Keeping Them Clicking: Promoting Student Engagement in MOOC Design

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Abstract

The MOOC (Massive Open Online Course) is the latest buzzword in distance education, bringing together, for the first time, high quality 'Ivy League' providers, online education and a low-cost model.

MOOCs align with the approaches to teaching and learning advocated by the Kronberg Declaration (UNESCO, 2007), whereby learners 'play an ever more active role in knowledge acquisition and sharing' with 'the role of teachers and instructors decreasing'. While the basic design of individual MOOCs may not have moved too far beyond traditional pedagogical approaches, being largely lecture-based in format, the concept itself is learner-centred, liberating students to access and engage with education.

However, to date, it would appear that MOOCs are falling short of these lofty ambitions for a radical shift in the way that education is delivered. The evidence strongly suggests that any reasonable measure of learner engagement in MOOCs is underwhelming when compared to the massive number of enrolments that many have secured.

With these issues in mind, the authors this summer (2013) ran an eight-week MOOC, which generated data for a randomised control trial that considers the impact of three factors on student engagement:

1) Workload

2) Task design

3) Level of and nature of facilitation

As part of the design, five different user groups were randomly created to investigate the contribution of each of the three factors above to the level of student engagement and to determine which, if any, had the greatest significance. Engagement was measured by tracking user activity and the collection of student feedback. This paper reports on the initial results of this experiment in MOOC delivery.

1. Introduction: Background to MOOCs

The MOOC (Massive Open Online Course) is the new darling of distance education, bringing together, for the first time, high quality 'Ivy League' providers, online education and a low-cost (for participants, although not necessarily for the institution) model. In the past six years the number of MOOCs being offered by universities around the world has expanded into the hundreds. Three MOOC platforms are leading the race, Coursera, Udacity and EdX, and all three are associated with the highest ranking US universities. At time of writing (September 2013) Coursera offers over 403 courses from 86 different universities and institutions and has over 4.6 million registered users (figures from Coursera website, 6 September, 2013). EdX represents a partnership between Harvard and MIT, while Udacity, like Coursera, started at Stanford.

A MOOC aims to have large-scale interactive participation and open free access via the Internet. Rather than simply making resources or courseware freely available, MOOCs create the opportunity for learners to take part in learning activities, interact with other learners and connect with course instructors, albeit in a limited sense. Generally MOOCs have no fees, prerequisite qualifications, formal accreditation or predefined levels of participation (Liyanagunawardena et al, 2013). Taking part is voluntary and depends on the interest and motivation of the learner.

The term MOOC was coined during a course on 'Connectivism and Connective Knowledge' run by the University of Manitoba in Canada in 2008, and the design was based on 'connectivism', an approach to networked learning advocated by the course organisers, George Siemens and Stephen Downes (Littlejohn, 2013). 'Connectivists advocate a learning organization whereby there is not a body of knowledge to be transferred from educator to learner...instead, knowledge is distributed across the Web, and people's engagement with it constitutes learning' (Kop, 2011, p.20). The MOOCs that have emerged from this philosophy of learning tend to be open in nature, non-hierarchical and largely learner-defined (Littlejohn, 2013).

Even in the short time of MOOCs' existence, however, a second type of course has emerged, with a distinct pedagogical outlook. The original MOOCs based on the connectivist approach, and now known as cMOOCs, have been overshadowed by their 'instructivist' cousin, known as the xMOOC. In xMOOCs 'learning goals are

predefined by an instructor, learning pathways structured by environment and learners have limited interactions with other learners' (Littlejohn, 2013, p3).

2. Student engagement and attrition

There is growing literature on MOOCs, focusing on challenges and trends, pedagogic approaches, technological issues and case studies. To date, the evidence emerging from this research strongly suggests that compared to the massive number of enrolments that many courses have secured, completion numbers are underwhelming (see Table 1: Student Attrition). For example, a paper from Duke University describing the development and delivery of a Bioelectricity MOOC reveals that only 4.41% of enrolled learners were still engaged after four weeks, as measured by scoring greater than zero in a online quiz (Belanger & Thornton, 2013). According to Daniel (2012), an MIT Circuits and Electronics MOOC started with 155,000 registrations, had 23,000 attempt the first problem (14.8%) and just 7,157 (4.6% of registered) pass the course.

Across a range of courses, the number accessing the course sites, even in the first week, is often a minority of those registered, and those actively engaged with the course content in the form of completing tasks, quizzes or posting on forums is a smaller number again.

To put the issue of attrition in context, it is worth examining the literature on distance and online learning in general. What becomes evident is that while the extent of MOOC attrition is unprecedented, the problem is not new in distance learning. Simpson (2004, p.80) reports that within the Open University (OU), 'The proportion of students who submit assignments on a typical course is about 60% of the starters for the first assignment, falling to around 40–50% for later assignments' (OU Institute of Educational Technology Student Research Centre, 2000). In their examination of learner attrition in online programmes, Bernard et al (2004) identified 'Readiness for online learning' as being a key element influencing whether an individual would complete the course of study. Such readiness, they proposed, included four dimensions: IT skills; organisational and cognitive strategies; attitudes to online learning; and interaction with tutors and classmates. These factors are also likely to be significant in relation to MOOCs. In addition, given that one of the defining

characteristics of MOOCs to date has been unrestricted admission, students from diverse backgrounds with a vast range of academic and life circumstances are likely to sign up. Couple this with the no-stakes nature of the courses and it is not hard to see why attrition rates have been so high. How then can MOOC designers seek to maximise the chances that learners will complete the course? This is the issue we seek to explore in this paper.

3. MOOC overview

The MOOC under scrutiny consisted of an eight-week programme considering the notion of identity through an exploration of history, literature, film, sport, art, music and dance, language and landscape. Mindful of the high attrition rates of previous MOOCs, the course designers sought to explore whether specific elements of the course design could help boost the completion rate.

Induction and orientation

Bearing in mind the issue of readiness for online learning and the problem of cognitive overload identified by Tyler-Smith (2006), the course designers included a step-by-step induction process to introduce students to the virtual learning environment and prepare them for studying online. In addition, for the first week of the course, the only content offered was brief introductory material to give students time to acclimatise, introduce themselves on the forums and familiarise themselves with their new surroundings.

Course structure/pedagogical aspects

The course design sought to include elements of both xMOOCs and cMOOCs. Course designers felt that a hybrid approach would offer the structure that many people required, while also providing the freedom to explore more widely, engage in peer learning and take a more self-directed approach (Fischer, 2011). They were mindful of research by Struyven et al, which found that a varied educational environment is more conducive to learning (2008).

For each session, students were provided with four to six videos, most of which were around 10 minutes long. The goal was to provide a broad overview of the subject matter to orient the student in preparation for further study if desired. Accompanying each video were links to supplementary resources to allow for further exploration.

In order to provide students with a tangible goal for each session and aid the learning process (Roediger and Karpike, 2006), a multiple-choice quiz based on the information in the video presentations was included. To help encourage students to progress through all eight sessions, those scoring 40%+ in all quizzes would qualify for a certificate.

Each session was also accompanied by up to four forum-based tasks. These included two discussion questions, which aimed to give students an opportunity to make connections between the theme of each session and its relationship to the notion of identity. The other forum activities were the Quest and Think tasks. The Quest task sought to incorporate some of the principles of gamification into the course and thus increase engagement and participation. Gamification 'takes the motivational properties of games and layers them on top of other learning activities... to direct the attention of learners and motivate them to action' (Landers & Callan, 2011, p. 421). The Quest task was an inquiry-based activity that required students to solve a puzzle, in the process conducting research, sharing findings on the forum and, hopefully, engaging in incidental learning (Fischer, 2011).

Think tasks were questions or activities that involved an element of reflection or required students to incorporate their own perspective in some way. The rationale was to open the course up beyond what was presented by the 'experts' to tap into the wealth of information that the participants brought to the course and enable them to learn from each other (Grünewald et al., 2013).

4. Research methodology

In order to explore how different aspects of course design operate, a randomised control trial was conducted to discover the impact of various pedagogical interventions on student engagement. Students were randomly assigned to four groups with slight variations in workload, task design and level and nature of facilitation:

Group 1 – video presentations, quizzes and discussion forum, no Quest or Think tasks and no facilitation (n=487)

Group 2 – video presentations, quizzes, discussion forum, Quest and Think tasks, but no facilitation (n=489)

Group 3 – same as group 2 plus input from a non-expert facilitator (n=491)

Group 4 – same as group 2 plus input from the session author (n=554)

A fifth group (Group 5) was also established comprising students who joined the MOOC after the groups were created. Group 5 received the same content as groups 2-5 and sporadic facilitation, sometimes from the session author, other times from a none-expert facilitator. This ultimately became the largest of the groups (n=1,279).

The research question centred on whether alterations to elements of the course design would affect the engagement levels of students. Specifically, there were four hypotheses:

1) There is a relationship between workload and student engagement.

2) There is a relationship between task design and student engagement.

3) There is a relationship between level of facilitation and student engagement.

4) There is a relationship between nature of facilitation and student engagement.

Engagement was measured by tracking user activity and examining completion rates. The analysis provided in this paper is a snapshot of a huge amount of data generated by the MOOC, which continues to be subject to an in-depth analysis.
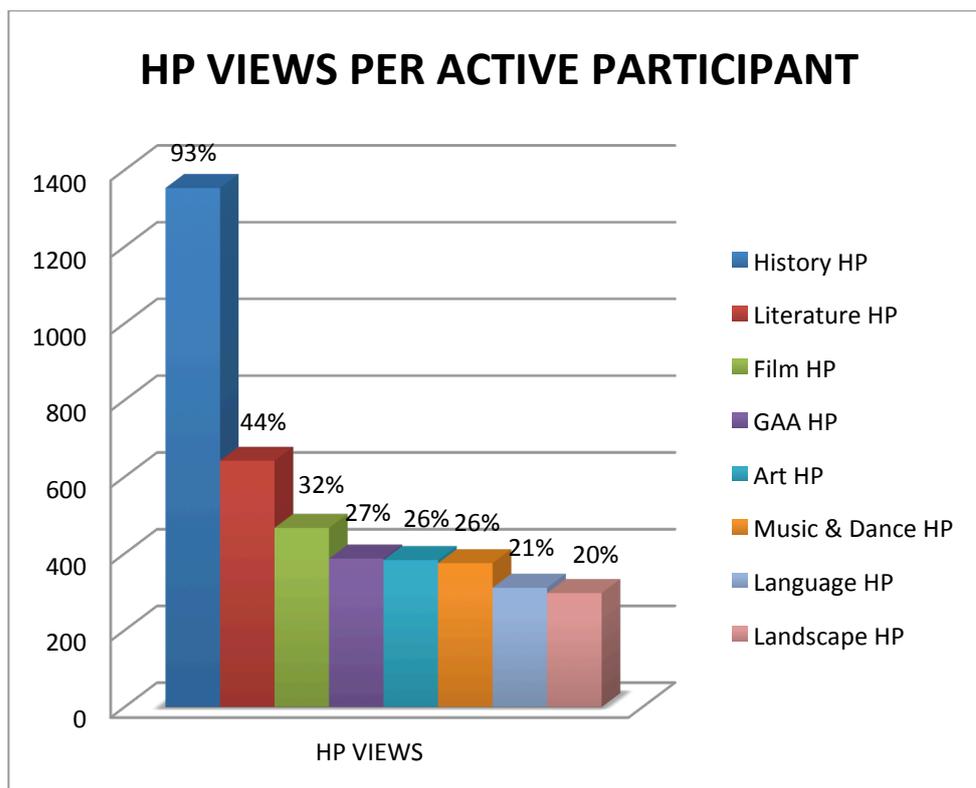
5. Findings: Student engagement in the MOOC

The first course content came online in June 2013. A total of 3,300 students registered from 68 countries across the world. The vast bulk of these came from the US, the UK and Ireland. Demographic data collected through a survey during induction week (n=963) revealed that 70% of participants were female and the vast majority (77%) were aged 35 or over. Of those who registered, 1,849 (56%) never logged into the course, so only 44% of registrants could be considered to be active participants. This is a common phenomenon in MOOCs. Across five MOOC run by Edinburgh University, 'conversion from peak enrolment to total active participation was 53%, with a range of 46-81% across the individual courses' (2013, p.21). A subsequent survey of those who did not participate (n:825) revealed that lack of time (72%) and illness or family crises (8%) were the main reasons given for non-participation. For the discussion of this paper, it is useful to consider only active participants.
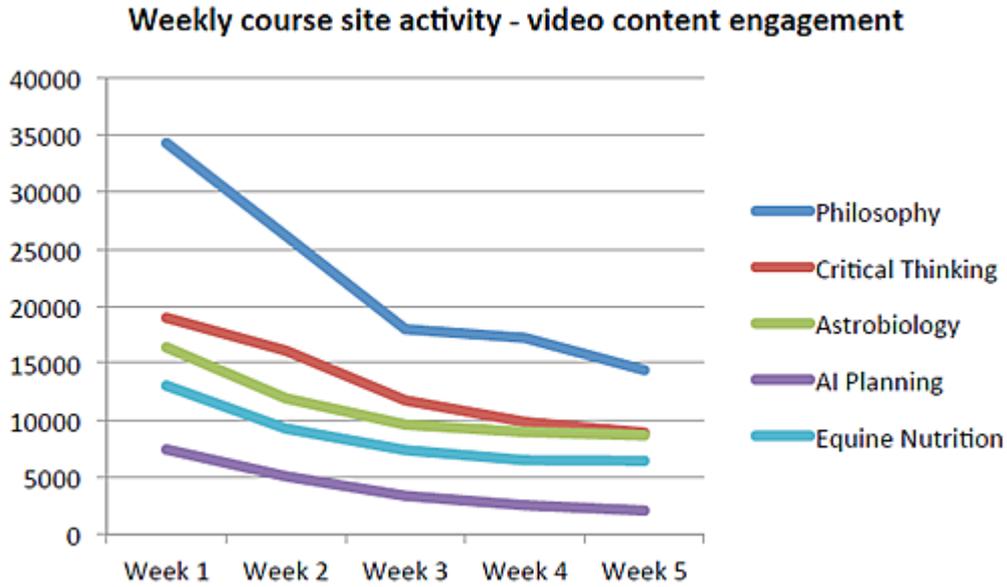
Overall student activity

Each session had its own home page, which served as a launch page for all of the resources and tasks related to the session topic. By examining session home page views, video plays, quiz attempts and forum posting over the course it is possible to get a sense of how engaged students were. What emerges is that there was a sharp drop in activity between week 1 and week 2, followed by a slight decline between weeks 2 and 3, and thereafter activity remained largely stable (see Figure 1: Viewed Session Home Page). This pattern is consistent with MOOCs in general, as can be seen from Figure 2, which shows the trend in video views for five Edinburgh MOOCs (2013, p.22). For all the MOOC activities measured, such as watching at least one video, attempting the topic quiz and posting in the session forum, a similar pattern emerged.

Figure 1: Viewed Session Home Page

HP VIEWS PER ACTIVE PARTICIPANT

History HP
Literature HP
Film HP
GAA HP
Art HP
Music & Dance HP
Language HP
Landscape HP

Figure 2: Edinburgh MOOCs

Weekly course site activity - video content engagement

Activity by groups

Analysis of the groups, each of which received slightly different treatment on the course, revealed the similar pattern of massive drop-off in home page views between weeks one and two. This was repeated in the video presentation views, quiz attempts and forum participation.

Figure 3: Viewed Session Home Page by Group


HP PAGE VIEWS BY GROUP
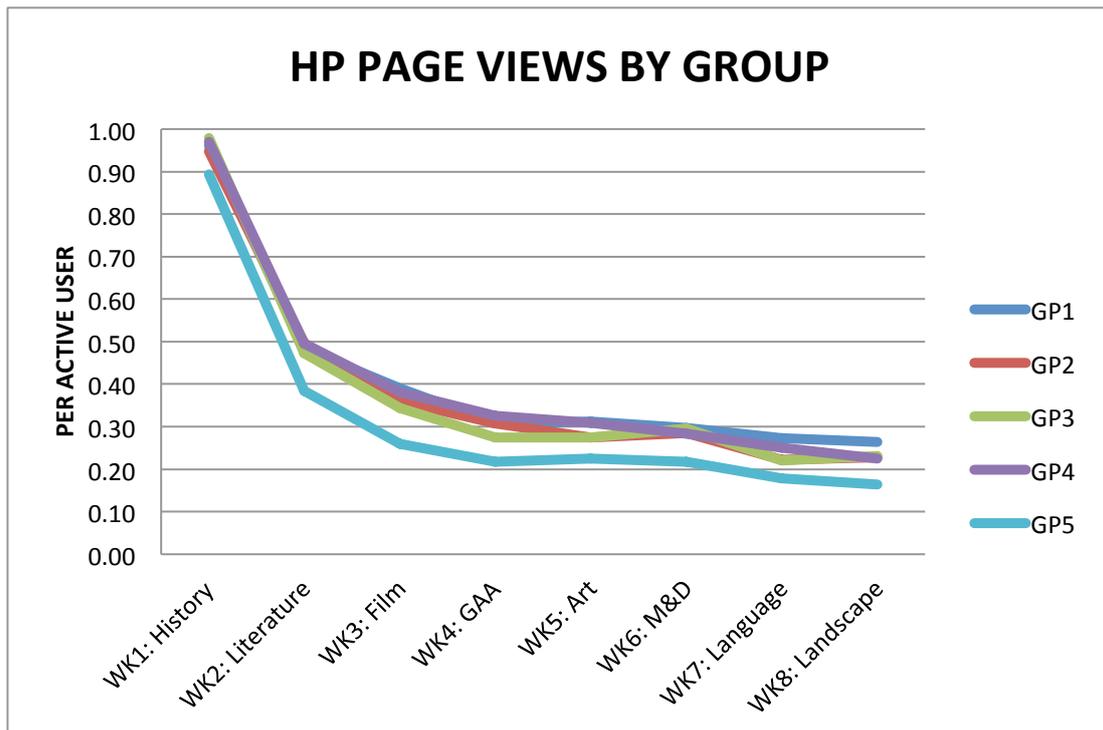
Comparing the aggregate activity between the groups, some differences can be observed. When the tasks common to all groups (i.e. excluding the Quest and Think tasks unavailable to Group 1) are considered together, we can see that Groups 1 and 4 show the highest levels of participation. This pattern carried through to course completions; while 18% of active students from groups 1 and 4 achieved a certificate of completion, the percentages were slightly lower for groups 2 and 3 (15% and 16% respectively) and fell to 9% for group 5.

Figure 4: All Group Activities Excluding Think and Quest
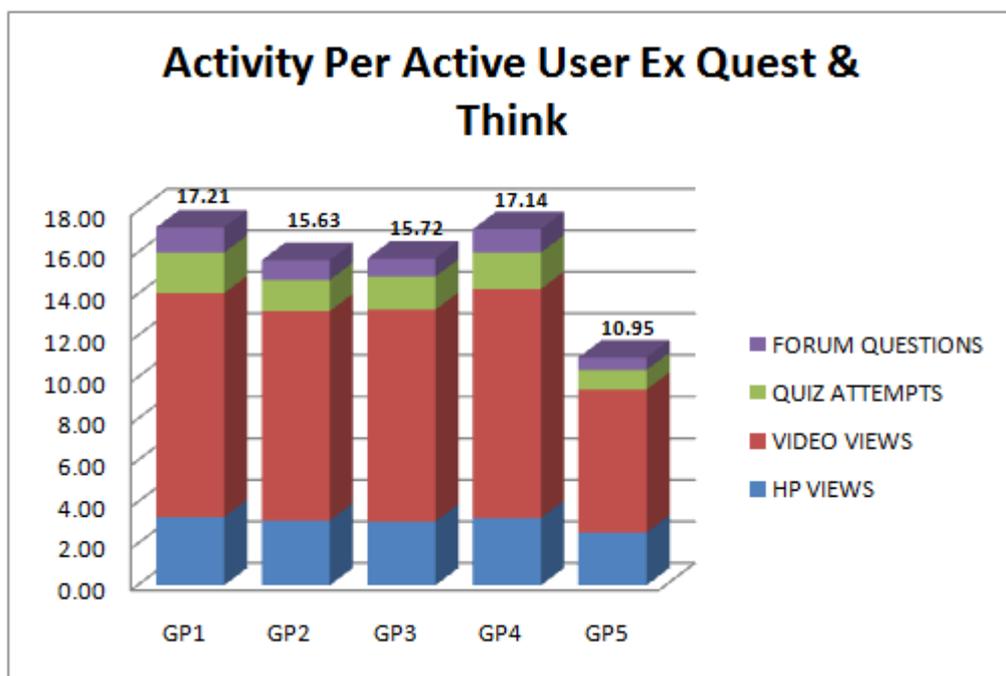
In terms of engagement with the various forum tasks, Figure 5 shows the trends over the course of the eight weeks. While the standard forum questions and Think tasks show a similar pattern of participation to the course in general, the gamified Quest tasks show a more erratic pattern of participation, that falls and rises throughout the course and is ultimately almost as high at the end as it was at the start.

Figure 5: Participation in Tasks
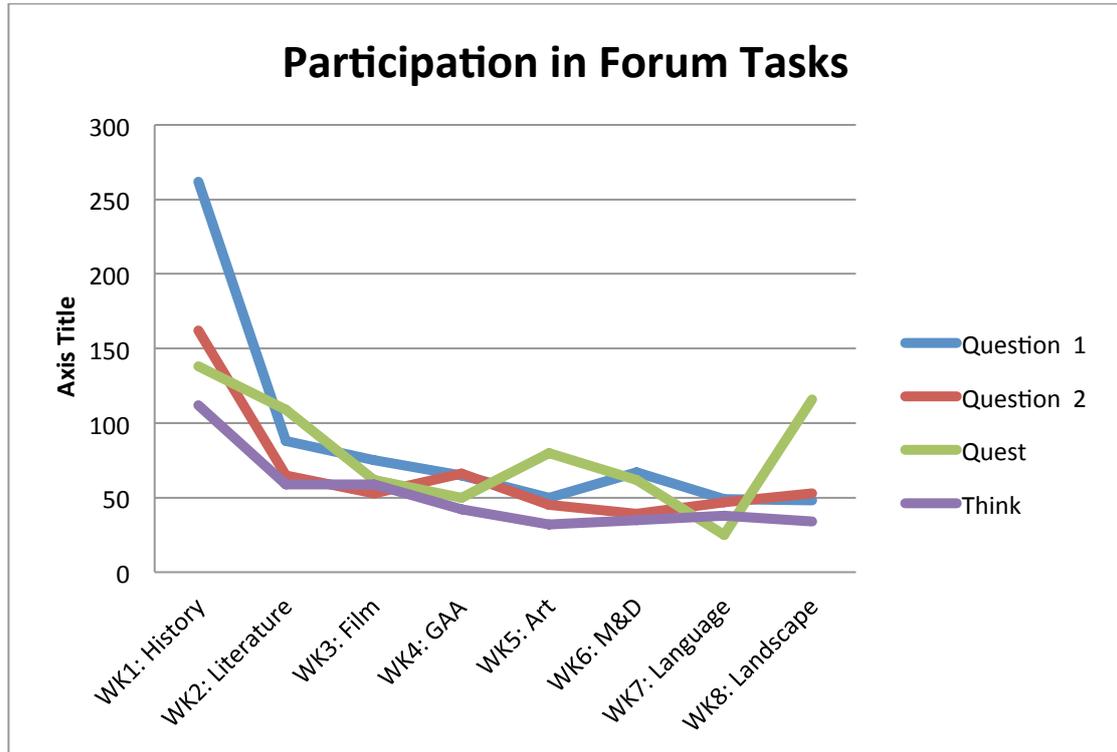
6. Conclusions and further work

The key aim of this research was to explore whether different forms of course design would have an impact on learner engagement and levels of attrition, and to test the four hypotheses described above.

Taking the first hypothesis – the relationship between workload and student engagement – the initial analysis of the data suggests that the group with the lightest workload (Group 1 – no Quest or Think tasks) had the highest overall level of participation. Moreover, when activity levels groups are compared across all groups and all tasks, group 1 showed a higher level of activity than groups 2 or 3, even though group 1 students were assigned fewer tasks. This suggests that in a course of this nature the perception of workload has an influence on engagement. Despite the fact that most of the tasks were optional, their existence appeared to create a sense of obligation on the participants, which left them feeling time-pressured. This was reinforced in the student feedback and support e-mails and accords with the finding of the survey of those who didn't participate, 72% of whom cited insufficient time as the reason.

With regard to the hypothesis examining the relationship between task design and engagement, the only task that did not follow the general trend in the pattern of participation was the Quest task. It is possible that the elements of gamification involved in the Quest task were a factor in sustaining student participation and this would appear to be a useful avenue for future research.

In relation to the hypotheses regarding the level and nature of facilitation, the findings suggest that having a subject expert as a facilitator may have a positive impact on student engagement. In contrast, the similarity of the activity levels of groups 2 and 3 suggests that having a non-expert facilitator has little effect on participation. In fact, the most active group of all (Group 1) received no facilitation. One of the findings of the University of Edinburgh MOOCs was that academic facilitation did not impact on student participation (2013, p.23). This appears to be an area where MOOCs diverge from online learning more generally. As Arbaugh (2010) points out, active facilitation is a key component of successful online courses, requiring instructors to 'review and comment upon student comments, raise questions and make observations to move discussions in a desired direction' (p.1236). It may be the case that the vast scale of MOOCs and the diversity of learning experiences their participants bring to them make it a challenge to provide a level of online facilitation that is capable of enhancing the student experience.

It is also worth speculating about possible reasons for the generally low level of participation for Group 5. One possibility is that many of the group members started too late to fully engage with the course. Analysis of the start dates revealed that 26% of group 5 joined the course after the first week of the course. Although the course remained open for 6 weeks after all the content had been delivered to allow late joiners time to complete, it may be the case that they were out of sync with the course schedule and wider community and so were less likely to engage. In addition, it may be the case that late starters are less likely to have gone through the induction process and thus may have been less prepared for the course.

Further work

The conclusions we can draw from this initial analysis are tentative and further work is required. Other data collected from those who completed the course may provide insights into the learner experience, and the discussion forums may also provide a rich source of data on both the experience of taking part in the MOOC and the motivations

of participants. A cursory examination of participant feedback shows that there is scope for exploring the intrinsic motivation for taking part in the MOOC – emotional responses to the experience and positive comments on making meaningful connections, as well as links with personal identity are all observable. This issue of learner motivation also seems likely to have a significant influence on attrition and requires further investigation. 'Many students have enrolled on the basis of professional interests and objectives, but "hobby" learners still tend to form the largest group on most courses' (Universities Report, 2013, p.13).

While this paper has focused on instructional design aspects of MOOCs, analysis of the secondary data on student demographics highlights the significance of the learners' personal circumstances in their ultimate success. One observation noted was that although unemployed people represented only 5% of those who registered for the MOOC, they represented 23% of completions. This contrasts with those in full-time employment, who represented 46% of the MOOC population but only 13% of completions. These statistics reinforces the importance of the availability of time as a factor in engagement.

A second, potentially interesting, observation is that 47% of those who completed possessed a post-graduate qualification, compared with 40% of the population as a whole. This suggests that perhaps the MOOC format is best suited to those who already possess the skills to be self-directed learners. This is important to consider at a time when MOOCs are sometimes touted as a panacea for a range of educational ills. Indeed, it underscores the need to consider the intended audience when planning a MOOC – would it be useful to implement more formal stratification in MOOCs to better cater for the mixed abilities and diverse backgrounds of participants? What kind of strategies will students need to have in place to manage workload and the potential information overload generated by the large number of discussions and sources of data provided by a MOOC? And finally, do students have to learn *how* to learn when they participate in a MOOC?

Reference List

Arbaugh, J. (2010) Sage, guide, both, or even more? An examination of instructor activity in online MBA courses, *Computers & Education*, 55: 1234–1244

Belanger, Y. & Thornton, J. (2013). Bioelectricity: A Quantitative Approach Duke University's First MOOC. Duke Center for Instructional Technology, Duke University.

Bernard, R.M., Brauer, A., Abrami, P.C. & Surkes, M. 2004, "The development of a questionnaire for predicting online learning achievement", *Distance Education,* vol. 25, no. 1, pp. 31-47.

Daniel, J D (2012), Making Sense of MOOCs: Musings in a Maze of Myth, Paradox and Possibility, *Journal Of Interactive Media In Education*, pp. 1-20

Edinburgh, University of (2013) MOOCs @ Edinburgh 2013 – Report #1 (May 2013). Available at http://hdl.handle.net/1842/6683

Fischer, G. 2011, "Understanding, fostering, and supporting cultures of participation", *interactions,* vol. 18, no. 3, pp. 42-53.

Grünewald, F., Meinel, C., Totschnig, M. & Willems, C. 2013, "Designing MOOCs for the Support of Multiple Learning Styles" in *Scaling up Learning for Sustained Impact* Springer, pp. 371-382.

Kop, R (2011) The Challenges to Connectivist Learning on Open Online Networks: Learning Experiences during a Massive Open Online Course, *International Review Of Research In Open & Distance Learning*, Vol 12, No 3:19-37

Landers, R.N. & Callan, R.C. 2011, "Casual social games as serious games: The psychology of gamification in undergraduate education and employee training" in *Serious Games and Edutainment Applications* Springer, pp. 399-423.

Littlejohn A (2013) Understanding MOOCs, CEMCA EdTech Notes. Available at: http://cemca.org.in/ckfinder/userfiles/files/EdTech%20Notes%202_Littlejohn_final_1 June2013.pdf

Liyanagunawardena, T.R, Adams, A. A. and Williams, S.A. (2013) MOOCs: A Systematic Study of the Published Literature 2008-2012. *International Review of Research in Open & Distance Learning* , Vol. 14, No 3: 202-227

OU Institute of Educational Technology Student Research Centre, (2000)

Roediger, H.L. & Karpicke, J.D. 2006, "Test-enhanced learning taking memory tests improves long-term retention", *Psychological Science,* vol. 17, no. 3, pp. 249-255.

Simpson, O. 2004, "The impact on retention of interventions to support distance learning students", *Open Learning: The Journal of Open, Distance and e-Learning,* vol. 19, no. 1, pp. 79-95.

Struyven, K., Dochy, F., Janssens, S. & Gielen, S. 2008, "Students' experiences with contrasting learning environments: The added value of students' perceptions", *Learning Environments Research,* vol. 11, no. 2, pp. 83-109.

Tyler-Smith, K. 2006, "Early attrition among first time eLearners: A review of factors that contribute to drop-out, withdrawal and non-completion rates of adult learners undertaking eLearning programmes", *Journal of Online learning and Teaching,* vol. 2, no. 2, pp. 73-85.

UNESCO (2007) Kronberg Declaration on the Future of Knowledge Acquisition and Sharing. Available at: http://www.unesco.de/kronberg_declaration.html

Universities Report, (2013) Available at: http://www.universitiesuk.ac.uk/highereducation/Documents/2013/MassiveOpenOnlineCourses.pdf