MASSIVE OPEN ONLINE COURSES: LEARNERS PARTICIPATION

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ABSTRACT

Massive Open Online Courses (MOOCs) have become a major international focus of investment and development in the area of learning technology. Despite a lack of research into effectiveness and assessment of outcomes, many educational institutions have joined the race to implement and deliver such courses. A wide range of different subjects can now be studied free of charge by anyone with interest to learn. Expectations for the benefits of MOOCs have run high, including their potential as a disruptive technology and their ability to solve educational needs in developing countries. However, in practice most MOOCs offer very traditional learning approaches and issues such as learner participation and retention are proving to be problematic. This paper provides a brief qualitative assessment of two different MOOC approaches focussing in particular on data relating to learner participation in forums and quizzes. The two approaches investigated are; firstly, an earlier comprehensive report from University of Edinburgh (using previously published data drawn from 6 courses) and secondly, from the University of Warwick (presenting new data from Moodle-based Computing for Teachers MOOC (CfT)). CfT MOOC is been run in two parallel modes: the tutor supported mode (in real-time Google hangout sessions) and the ‘traditional’ peer-supported mode (in online discussion forum). We investigate certain features between these two conventional institutions’ courses with respect to their operation and levels of learner participation. It has been observed that using forums in Massive Open Online Courses help motivate learners to continue their participation towards completion of the course. Advice from fellow students can be encouraging, however it can also have a negative effect when insensitive or misleading comments are posted.

Keyword: Massive Open Online Course, MOOC, discussion forum, quiz, learner participation, dropout rate, CfT
1 INTRODUCTION

The concept of Massive Open Online Courses (MOOCs) came “originally from academic research in the early 1960s with people linking to others using computer to listen, discuss and learn about certain topics of interest” [1]. Technological improvement in education has given many people worldwide access to free online learning in a wide variety of subjects [2]. As noted by Kop, “MOOCs provide a unique platform for people of similar interest to study, learn and interact together on a particular topic of interest… participants cut across different organisations around the world”[2]. MOOCs are a variety of distance learning education, some of which can register hundreds of thousands of participants in a single course [3]. “The intention of instruction-based MOOCs is to provide access to as many people as possible to free, high quality, online courses; with contents and lecturers that most learners could not otherwise gain access to”[2]. MOOCs offer opportunities for people in remote areas and developing countries to have access to online quality education [4], however, drawbacks include issues with poor Internet connectivity and lack of provision in most languages. People with inspiration to achieve more in their careers or those wishing to learn more for personal development also have the opportunity to do this through massive open online courses [5]. It has been predicted by some that the introduction of MOOCs will change the nature of traditional elite universities from being establishments for the affluent and privileged few to becoming free and accessible to virtually everybody [1]. MOOCs have grown increasingly with, according to Ryan [1], Coursera continuing to grow at the rate of over 6,900 new participants (Courserians) per day. Coursera is just one of the increasing numbers of MOOC providers offering platforms for a diversity of open online courses [6]. MOOCs started from a background of collaborative online learning with people interacting via the Internet and being exposed to different views, opinions and ideas [2]. Early MOOCs were collaborative, networked learning experiences with knowledge generated by participants throughout the network according to a connectivist approach [7]. This type of MOOC is now often referred to as a cMOOC. However, the majority of current MOOCs have “moved towards traditional educational systems, as the courses are like shorter version of the traditional courses delivered which are underpinned by academic researchers and experts in the area” [2]. This type of conservative, instructor-led course is referred to as xMOOC. MOOCs providers such as Edx [8], continually monitor their courses and participants’ experiences in order to improve the learning structure and to improve interaction with the systems by the learners. However, there are still many concerns regarding the use and effectiveness of MOOCs such as the absence of pedagogy, lack of effective support and, as yet, despite the great proliferation of such courses, a dearth of research into all aspects of these courses [3].

Our work here builds on the recent paper by Onah, et al., [9] which investigated dropout rates of massive open online courses by considering the learners behavioural patterns. That paper discussed reasons for dropout in MOOCs. The contribution of this paper is to discuss leaner participation in MOOCs and give a simplified insight of the patterns of learning and to investigate the effect in MOOCs participation. One particular area of concern is the large dropout rate generally observed in all MOOCs [9]. Jordan’s work on MOOC dropout indicates that most MOOCs have a completion rate of less than 13%[10]. While there are many factors at play (such as casual enrolment of many people who never start the course) there is undoubtedly room for improvement in engaging and retaining learners. In order to gain a better perspective on learner participation this paper considers some specific approaches to MOOCs. In particular, data for participation in quizzes and forums is presented and discussed.

The first course considered is the University of Edinburgh MOOC report and secondly the Computing for Teachers (CfT) MOOC offered by the department of Computer Science at the University of Warwick, U.K. and hosted on a Moodle platform [11]. This CfT course was designed specifically to assist and support teachers of Computer Science. The structure of this course and data relating to participant engagement is compared to data for a set of quizzes conducted and also of forum participation.
The paper is structured as follows. Firstly, a review of literature on MOOC issues and concerns relating to user participation is presented. The courses of interest (Edinburgh and CfT MOOCs) are then introduced, describing the basics of the approaches taken in these courses. Preliminary CfT MOOC data on user participation in forums and quizzes is presented to indicate participation levels. A brief comparison of employing similar patterns of learner engagement in the learning structures between Edinburgh and CfT MOOCs is discussed. The paper concludes with a discussion of the findings and suggestions for future work.

2 LITERATURE SURVEY

This section will present a brief review of some of the main issues relating to user experience and participation in MOOCs. The main idea was to investigate the various paradigm of learning seen in MOOCs and also reveals the various ways of learners’ interaction within the MOOC format of online learning.

2.1 Participants Participation in a MOOC

MOOCs generally aim to provide a structured course which is usually spaced over a fixed time period so that learners work through the material at a similar pace. All participants have to complete an online registration to enrol on their choice of course in a particular topic of interest [12]. Participants are made aware that when registering for MOOCs, they are enrolling for a course only and not the actual university delivering the course. Such courses are generally free of charge and do not have enforced prerequisites [13]. Materials can be accessed online or downloaded from the course website, although some times other resources such as textbooks are recommended to participants to aid their studies [1].

At the end of some MOOC programs, successful participants are able to obtain a certificate of completion although a small fee may be required for this. Until recently, MOOCs have not been provided participants with any formal credit for these courses [12]. However, some universities are now considering incorporating MOOCs into their curriculum either by providing formal credit for a standard MOOC or by using a format within a blended learning framework [3]. For example Antioch University has been the first U.S. University to provide credit for a few selected MOOCs through Coursera [14].

MOOCs encourage continuous assessment, regular self-test, compulsory projects and examination. However, the MOOC model which promotes possibly tens of thousands of students per instructor must rely on scalable forms of assessment such as automatically marked quizzes and peer assessment [3]. Several Universities are investigating how participants can demonstrate mastering a topic in order to be granted formal credit for the MOOC study, and this may involve different forms of assessment such as undertaking a formal examination at an invigilated centre for which payment would be necessary [1]. In many cases, financial models have not yet been clarified, but Universities have joined the MOOC movement regardless for fear of being left behind [15].

2.2 MOOCs Operations

In this section we consider how MOOCs are organised and presented. As noted above, there is a variety of different MOOC models and platforms but certain features are commonly observed in the majority of current courses.

MOOCs organise and present online learning materials often provided by a single lecturer to be accessed by thousands of participants in each course delivery. Grover et al., [16] noted that “design choices reflect the assumption of designers about the ways in which people learn, and should be pushed to reflect the state of the art of knowledge in the learning sciences”. Despite the potential for MOOCs to act as disruptive technology in education, the majority of courses currently use very conservative and indeed backward-looking approaches to teaching and learning.
MOOCs are often four to six weeks in duration and the course format generally involves learners watching a series of videos prepared by the course lecturers on the specific topic for the week [1]. Asynchronous learning allows participants to view the materials times suitable for them and their time zone and participants can network with others learning online [4]. A series of online tests is often used to allow learners to check their understanding of each concept presented and to evaluate their progress. Some MOOCs required participants to tackle more substantial assignments or to write comprehensive essay which are then passed on to participating peers for assessment and grading [17]. This method enables participants to receive feedback from other learners and to deepen their own understanding by assessing the work of others [17]. Lecturers may be needed to moderate peer assessment where there are diverse marks and when some participants mark very harshly [1, 13].

2.3 Learner Interaction

Assessment within a MOOC offers one very valuable opportunity for interaction as learners can test and evaluate their progress. However, there are many different ways in which learner interaction occurs. Grover et al., [16] noted that learners communicate with their MOOC instructors through their various personal online learning interactions. A good indicator of a MOOC’s success is participants’ interaction at various levels [4]. A learner’s pattern of interaction can also provide a strong predictor of their likelihood of dropping out of completing the course, however, as noted by Grover et al., “these choices about interaction and assessment are also driven by the learner’s background and intentions”[16].

Inevitably in MOOC most interactions will be through the standard online channels, although “some lecturers tried to organise face-to-face study groups based on participants locations or separate online forums to encourage and promote effective learning attitudes and sharing of ideas with other participants”[1]. Interaction may be with course materials or with other course members. Boyatt et al., [3] emphasise the importance of the social context for interaction leading to teaching and learning in which networking plays a central role. As noted above, MOOCs developed on connectivist principles place central importance on collaborative learning and knowledge creation within the network [7, 18].

One standard provision within MOOCs is the use of forums. In some frameworks, participants may gain additional access to staff through online discussion forums for further explanation of course topics but in others they may be intended mainly for peer support [1, 19]. Engaging in forum discussion, asking questions and posting replies to others is seen as an active and creative form of engagement likely to enhance learning. Grover et al., give an example of how learners push each other’s understanding through forum participation.

2.4 Learning Analytics

A data analytics platform monitors students’ online activities [4]. This provides information on students’ interactions to the instructor. It monitors the students participation, in such aspect as lecture slides viewed, videos watched, forum or blog interactions, quiz submissions, lectures rewound and so on. Feedback received from constantly monitoring data will inform organisers if there is a need to refine the course to the learners’ needs and preferences [4,20]. For example if a large percentage of students keep stumbling over the concepts from certain lectures, then there is an indication that the resource materials should be revised [20].

Learning analytics can provide an unprecedented level of feedback for Universities and colleges [4]. With data analytics, researchers can narrow their studies on the progress of students through their studies, measuring exactly how specific experiences and interactions affect their learning outcomes [21, 22]. Grover et al., [16] argue that in the light of analytic behavioural data from learners using MOOCs, the measurement of traditional learning performance such as completion of courses might not actually reflect accurate student engagement.

Learning interactions and the analysis of collected interaction data is a very important and useful area of research and the large amounts of data that can be collected from MOOC is providing a
major source of input. In the following sections we introduce two different accounts of MOOC provision, presenting and comparing basic data on interaction from both.

3 A REVIEW OF EDINBURGH MOOCs

The information relating to the Edinburgh MOOCs presented in this section is taken from the MOOCs@Edinburgh 2013: Report#1 [23] with additional information from [22]. The University of Edinburgh launched six MOOCs on the Coursera virtual learning environment (VLE) platform in January 2013. These courses ran for 5-7 weeks as "short fully-online courses". The courses were organised among three academic colleges and had an initial total enrolment "of just above 309,000 learners". The Edinburgh MOOC teams delivered six different course structures with course organisers choosing different content delivery and collaboration methods in each case. There is therefore a good deal of diversity within the Edinburgh MOOCs with some using a typical Coursera video based style while others are based more on user-generated input. An evaluation of the Edinburgh MOOCs revealed that "of the 309,628 people who registered on the Edinburgh MOOCs, 123,816 learners accessed the course sites (’active learners’) during the first week of launch—an average of 40% of those enrolled—of whom 90,120 engaged actively with course content during the life span of the courses, and 36,266 learners engaged with week 5 assessments (29% average of initial active learners, with a range of 7-59% across the six courses)" [23]. Here, as reported by other MOOCs including the Warwick CfT course [9], many registered learners never visited or accessed the course site.

The University of Edinburgh became an early Coursera partner joining 13 other Universities in early 2013. It was felt that a partnership with an existing MOOC provider would be preferable to developing an in-house platform providing a better opportunity to enhance the reach of their courses and improve their awareness of new educational delivery techniques. Using an existing platform means that infrastructure, hosting space and administrative tasks are all taken care of. Usage data is also collected and made available to the MOOC teams. The MOOCs were first announced in July 2012 with promotional videos used to describe each of the six courses. All six began on 28th January 2013 and were accessible free of charge to all regardless of prior qualifications or geographical location. The University of Edinburgh had an existing strong track record in online education and innovative technology which they were keen to bring to MOOC development. An initial plan to charge successful learners for a certificate of completion was not implemented as this was still under discussion in Coursera. However, this is and other developments such as use of Coursera's signature tracking for identity verification are under consideration for future runs of the courses [23].

Curriculum design for all the Edinburgh MOOCs was developed from scratch, drawing on experience from existing academic programs where appropriate. Additional checks were carried out for all courses to ensure the rules of Coursera were met.

4 COMPUTING FOR TEACHERS (CfT) MOOC

The Department of Computer Science, the University of Warwick, and U.K developed the CfT MOOC. Its aim is to provide continuing professional development for teachers, specifically, teachers within the U.K. who are preparing to teach the new computing curriculum in schools from September 2014. The CfT MOOC is therefore a rather different course in that it has a specific audience in mind (although registration is open to all). It might therefore be supposed that there is some similarity in background and in levels of self-motivated learning skills. The course covered three strands: computing concepts, programming (using Python) and classroom pedagogy. A further distinguishing feature of the course is that it was run in two parallel modes: - the "traditional" MOOC mode with peer support, and “supported” mode with real-time tutored programming laboratory sessions [9]. The course started in October 2013 with an introductory session. Eight subsequent sessions were released at fortnightly intervals which were felt to provide a balance between the need to provide flexibility for busy teachers and the concern that momentum should not be lost.
The CfT MOOC was presented on a Moodle platform. This provides flexibility and has the advantage that Moodle is already a widely used learning environment which is likely to be familiar to many participants. However, it means that time must be spent taking care of aspects which might be managed by a MOOC platform provider. One reason for this decision was that, although the University of Warwick is a partner in the FutureLearn MOOC platform, the initiative had not got underway at the start of planning for CfT. As with the Edinburgh courses, the CfT MOOC hosted by Moodle platform is also design from the beginning, there have not been any existing platform in the past, it is a new system introduced in the department to aid and assist teachers to learn and advance their knowledge to the changing curriculum in the teaching of Computer Science in schools. Transcripts are used within CfT MOOC to further explain in text format the lecture videos for clearer understanding of course concepts.

A further difference with a “go it alone” MOOC is that the course is not offered and publicised on an established site where it is likely to be found easily by those interested in participating. Information on CfT was made available through the U.K Computing at Schools organisation (CAS) and leaflets were distributed at the CS conference in June 2013. Wider publicity was not undertaken as it was considered wise to keep numbers fairly low for the course. The CfT MOOC initially registered 552 students. 228 female, 322 male, 1 prefer not to say and 1 unknown participant. The level of activity participation varies from function-function. At the beginning of every activity we registered high numbers, but has the process progresses dropout is observed in the subsequent activity, for example as shown in fig.1 & fig.2 the quizzes and forum participation from the two CfT MOOC modes reveals reduction in participants contributions and attempts. For example, the quizzes in fig.1 shows initial attempts of 145 in computing concepts in the first session of the course then dropped down to 120 in computer hardware in session2, these trend continues till the end of the course.

**Fig. 1** Shows the quiz participation of the learners in CfT MOOC

<table>
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<tr>
<th>Computing concepts</th>
<th>Python</th>
<th>Computer hardware</th>
<th>Programming</th>
<th>Boolean Algebra &amp; Programming in list</th>
<th>Data structure &amp; Python dictionaries</th>
<th>Computing concepts</th>
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Number Attempted
Fig. 2 illustrates the discussion forums in the CfT MOOC.

The forum post is a combination of the two CfT MOOC forums, the traditional mode and the tutor mode (fig. 2).

4.1 Observations in Forum & Quizzes

As observed in CfT MOOC about 13% distinct active users posted a comment and had an estimated average contribution of about 20% participants engaged in the discussions forum as recorded in fig. 3. The general discussion has the highest contribution of 45% while the least is teaching with 4% (fig. 3). The forum within the CfT MOOC is no exception in the sense of supports from fellow learners and tutors. Tutor sometimes uses Google hangout to discuss with learners to assist in any challenges they encountered in the course sessions [9]. CfT only recorded a handful of about only 13% (71) distinct users made posts in the forums out of the 139 number of contribution of over 500 registered participants. CfT MOOC recorded about 190 forum posts, we see incredible low numbers compared to what we might have expected. We probably should have prompted more discussion with weekly topics to engage the learning participants. In terms of visit, there were about 7000 distinct visits to the CfT MOOC forums. In our observation in the quizzes the average percentage contribution was about 7% (see fig. 4). As the courses progresses the quizzes participation rates drop down as seen in fig. 4.

Fig. 3 Percentage illustration of CfT forum (Percentage of total responses shown in each forum)
Participants attempts and % rate of quizzes undertaking in CfT MOOC shows that 37% of participation is from computing concepts and Python programming while the other 63% is from the rest of the quizzes.

5 COMPARISON EDINBURGH AND CFT MOOC

There are similar patterns of learner engagement in the learning structures. Example, employing the use of quizzes and forums to support learning were done in a similar way. Though Edinburgh MOOC has larger participants as compared to CfT MOOC, therefore most findings and analysis were different in results. Though CfT MOOC was developed predominantly for teachers with the hope they will be more committed and motivated to continue, but similarity in dropout rates were observed even with vary registration figures between the two MOOCs.

Also similarly the volume of participants presence in the forum seems to follow the same patterns in both forums as the rate of participants posting differed considerably from forum to forum. One major difference between both MOOCs, which also encouraged learners as mentioned in Edinburgh forum is that “participation on the forums may be used to contribute towards overall assessment”, while in CfT MOOC is not so. One similarity of CfT to Edinburgh, “only learner activity in the data has been analysed”[9, 23]. However, Edinburgh is larger in size and number in terms of participants as compared to CfT, while they are having a total post of 73,038 posts created from the six course forums participated by 25,242 [23], CfT only recorded a handful post about 71 distinct participants. Do to the elaborate participation they were able to obtain useful information such as voting on the forums per activities [23]. Forums as mentioned in this paper are a key element of learners’ interactions and collaboration towards exchanging ideas and knowledge [24,25]. Forum according to Edinburgh MOOC report [23, 26] and CfT MOOC is an area to facilitate course discussion, though the activities are optional to all participants in accordance with their comfortable preferences. Edinburgh report pointed out that just only about 15% active participants engage in the discussion and posted comments [23], while CfT has a similar range of about 13% distinct active users posted comments as mentioned earlier.
6 CONCLUSIONS AND FURTHER WORK

MOOCs have grown rapidly both in terms of the number of courses delivered and also the number of participants. Despite the attention given to MOOCs they are still a relative newcomer to the established world of on-line distance courses. MOOCs have encountered difficulties of being accepted as legitimate on-line courses and adapting existing pedagogies for the large-scale delivery of courses. Measuring and evaluating the effectiveness of these courses is becoming important to understand their role in on-line course delivery.

This paper has considered different deliveries of MOOC courses using Edinburgh platforms as the base and CfT MOOCs. Both approaches include similar features but these have been deployed in different ways according to the specific needs of the course. The opportunity of participants to interact has provided an opportunity to understand participants’ levels of understanding and skill levels, and to improve future on-line course delivery by building experience of these courses format [22, 23].

To understand the Computing for Teachers MOOC we have begun to analyse the activity data including participation in discussion forums and quizzes. By analysing the data available from these activities within the course we have tried to identify patterns of activity within the course and inform future MOOC development. By tracking participants across multiple sessions within the course we are building an understanding of the knowledge acquired and skills developed. In particular, the messages posted in the forum have been invaluable in terms of identifying common problems and misunderstandings allowing us to augment the existing material as appropriate. Further quantitative and qualitative analysis is planned. Finally this reveals that the participation rate in MOOC seems closely related across both platforms. The method of analysis of quizzes and forums follows similar patterns. The dropout rates investigations were followed in similar patterns.

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REFERENCE


