

How to foster forum discussions within MOOCs: A case study

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Abstract

Discussion forums are an essential part to foster interaction among teachers and students, as well as students and students, in virtual learning settings. If interaction can be enhanced, this has a positive influence on motivation and finally also on dropout rates. These days, a special form of online courses, so-called MOOCs (Massive Open Online Courses), are popping up massively. Those courses are characterized by a high number of students. In this paper, we would like to examine discussion forums and their role concerning interaction. Therefore, Gilly Salmon's well-known Five stage model is taken and adapted to MOOCs based on a case study. As a method, we tracked learners' data through learning analytics applications and concluded that there is a positive correlation between reading from one side and writing in forums from the other side.

Submitted

05 April 2016

Revised

08 June 2016

Accepted

30 September 2016

Keywords:

Forum discussion,
MOOC,
Learning Analytics,
e-moderation.

Suggested Citation:

Lackner, E., Khalil, M. & Ebner, M. (2016). How to foster forum discussions within MOOCs: A case study, *International Journal of Academic Research in Education*, 2(2), 01-13. DOI: [10.17985/ijare.31432](https://doi.org/10.17985/ijare.31432)

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INTRODUCTION

Forum discussions and their role in and for MOOCs have been widely scrutinized so far. The results are ambivalent: researchers underline that only a few participants seem to actively contribute to forums. They are, however, highly important for a course's success and positive notion. As interaction among the participants is crucial to foster their motivation to engage in a course (and not to drop out), a closer investigation of the forum as an interaction space should be done in this paper. The paper's objective is to deduce design recommendations that help establishing individualized support for participants, fostering interaction and collaboration among learners, and, thus, supporting self-regulated learning. Therefore, after a short literature review, Gilly Salmon's Five stage model, a model that was designed for, more or less traditional, online learning settings and that generally describes the different stages, tasks, and challenges of e-moderation, will be introduced and adapted to a MOOC's special requirements; these are mainly deduced from a data-driven investigation of the MOOC *Gratis Online Lernen* that ran in autumn and winter 2014 at the Austrian MOOC-platform iMooX (www.imoox.at).

Forum discussions in MOOC: a literature review

Discussion forums are, besides the videos and different assessment methods; a fixed part of both xMOOCs and cMOOCs (Jasnani, 2013, pp. 11, 15). Their role within MOOCs has already been scrutinized from different perspectives and with ambivalent results. Huang et al. (2014, p. 125) summarized that participants use the forum for different purposes according to their personal needs and interests, "which appears to be more an inherent than an extrinsic trait". McGuire (2013) stated that, in theory, forums offer possibilities for community building within online settings but often fail to do so. One of the reasons is the lack of means to assort and easily search within different threads, posts and comments; a second reason is the missing link to discussions outside the course. The author (2013, p. 31) resumed: "As a result, conversations have little chance of picking up steam, and community is more often stifled than encouraged". Participants are overwhelmed by the huge number of different discussion threads, postings and comments, and fall behind.

There are only a few participants that become active in a forum but play an important role in the construction of knowledge. Breslow et al. (2013, p. 22) showed in their study, which analyzed the first MOOC on edX, that "only 3% of all students participated in the discussion forum" and "52% of the certificate learners were active on the forum." Huang et al. (2014, p. 125) identified and scrutinized the so-called superposters, i.e. learners who actively participate in forums, and highlight the important role that forums play for MOOCs. They resumed that their "results suggest that superposting [...] largely results in high-value contributions and also correlates positively with activity and contribution quality from fellow students, mitigating concerns about contribution quality and any negative effects of such prolific posting on other forum users". In their study on 23 MOOCs from Coursera, Manning and Sanders (2013) came to a similar conclusion, but concretized "we weren't counting those who only introduced themselves, it looks as though for most courses, fewer than 20% of even quite engaged students (scoring 60% or above in the course) were active forum participants, and numbers weren't much different even for students scoring 90% and above." Onah et al. (2014), again, showed that the interaction level in forums is generally low. They resumed (2014, p. 4): "In general, more active engagement strategies and the introduction of tasks related to forum posts are needed to encourage users both to initiate threads and to post replies to others." Consequently, they (ibid.) formulated a desideratum for research regarding "the use of forums and [...] the wider issue of support. We intend to investigate pedagogy for effective use of MOOC forums and to explore aspects of adaptivity for MOOCs." As Qiu et al. (2012) added, class

size plays an important role regarding active participation in online discussions. It is, hence, not possible to establish a correlation between class size and the quality of the discussions.

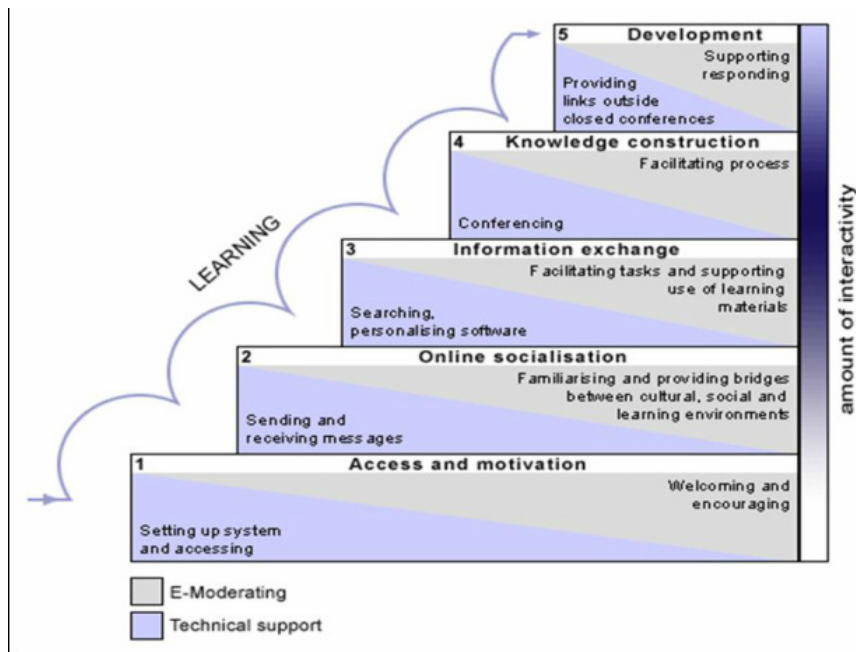
Ezen-Can et al. (2015, p. 150) had undertaken a first step into this direction and looked at the postings from a semantic point of view “with the goal of automatically extracting the structure of the discussions to understand students [sic] posts better.” Stump et al. (2013), therefore, create a coding framework to cluster the different threads and postings and use the poster’s role and the posting’s topic as parameters. Wang et al. (2015) underlined how important it is to understand forum routines for deducing design patterns that help fostering participants’ interaction and communication in MOOCs. Nevertheless, the relation between active participation and learning gains is not linear, as the authors (2015, p. 132) prove: they “observed that students’ active and constructive discussion behaviors are significant in predicting students’ learning gains, with active discussion behaviors possessing better predictive power, which is inconsistent with our hypotheses. Interactive discussion behaviors are significant in predicting learning gains only for students who are less active in the forums.” in order to explain their ambivalence and means to create learning and discussion settings that are appealing and initiate discussion, interaction or collaboration. Regarding the instructor’s point of view, a speech act analysis done by Arguello and Shaffer (2015, p. 19) shows that “instructors intervened mostly to answer questions, fix problems, and provide encouragement”. Thus, an appropriate setting is needed to help establishing individualized support for participants, fostering interaction and collaboration among learners, and, thus, supporting self-regulated learning.

Gilly Salmon’s Five stage model

More than ten years ago, Gilly Salmon introduced a book called *e-moderating: The key to teaching and learning online*. It has become a benchmark in the field of online learning and teaching. According to the author, e-moderation is crucial to establish a setting that offers individualized support for learners, that fosters interaction and collaboration, hence the construction of knowledge, and that, finally, supports self-regulated learning. Therefore, e-moderators need new skills that do not focus on the technical, but the motivational and organizational field, as Salmon (2007, vii) puts it. Thus, the e-moderators’ role is to encourage learners to collaborate and communicate to maintain interactivity and to strengthen the motivation in moments of weakness. Accordingly, the instructional setting is crucial; it is about “promoting human interaction and communication through the modelling, conveying and building of knowledge and skills.” (ibid., p. 4) In summary, e-moderators are facilitators who organise a shift from teacher-centred instruction to the learner-centred construction of knowledge. They support and guide the group and enable a specific learning setting.

In order to achieve these objectives, i.e. to guide and support the group and initiate learning processes, Salmon (ibid., pp. 28-50) suggests thinking in five different stages as figure 1 illustrates:

Figure 1. The Five stage model by Gilly Salmon (source: <http://www.gillysalmon.com/five-stage-model.html>)



It seems obvious that the individual stages are built on each other. It is hardly possible to skip stages, as it is true for learning “that participants learn about the use of computer networking along with learning about the topic” [emphasis in the original] (ibid., p. 28). Even more important, however, is the fact that they learn “with and through other people.” (ibid.) Climbing up the stages means that the degree of interactivity increases and, simultaneously, the degree of instruction decreases in favour of the construction of knowledge. At each stage learners and teachers stay individually in terms of time and dedication (ibid., p. 30). In the beginning, the learners get familiar with the learning environment and the course design. However, there must be a “purpose for taking part online” (ibid.). It might be important to make the participants “understand how [an] online [activity] contributes to learning for their topic, this course, this discipline” [emphasis in the original] (ibid., p. 33). Motivation flattens from time to time. It is then the moderator’s turn to help and motivate and to keep the knowledge construction going without being too instructional. At these first two stages the forum might play an important role as a place to collect and publish all information that seems to be necessary to get used to the course (design), and to get to know each other (e.g. in a first introductory post) as well as to assist the participants in case of technical issues. Previous experience (ibid.) has shown that participants in forums have specific problems and concerns; nevertheless, a communication channel between learners and instructor(s) may help them crossing the earlier obstacles.

At stage 3 the e-moderator has to focus on the participants’ activity. Though, Salmon (ibid., p. 38) does not recommend to “treat browsers or vicarious learners as criminals, but instead you should continue to both design and e-moderate for active participation and workable online relationships.” At this stage the e-moderators have to pay attention to the group dynamics and identify so-called lurkers (Beaudoin, 2002; Ebner & Holzinger, 2005) or browsers, i.e. participants who do not actively take part in a course but stay passive content consumers (Salmon, 2007, pp. 36f.). It is obvious that not all participants simultaneously begin to use the forum, and only some more reluctant learners have the courage, experience or time to start immediately to participate in the course, to write posts, in short, to be active.

The individual support is important in order to activate and reactivate participants. Furthermore, it helps them to organise their self-regulated learning process. There are different ways to cope with the massive number of inputs, “the potential information overload at this stage.” (ibid., p. 39) Salmon (ibid.) identifies

at least four different strategies: (1) "Some do not try to read all messages." (2) "Some remove themselves from conferences of little or no interest to them, and save or download others." (3) "Others try to read everything and spend considerable time happily online, responding where appropriate." (4) "Yet others try to read everything but rarely respond." It is the e-moderator's task to help learners from all types by "offer[ing] appropriate support and direction" (ibid.), otherwise they might "become irritated and frustrated. They may even disappear offline." (ibid.)

Therefore, Salmon (ibid., p. 40) suggests, both, formative and summative feedback. One strategy regarding formative assessment is to "celebrate, give value to and acknowledge contributions to discussion processes and knowledge sharing by participants, and give credibility, authenticity and verification of information offered." The summative aspect is limited to stage three in terms of "feedback and assessment [...] especially if aligned with the online processes and achievements." In order to keep discussion, interaction and collaboration going, it might be important to "ask more questions, seek more discussion, motivate, challenge, complement and encourage all participants." (ibid., p. 42) It has, however, to be stated, that the smaller the group, the greater the participation and output for each participant. Small groups facilitate to reach all learners, large groups facilitate lurking and browsing, which, thus, is one of the challenges e-moderating techniques face within MOOCs and where specific strategies should be used, and, thus, Salmon's model should be adapted.

Gratis Online Lernen scrutinized via Learning Analytics

MOOCs and especially xMOOCs are attended by thousands of participants who interact, collaborate and communicate. In order to cope with the huge amount of data produced in this setting, new techniques are necessary to learn from the data, such techniques and methods are listed in (Khalil & Ebner, 2016a). In the field of education, this automated data processing is called Learning Analytics (LA). It is a process that analyzes interaction, communication, and collaboration. Thus, it helps understanding learning behavior and pursues the objective to optimize learning settings and improve learning behavior (Greller et al., 2014; Retalis et al., 2006). Therefore, data from different sources, e.g. log files, number of written or read posts, time spent in a forum, are gathered in the background of the learning environments such as the MOOC. It is then processed using analytics techniques and interpreted to achieve different goals of revealing hidden patterns, predicting behaviors to name some objectives (Khalil & Ebner, 2015).

Study object

In this case study, a Learning Analytics approach was implemented in order to track user activities within the forum of an xMOOC called Gratis Online Lernen ('Free Online Learning') (GOL) which ran in autumn and winter 2014 at the Austrian MOOC-platform iMooX (Ebner et al., 2015). The course duration was eight weeks with an average workload of two hours per week; the course language was German. Every week consisted of videos, further reading resources (e.g. documents, web links), and a quiz. Moreover, a forum was accompanying the course in which instructors and students could actively participate and discuss the topics. The course was intended for people not familiar with virtual space and can be seen as an introduction to finding one's way on the World Wide Web.

The analysis results show that there were 1012 registered participants, 479 of them can be labeled active (47.33%). 'Active participants' are those who write at least one forum post, read a number of forum's thread, or do at least one weekly quiz. If the completion rates are calculated on the basis of the registration rate, 21.44% of the participants completed the course, and 17.49% downloaded a certificate. Calculating the completion rate on the basis of the active participants, the percentage doubles: 45.30% were active and completed the course, whereas 36.95% were active and downloaded a certificate too.

FINDINGS

Forum activity

Regarding the overall forum activity in this MOOC, it can be stated that the number of forum reads was very high within the first four weeks as figure 2 shows:

Figure 2. Number of forum reads

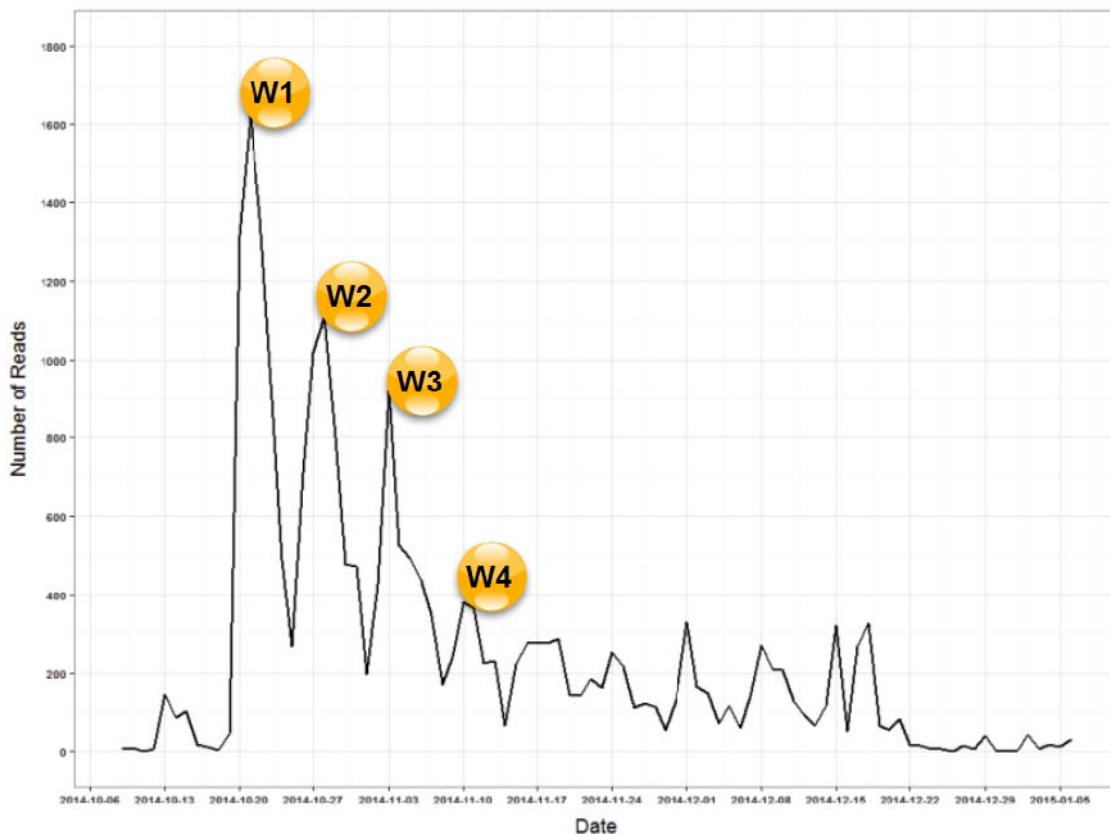


Figure 2 depicts that the participants have already started a forum activity before the course had started in detail. The first three weeks in the course were highly active with 6,706 reads. The frequency diminishes continuously to 1,760 reads for the whole period of week 4. It then stays more or less constant. The referent participants' number in this case is 1012 registered participants as the reading of forums posts is not included in the definition of *active participation*. The first week was characterized by a round of introductions, where the participants were asked to introduce themselves and to react to their colleagues' introductions. The following weeks, the instructors posted discussion impulses on a regular (weekly) basis in order to foster interaction within the course and to start discussions in the forum.

As MOOCs are mostly an informal learning setting (Kop & Fournier, 2010), the learning rhythm is expected to be beyond the traditional working hours. MOOCs enable participants to learn according to their personal learning attitudes and preferences, independently in time and space. There are no fixed lessons, where participants have to come to class in terms of a synchronous meeting. There are deadlines that have to be met and the participants learn in a highly self-regulated way, at their own pace. To get more information about the working and learning rhythm within MOOCs, the reading time and rhythm spent in the forums are visualized in figure 3 and 4 for the GOL.

Figure 3. *When do participants read in forums?*

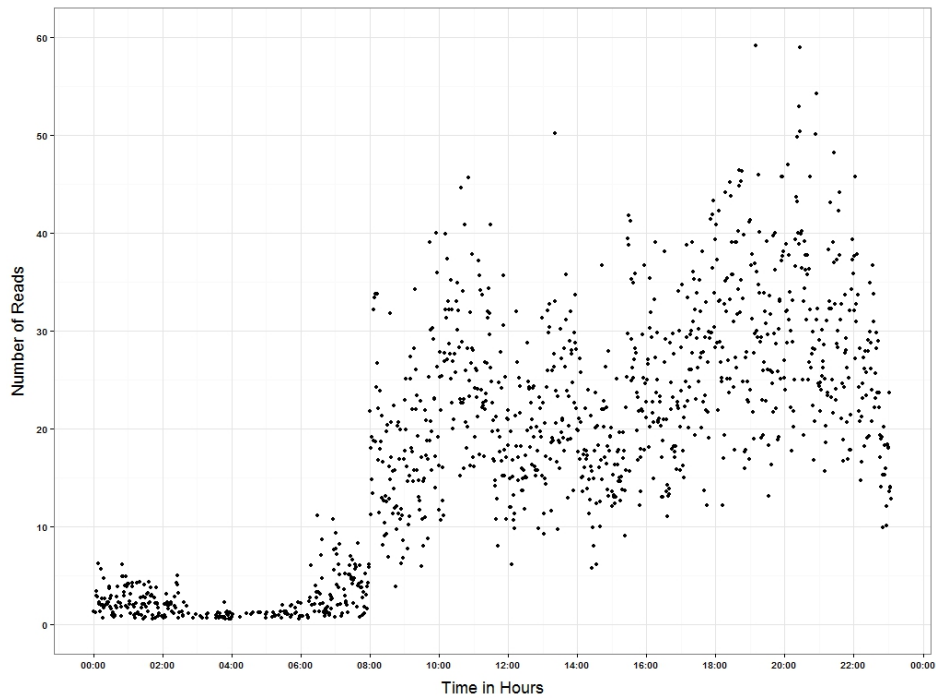
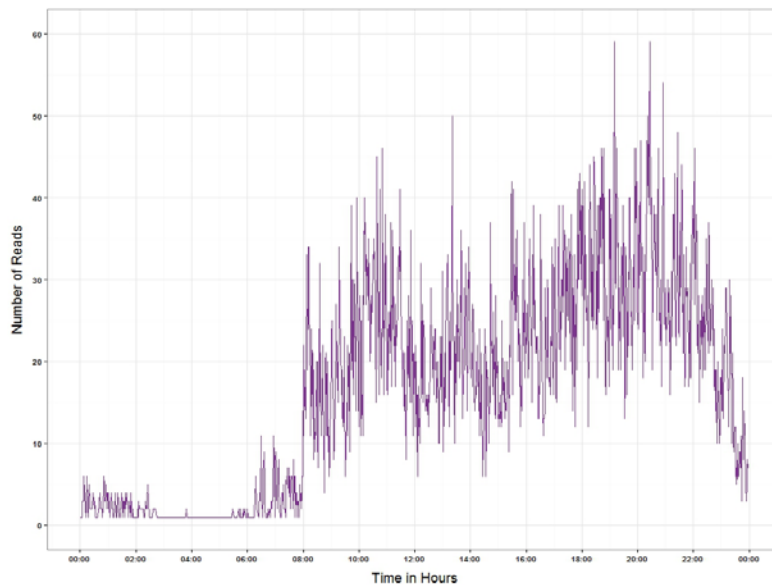


Figure 3 shows the number of reads against the time of day. It can be clearly seen that the participants, mostly read between 8 a.m. and 10 p.m. and that there is a higher number of reads between 6 p.m. and 10 p.m. Only a few participants are highly active in the morning, between midnight and 8 a.m.

The same holds for the time spent reading in a forum, as figure 4 makes clear:

Figure 4. *Time spent reading in the forum*

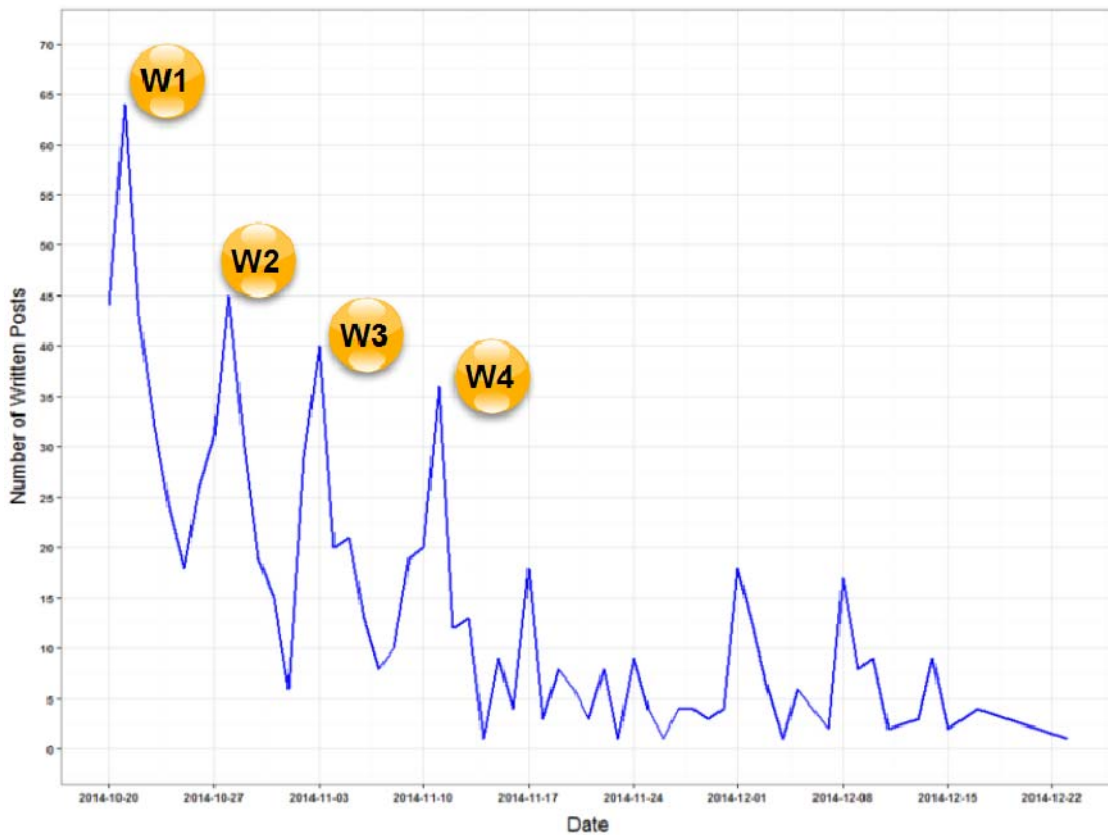


It can be seen that the morning time seems to be used to quickly check the messages, whereas the slot between 8 a.m. and 11 p.m. is used to spend more time in the forum. It has to be said that these visualizations are based on quantitative data and it cannot be said that the participants read the postings (attentively) but only spend more time in the forum. The qualitative dimension cannot be deduced from

the data available from the LA database. On the other side, it can be assumed that just clicking on all the threads without reading does not make any sense. It can nevertheless be stated that there are peaks regarding the time spent in the forum around noon (10 a.m. – 2 p.m.), even though a cut around lunch time is apparent, and in the evening (6 p.m. – 10 p.m.) followed by suddenly falling till midnight. Between 3 a.m. and 5 a.m., almost no activity can be identified.

As reading forum posts means to consume them and not to actively contribute, i.e. produce content, a closer look at the active participation within the GOL has to be added. Therefore, the number of written posts has been analyzed and visualized as shown in figure 5:

Figure 5. Number of written forum posts



In this case, the 476 active participants are the reference, but the tendency is the same: Participants and instructors are highly active in weeks 1 to 4, thus become more reticent from week 5. The reasons for this decline might be seen in the fact that the participants' questions were answered by the instructors (Onah et al., 2014); the forum was too confusing due to the high number of posts which led to reluctance (McGuire, 2013; Salmon, 2007) or other intrinsic motifs (Huang et al., 2014).

Nevertheless, a logical and non-surprising correlation between reading and writing can be identified. To check this correlation, all participants who read and those who posted in the forum from the start of the MOOC till its end were retrieved from the database. By merging both datasets, a noticeable relation between reading and writing could be seen as figure 6 shows:

Figure 6. Relationship between number of readings and writings

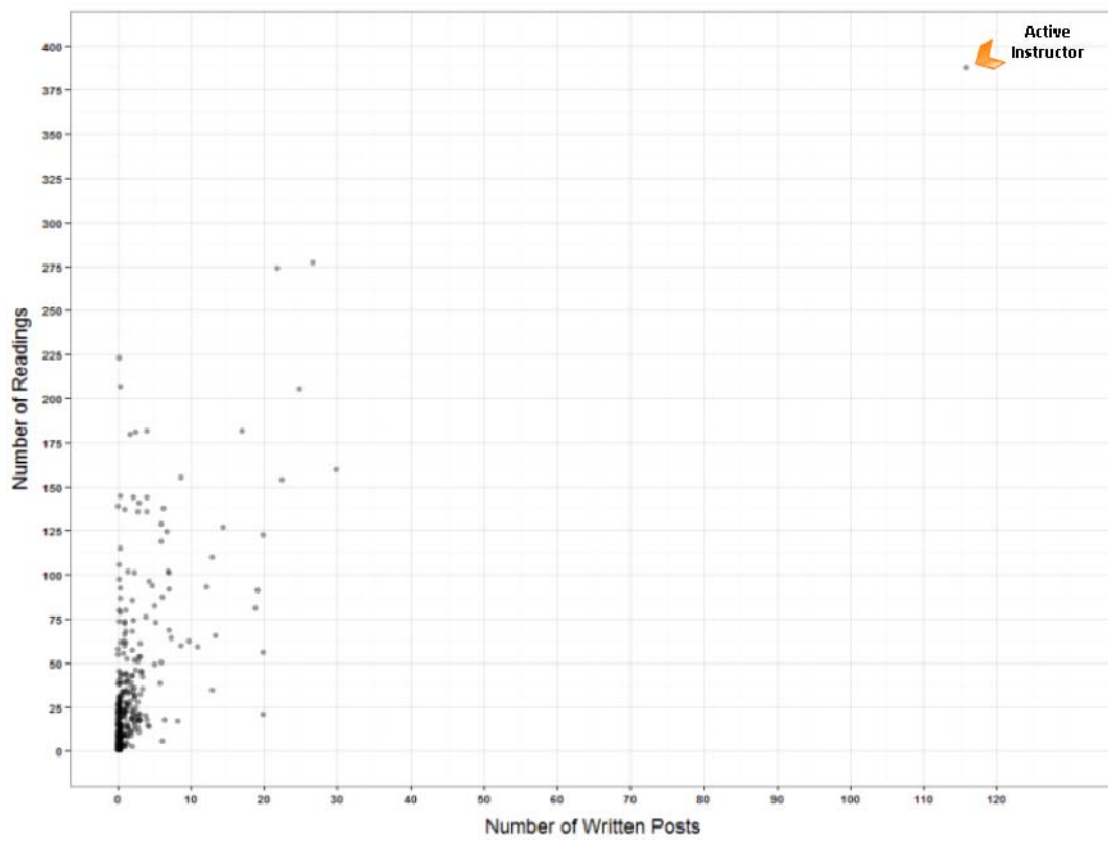


Figure 6 depicts a linear correlation between reading and posting in the discussion forums. A sample of the dataset was tested randomly; the result is a Pearson product-moment correlation coefficient of 0.52, which indicates a moderate positive relation, as a 95 percent confidence interval between 0.46 and 0.57 can be identified, which leads to the correlation of 0.52. The figure visualizes the points in an upward shape. Some outliers or *superposters* according to Huang et al. (2014) exist in our case study. For example, the highly active instructor is shown on the top right of the pane. To check the validity of the correlation, a second step linear test was done between reading and writing using proportions and not the original numerical values. The correlation result equaled to a value of 0.58.

It may therefore be supposed that the main time spent passively consuming from one side and actively producing from the other side correlate to each other. In addition, it should be noted that there are two main time frames around noon and in the evening as figure 3 and figure 4 have illustrated where participants find the time to read posts and also write down their comments and posts.

DISCUSSION AND EVALUATION

Bringing together the insights of the three mentioned parts of this paper, it can be said that forum discussions play an important role within MOOCs in order to enable the participants to communicate and collaborate with each other. This personal interaction among participants and between participants and instructors is crucial as Khalil and Ebner (2013a; 2013b; 2014) proved. Thus, there are several reasons to consider when designing a MOOC in order to actively and consciously foster forum discussions.

Gilly Salmon's (2007) e-moderation model may be the first indication of these design processes but has to be revisited as it was conceptualized for smaller groups. According to the author, a forum without moderation may not work or flatten, thus, her focus lies on the interaction between teachers and students. The e-moderator's role embraces activities to motivate learners on an individual level, as the author acts on the assumption that communication has to be fostered and is not a self-selling item.

Therefore, e-moderators have to identify lurkers (Beaudoin, 2002; Ebner & Holzinger, 2005) or browsers (Salmon, 2007, pp. 36f.), and should name them personally according to Salmon. This includes that e-moderators know their target group by name. To do so the group must be rather small, otherwise an individual support cannot be handled. Given the fact, that the group of participants in MOOCs is massive and heterogeneous (Gaebel, 2013, pp. 7f.; Gaebel et al., 2014, pp. 64ff; Hollands & Tirthali, 2014, p. 42), the instructors are not anymore able to know every single participant and to witness their learning processes. Nevertheless, some crucial points mentioned by Salmon (2007) hold for traditional settings as well as for MOOCs. Taken into account the five stages, the following design recommendations may be deduced. Two units have to be distinguished, due to the different learning processes and paces of the heterogeneous learning group.

Stage 1 (Access and Motivation) and stage 2 (Socialization) should be seen as a first unit. Participants should know how to enter the course (platform) and should be motivated from the beginning. At this point, the instructors make clear what can be the “purpose for taking part” (ibid., 30). Due to the group’s heterogeneity, they will have to focus on different purposes and personal issues that motivate learners to take part. The first week of a MOOC may be used to get to know each other, as well as to get familiar with the platform and the course design (MoocGuide, 2015). This community building can be obtained via a round of introductions within the forum. In order to get a quick overview of the heterogeneous target group, a supplementary short demographic survey can be introduced at the beginning of the course. The data can be processed and interpreted automatically.

The first unit should cover the week before the start of the MOOC and the first weeks of the MOOC. As Lackner et al. (2015) show the participant’s activity diminishes from week 4 on. It is in the first four weeks that participants mostly perceive the feeling of being overwhelmed by an information overload. This overload might also be seen as one of the reasons for participants to abandon a course (McGuire, 2013; Salmon, 2007, p. 39). The moderators should be prepared to cope with the high number of posts, thus input, in the first four weeks as figure 2 shows. During this period, it might be necessary to work in a team to help participants on a technical-administrative and content-related level, e.g. regarding registration, first attempts in the forum or with quizzes and content-related questions. This holds especially for the peak consuming and production times as illustrated in figure 6. Instructors should decide beforehand if they react to the messages in a specific time frame or according to their personal time resources. In both cases, they have to announce their strategies in advance, i.e. at the beginning of the MOOC, in order to keep the participants’ frustration level that normally grows when they are waiting for an answer. The installment of a FAQ forum thread might help as well.

Stage 3 (Information exchange), stage 4 (knowledge construction) and stage 5 (Development) are a second bundle. The instructors should then keep in mind that not all registered participants become active and just a small percentage completes the course. It is not everybody’s intention to complete a MOOC as Colman (2013) discusses. Several inducements and lurking or browsing participants are a normal phenomenon in MOOCs; the certificate that requires active participation is not the most important reason to register for a MOOC. Nevertheless, the instructor should schedule a weekly post that announces the program of the week and the upcoming deadlines in order to help students following the different discussion threads. The research study by Khalil, Kastl and Ebner (2016) is considered as emphasizing evidence. The authors clustered MOOCs participants and found a group of students who are more involved in discussions than the others. These students were named *sociable* students.

In order to organize forum discussions, rules of conduct for the forum should be set and clearly communicated before the course start. These rules might cover the prohibition of violent, politically incorrect, homophobic, racist, illegal, or pornographic contributions as well as an explanation of the

forum's structure. Moreover, rules should be stated inside forums about how to open a thread and when, so that the instructor can get in contact with the learners without delays.

Finally, the forum's borders should be opened as the forum is often limited to the course and the integration of supplementary resources is difficult. A hashtag created for the course, such as #GOL2014 for the scrutinized MOOC, helps participants connecting outside the course and form smaller networks according to, amongst others, personal interests, level of expertise, geographical background (Guàrdia et al., 2013). These smaller groups help them to organize themselves and foster interaction, collaboration and communication.

CONCLUSION

Forum discussions are an important part of each online learning setting as it helps to transfer the feeling of being part of a learning community from analog to digital learning settings. Given that, one of the disadvantages of online learning is the lack of face-to-face communications.

However, discussion forums play an important role to guarantee interaction and foster communication, thus collaboration between learners and instructors as well as learners themselves. Gilly Salmon's traditional *Five stage model* regarding e-moderation is primarily tailored to small learning groups in a rather traditional, private course setting. As MOOCs differ from traditional courses in terms of their instructional design (Kopp & Lackner, 2014), the moderation concept has to be adapted to the MOOC specific requirements highlighted in this paper. By getting this adaption done, forum discussions might help establishing individualized support for participants, fostering interaction and collaboration among learners, and, thus, supporting self-regulated learning. Additionally and besides this research work, the lead management of iMooX is looking forward to enhancing social communications among MOOC stakeholders (Khalil & Ebner, 2016b). However, in terms of limitations, it has to be stated that the reflections drawn upon this topic rest upon the data fetched from only one MOOC at the Austrian MOOC-platform. Further research in this area is not only preferable but absolutely necessary.

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