other over time [21]. A learner might originally enroll in a MOOC because of the expectation of a certificate (external incentive). This decision might allow the person to experience the activity’s intrinsically interesting content, resulting in an orientation shift. The process of taking in a value is called *internalization*, whereas *integration* means that individuals turn the new value into their own [21]. Three main reasons that explain why people are likely to act in a certain way have been identified. These reasons are relatedness, competence, and autonomy. Relatedness refers to the universal desire of humans to be connected to and interact with each other [22]. Relatedness includes a sense of belongingness to the persons, group, or culture disseminating a goal. MOOCs offer the possibility of being part of a group, learning from and interacting with each other in different ways which will be presented later. Secondly, a person is more likely to behave in a certain way if he or she understands the task and the task promises success (perceived competence). Applied to MOOCs, this means that a learner is more motivated to take a course if the learner expects to be able to solve the tests and to get a good grade in the end. Last but not least, decisions must be taken autonomously to leave participants feeling self-determined. For MOOCs this means everyone should be free to enroll in a course and to take all the lessons required to finish it.

3.3. Collab Spaces

So-called collab spaces give the learner the opportunity to discuss things within a smaller group. Furthermore, learners can exchange documents within a collab space or start a Google Hangout. Some users prefer a more private place for different reasons. Maybe a question is very specific and greatly extends beyond the course content. Some might be too shy to post in the global forum, especially newbies in the subject matter who might be afraid to embarrass themselves. In this case, they could, for example, build up a “beginners” collab space. Another scenario might be those users who know each other in real life and want to build a collab space to talk in a more private environment. A survey

conducted among the users of the openHPI platform revealed that more than a third of the participants had taken the course together with friends or colleagues or were aware that colleagues and friends attend the same course [16]. In the course *Learning How to Program in a Playful Way*, a lot of school classes took part and built their own class collab spaces. There they could, for instance, discuss the video lectures with their classmates in the context of what they have learned at school.

Collab spaces can be open or closed. For a closed collab space other users who want to join have to first request membership. In our openHPI courses we have seen that how much the collab spaces are used depends greatly on the course topic. In the mooc.house course *Hands on Industrie 4.0* (6400 participants) only seven collab spaces with a total of 95 users were created within the first three weeks whereas in the course *Learning how to Program in a Playful Way* (10,070 enrolled learners) 56 collab spaces were built with more than 350 users in one single collab space (“Python Anfänger”). In contrast to the forum, the building and usage of the collab spaces is less intuitive and needs to be strongly promoted by the teaching team. One possible way to do this is to connect the opening of collab spaces with an exercise the learners have to submit. For example, learners must work on a homework essay and are encouraged to exchange, for example, their ideas, images, and statistics in a collab space. Before submitting the homework, they have the task to get a first feedback from their peers.

3.4. Peer Assessment

Finally, peer assessment is another instrument that supports social learning in MOOCs. Up to now, this type of exercise has been introduced in three openHPI and in three openSAP courses. Peer assessment is divided into the following phases: (1) The participants solve a task (or tasks) and submit their solution; (2) The teaching team reviews a sample of submitted tasks and grades them; (3) Every participant reviews a fixed number of tasks submitted by their peers. Without reviewing and grading their peers, participants will not get any grading themselves. In grading others, participants can follow the model the teaching team has provided in phase 2; (4) After participants have seen what some of their peers have submitted, they grade their own work. A realistic evaluation pays off as one gets bonus points if his or her own method of thoroughness in grading is close to the peer’s grading; (5) Participants can see how many points they have earned, read their peers’ reviews and give bonus points for good feedback.

The advantage of using peer assessment is that diverse types of assignments related to the MOOC can be used, and users are not restricted to multiple choice/multiple answer questions. At openHPI, peer assessment has been used so far mainly for complex programming tasks. In the workshop *Social Media—What No One has Told You about Privacy*, it was used for grading essays submitted by the participants. The effect of social learning using peer assessment works at several levels. Reading the solution of fellow students often leads to new insights and ideas and fortifies the knowledge gained in the course. Even if user names are anonymized in the peer assessment, users get direct personal feedback on what they have submitted and, at best, recommendations of what can be improved.

Park and Williams examined how the assessors are impacted by the process [23]. In the experiment they made with more than 100 students of a university-level course, *Introduction to Natural Language Processing* (NLP), they found that peer and self-assessment scores were higher than no-assessment scores. Furthermore, the participants of this course said in a survey that the peer assessment was beneficial to them and that they appreciated seeing other ways of approaching the same problems [23].

One common objection to peer assessment is the reliability of the peer grading. Kulkarni et al. examined this question through the example of the Stanford HCI MOOC, the first large-scale online class that used peer assessment [24]. They came to the conclusion that, on average, students assessed their work 7% higher than staff did. Furthermore, they found out that the graders’ accuracy could be improved by giving them feedback. They noticed a significant effect of the presence of feedback. In the following peer assessment 4.4% more samples obtained a grade within 5% of the staff grade than those without feedback [24].

We have seen the advantages and weaknesses of peer assessment. Currently, every participant works on his or her own in the area of peer assessment. The openHPI team is working on the feature of group peer assessment at the moment whereby a group is able to work on a task together. In this way the social character of MOOCs is highlighted once again. Grading will be done by the group too, not by an individual. This means that good coordination within the team is necessary. While this might lead to more discussions, at the same time it can bring participants closer together and help to build a tight social community.

3.5. Implementing a Social Graph

In a survey conducted among openHPI users, only a very small percentage was interested in exporting or linking the certificates they had earned to professional platforms such as LinkedIn or XING [16]. One reason for the low approval of this idea might be the age structure of our platform users. The age group of 40–70 year olds was slightly overrepresented in the survey and typically this age group is not as supportive of social media as a younger audience. We suppose that the integration of existing social media platforms such as Facebook, Google+, and others can be beneficial to users and instrumental in strengthening the social community in a MOOC platform. One possible advantage is that the user is able to log in with an existing account (e.g., Facebook) and does not have to create a new one. Second, after having logged in, participants in a specific course will see the names of all their friends who are also taking the course on social media platforms. This gives them another common ground in building their relationship with the person. It is another way to motivate their participation in the course from start to finish. In social media platforms like Facebook, friends who have visited the same school or university are recommended as new Facebook friends. In a MOOC platform this holds little interest for the user.

As we hope to attract new participants, particularly young people, to openHPI we will further research the implementation of a social graph. The following questions should be examined and discussed:

- Is it possible to generate new target groups by integrating social media platforms?
- Which other users should be recommended as new “friends” on the platform (users who are in the same collab space, users who write in the same forum thread, users who have taken the same courses before, etc.)?
- Which features are requested by the course participants (friendship, likes, direct messages, etc.)?
- What settings should be made for the user to make the procedure as simple as possible?

4. Discussion and Future Work

4.1. Present Results and Future Research

As we have seen in the previous section, there are a couple of features in use that allow the digital community to communicate and to interact with each other. When we analyzed the forum activity we found out that participants who were taking part in discussions, and especially those who answered and commented on existing threads, performed well above average in the final exam. Still, only around 20%–25% are active in the forum. We see a strong correlation between forum activity and final results. In our opinion, MOOC providers should look very carefully at the forum and try to convert as many students as possible into active forum users.

We have to ask ourselves what strategy could lead to more activity in the forum and the collab spaces. As we have seen in Section 3, there is already a lot of work in progress to improve the learners’ “activity rate”. Social graphs, new assessment tools such as group peer assessment or the closer integration of collab spaces in the exercises could be possible solutions. Another buzzword that everyone is talking about at the moment is *gamification*. The HPI researchers are studying this method as well, testing if it turns out to be successful for all user types and how it can, or better, should be implemented on openHPI. We will explain this way of motivating users in Section 4.3.

Looking at the collab spaces, we observe that their use is not intuitive to the course participants. Users need guidance with that feature, at best exercises should integrate the collab spaces. You could imagine that an exercise contains a step in which participants must solve a task within a smaller group and build a collab space therefore.

We provided details on peer assessment, which also support social interaction in MOOCs. The positive effects of getting direct personal feedback were highlighted. Furthermore, reading the solutions others submitted helped to get different perspectives about one subject matter. On the other hand, future research must focus on the quality of peer grades. For the certificate to be valuable it should be assured and proven that peers are able to grade accurately and that the difference between a peer grade and a teacher's grade is kept to a minimum.

Finally, we went deeper into the implementation of a social graph which is not implemented on openHPI, yet, but looks promising and will be the subject of future research.

4.2. Dropout in MOOCs

Despite the existing social learning elements we must admit that dropout rates are still high. High dropout rates are one of the major criticisms of MOOCs. With a completion rate of around 16% openHPI shows better results by comparison. Other known platforms have only single digit completion rates. Nevertheless, we have to take action against early dropouts and find out what keeps people on the platform.

The high dropout rate is a major argument critics often mention in the context of MOOCs. There are different reasons for the "funnel of participation" as Clow called it [25]. This model is inspired by the marketing funnel approach. In the first step of this approach, potential learners must become aware of the MOOC. A fraction of them will be interested and register for the course. Again, only some of those who register will play an active part in the MOOC (e.g., join in discussions with other participants or submit homework). Only some of these participants will make significant progress and get a certificate in the end. At each step, we observe a large drop-off [25]. Why is the dropout rate so much higher in MOOCs than it is in traditional education? Well, one reason certainly is the ease of registration and the free-of-charge offer. Many people become aware of a new course and register for it before the course starts and then never take part. Table 1 presents the no-show rates of the openHPI courses in 2016 so far. The no-show rate shows us how many people signed up but never even looked at the course content. Possible reasons for that are: time restraints, change of plans, and sudden events (work, private life).

Table 1. No-shows in current and past openHPI courses 2016 (status: May 2016).

Course Name	Number of Enrollments	Number of No-Shows	No-Show Rate
JavaWorkshop	2748	1157	42.1%
Business Process Modelling	5278	1786	33.84%
How to Become a Successful Entrepreneur	6048	1426	23.58%
Internet Security	11,531	1823	15%
Social Media	4501	784	17%

Only a percentage of those who participated in the course were active and took the exams to get a certificate in the end. Onah et al. list a couple of reasons for the low completion rate [26]:

- (a) No real intention to complete

One possible reason for that may be the different motivations of the students to take part in the course. Wilkowski et al. who evaluated the *Mapping with Google* MOOC discovered that only 52.5% of registrants intended to earn a certificate. 44.7% of participants said that their goal was to learn a few new skills and to explore the online course [27]. That corresponds with our own evaluations. In our course *Social Media—What No One Has Told You about Privacy* 47.6% answered that their primary goal

was to complete the course and to receive a record of achievement in the end. For 40.8% the main goal was to learn the course content by watching the videos. In the course *Internet Security*, 56.5% aimed to receive a certificate whereas 25% wanted to learn the course content mainly by watching the videos. To highlight the value of the certificate is not a bad idea. Nevertheless, the success of MOOC should not be judged on how many people receive the certificate but on how much participants learn in the course, i.e. their learning progress.

(b) Lack of time

Already mentioned as a reason for no-show, the lack of time may also be responsible for dropout during the runtime of the course.

(c) Course difficulty and lack of support

If participants take part in a course and do not bring the needed pre-requisites, this may lead to frustration and an inability to follow the course content. Dropping out will be the result. If the course is addressed to beginners and does not require any pre-requisites, like many openHPI courses, this is an important indicator of whether the course was too difficult. In this case, the teaching team is able to reduce the dropout rate by offering more explanations.

(d) Lack of digital skills and learning skills

(e) Bad experiences

(f) Expectations

(g) Starting late

(h) Peer assessment

Courses that involve a peer grading often have lower completion rates than others. One reason for that is surely connected to the fact that peer assessments require more work on the students' part than other exercise types. The evaluation in our openHPI courses support this thesis. Up to now, we have used peer assessment in three openHPI courses. The completion rate in these three courses was never higher than 12.3%.

4.3. Gaming

As mentioned before, gamification looks promising in terms of raising the users' motivation and will be subject to future research. We observe that, in spite of existing social features, a large share of users are not very active during the course [22]. Gamification could help motivate more course participants to play an active role. Gamification means the application of game elements in a non-gaming context. It can include:

- Points: Points are a generic reward, representing either progress or a virtual value in the sense of currency [15]. Progress means, for example, doing the self-tests, submitting the homework, watching all the lecture videos, etc. Besides, points could potentially be earned for giving answers in the forum or for being the moderator of a collab space.
- Levels: Levels divide the learner's journey on the path to the certificate into smaller steps. The idea is that a goal that is too big and too far away seems unreachable to the learner. In contrast, if the course is structured in several levels and the learner gets a reward for reaching each of them, it becomes more probable that learning will progress.
- Badges: Users can receive badges for different tasks (e.g., badge with designations such as: the *Knowledgeable*, for excellent results in the assignments, the *Communicator*, for being very active in the discussion forums or the *Self-Tested*, if he or she has completed all of the self-tests.
- Acknowledgements: Short direct messages that have the intention of giving users feedback on their actions and motivation to carry on. Acknowledgements can, for example, give the user a feeling of success after completing a self-test.

- Virtual goods: Users could be rewarded by a special feature that is unlocked after a certain task is solved.
- Leaderboards: Leaderboards show a participant's ranking within a group, and thus go hand in hand with the implementation of a social graph explained above. Course participants can see, for example, how many points friends have reached and also where they rank themselves. This tool needs to be handled with great care, however, as it can motivate, on the one hand, but can also demotivate if a participant is the worst one in a group and does not see a chance to catch up.

Anderson et al. made a badge experiment in the second iteration of the Stanford course on *Machine Learning* which led them to the conclusion that badges were able to raise users' activity rate [13]. In the experiment, badges were awarded for reading certain numbers of threads and for voting on threads, not for authoring them. In this way the researchers wanted to avoid "the creation of low quality content". The designed badge system led to a significant increase in user engagement on the forum. The two previous courses on Machine Learning served as a comparison. During the experiment these two striking observations were made in the course where badges were implemented:

- "Relative to the students who voted at least once, the fraction of students who voted at least 100 times was 10 times larger than in the first two runs of the course."
- "Relative to the students who read at least one thread, the number who read at least 100 threads was 10 times larger" [13].

Certainly one difficulty in implementing gamification tools in a MOOC platform is the diverse user structure, reflected in different types of players. Richard Bartle [28] and Andrzej Marczewski [29] have analyzed different user types in their papers. To go deeper into this topic would go beyond the scope of this article, but the goal for MOOC providers must be to reach all of the participants and to ensure, to the best of their abilities, that everyone is being reached and enjoying the course. Future research should focus on these features and evaluate which one is the most effective to reduce dropout rates and raise the learners' motivation to keep on learning.

5. Conclusions

This article demonstrates the steadily increasing popularity of MOOCs, which is reflected in the significant numbers for 2015. Hence, there are all indications that this positive trend will continue. The integration of a social platform in a learning platform is the secret of MOOCs. This paper presents the social character of MOOCs and the features in use within MOOC platforms that support social interaction (e.g., the forum and the collab spaces). In summary, we state the following points:

We see a strong correlation between the activeness of users and their results. Active users who, for example, help other users in the forum by answering their questions tend to show better results in the exam. We are convinced that learning within a social community and interacting with other learners has a motivating impact. MOOCs live from the contribution of every single learner. Without the active participation of learners, a MOOC would be dead. Therefore, it should be in the interest of every MOOC provider to raise the share of its active learners, which in the case of openHPI is around 25% of total learners. So the advantage of the integration of a social platform is not only that it serves to increase learners' motivation and fun in the course but, beyond that, it produces better grades in the end.

As a next step, we reflect on how the activity rate in a MOOC can be raised through motivational tools. With regard to openHPI, we have shown that gamification tools, such as badges or points, the implementation of a social graph, and social assessment tools, can have a strong motivational impact, and help decrease the dropout rate. Future work in this area is necessary to find out the correct "proportions" and mix of features. On the other hand, we have already implemented new tools to raise interaction (e.g., peer assessment and new functions within the forum). In the near future, we will try group peer assessment as another method to bring the community closer together. With a view to

the collab spaces, we have found out that they are less intuitive to use than the forum and therefore should be connected to a task the learners have to fulfill.

Last but not least, we discussed the dropout rate—a point critics often mention with regard to MOOCs. Looking at the different factors that motivate learners to take part in a MOOC we would like to note that dropout rates must be regarded on an individual basis and must not be overvalued. A significant share of users might be interested in certain parts of the course only and not see the necessity of earning a certificate, as our surveys show.

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