British Journal of Educational Technology *Vol 47 No 2 2016* 320–341
doi:10.1111/bjet.12235

Promoting engagement in online courses: What strategies can we learn from three highly rated MOOCS

Khe Foon Hew

Khe Foon Hew is an associate professor of Information and Technology Studies at the Faculty of Education, The University of Hong Kong. His research primarily focuses on learning technology, e-learning, motivation, online communities and knowledge sharing. Address for correspondence: Dr Khe Foon Hew, Faculty of Education, The University of Hong Kong, Pok Fu Lam Road, Hong Kong, China. Email: kfhew@hku.hk

Abstract

Although past research has sought to identify the factors of student engagement in traditional online courses, two questions remained largely unanswered with regard to Massive Open Online Courses (MOOCs): do the factors that could influence student engagement in traditional online courses also apply to online courses that are massive and open? What factors do students consider important in terms of their perceived ability to promote a satisfying or engaging online learning experience? This paper reports a case study of three top-rated MOOCs in the disciplines of programming languages, literature, and arts & design in order to address these very questions. Using a mixed methods approach that combines participant observation with analysis of reflection data from 965 course participants, this paper seeks to understand the factors behind the popularity of these MOOCs. Five factors were found. These include the following, ranked in terms of importance: (1) problem-centric learning with clear expositions, (2) instructor accessibility and passion, (3) active learning, (4) peer interaction, and (5) using helpful course resources. The specific design strategies pertaining to each factor are further discussed in this paper. These strategies can provide useful guidance for instructors and are a worthwhile subject for further experimental validation.

Introduction

One of the best courses I have ever taken–certainly the best online course ever. Carefully organized and planned for a variety of learning styles and student differences. (Student 3, the Poetry MOOC)

Although there has been access to free courses on the Internet for many years, only recently has there been a great renewal of interest among many educators and students across the world due to the advent of Massive Open Online Courses, or MOOCs for short. Enrolment sizes of MOOCs tend to be high, generally over a few thousands participants. MOOCs are currently offered by every college and university atop the *U.S. News and World Report's* national university rankings (McMinn, 2013). What started as a US trend has since gone international and many other universities across the world have already offered or are planning to offer MOOCs (Whitehead, 2014). Just this year alone, from January 2014 to June 2014, there has been an increase of 91% in the number of MOOCs offered. As at June 17, 2014, more than 2620 MOOCs are offered by universities and organizations across the globe (see Figure 1).

Some pundits believe MOOCs serve a noble purpose because they represent the ultimate democratization of education by making education accessible to as many people as possible (Jacobs, 2013), yet others are skeptical of the quality of learning provided by MOOCs and possible

Practitioner Notes

What is already known about this topic

- Massive Open Online Courses (MOOCs) are increasingly popular within higher educational domains.
- Teaching thousands of students and trying to engage them is not an easy task.
- There are some MOOCs that are more highly rated by students than others.

What this paper adds

- A model of student engagement organized around the Self-Determination Theory of Motivation.
- The results suggest five main factors considered by participants to be important in terms of their perceived ability to promote an engaging online learning experience.
- This study delineates the specific design strategies that could engage students in highly rated MOOCs.

Implications for practice and/or policy

- Engagement is promoted when learning is problem-centric and supported with simple-to-understand explanations of procedures or concepts.
- Engagement is promoted when the course staff is accessible and shows passion in teaching the course.
- Engagement is promoted when active learning is emphasized and supported.
- Engagement is promoted when peer interaction is promoted and course resources are used to address participants' diverse learning preferences.

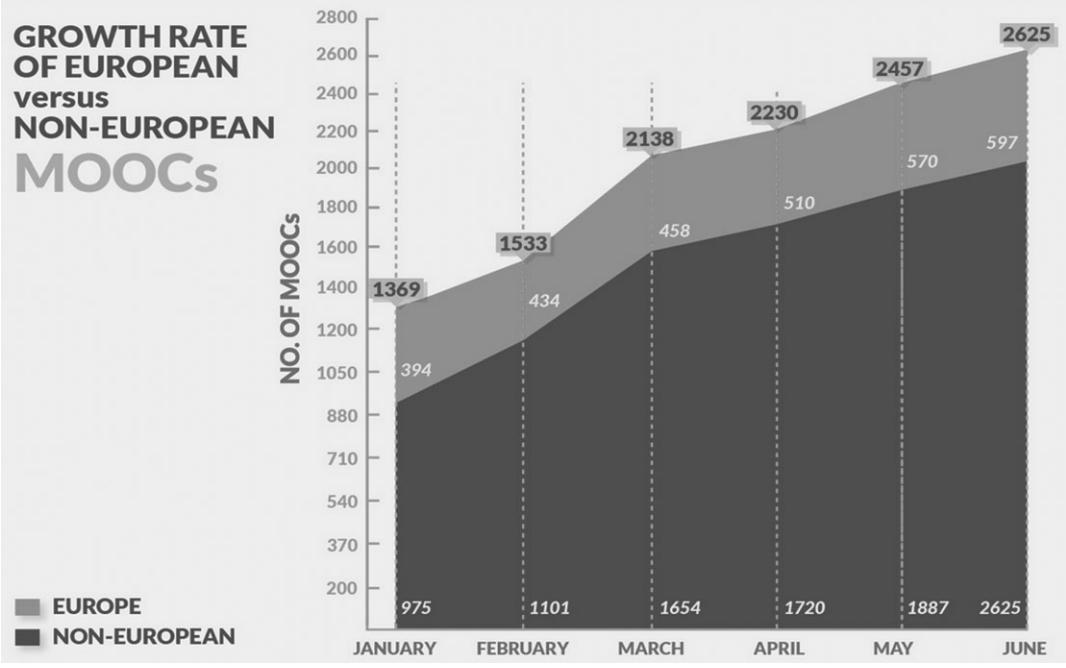

Figure 1: Growth of MOOCs (http://openeducationeuropa.eu/en/european_scoreboard_moocs)

detrimental consequences (Kolowich, 2013). Nevertheless, when discussing MOOCs, it is important to note that one cannot simply generalize about MOOCs as being "all good" or "all bad" (Bali, 2014). Many people believe that MOOCs are *not* going to render teachers obsolete (eg, Cooper & Sahami, 2013) and that MOOCs are, at least for now, another resource for learning (eg, via the flipped classroom concept), albeit a significantly more interactive content delivery platform as compared with a traditional printed book (Krause, 2013).

Indeed with so many MOOCs to choose from, students are spoiled for choice. However, not every MOOC is well received by students who enrolled in them. There are some MOOCs that are more well received by students than others. What makes these MOOCs well received but not others? Specifically, what design factors are most valued by participants in terms of their perceived ability to promote an engaging online learning experience?

In online learning, as well as other types of learning, student engagement is considered a necessary prerequisite for learning (Guo, Kim & Rubin, 2014). Previous studies in face-to-face learning contexts have indicated that student engagement has both short-term and long-term impacts on students (Lam, Wong, Yang & Liu, 2012). In the short term, findings suggest that student engagement is predictive of grades and conduct in school (Hill & Werner, 2006; Lam *et al*, 2012; Marks, 2000; Skinner & Belmont, 1993; Voelkl, 1997). In the long term, student engagement can be linked to individual academic achievement, self-esteem and socially appropriate behaviors (Hawkins, Gou, Hill, Battin-Pearson & Abbott, 2001; Maddox & Prinz, 2003).

In the context of MOOCs, the challenge of engaging students is made much more difficult due to the large and diverse student body. There are, of course, students who find a MOOC engaging or satisfying due to their personal interest or curiosity in the topic or subject, or that they see extrinsic value in terms of gaining a MOOC certificate or knowledge and skills for potential work advancement (eg, Agarwal, 2012; Allon, 2012; Breslow *et al*, 2013). There are also students who are simply obsessed with MOOCs and treated their participation in MOOCs-related activities such as viewing video lectures as a pastime (Young, 2013).

But are there other possible reasons? Rather than examining individual student related factors, this study is interested to uncover what specific factors related to MOOC design, use of course resources, or to the individual instructor who may have contributed to student engagement in an open online course. The premise of this paper is that there is a set of design factors that can be found in well-received MOOCs, and although the specific strategies used to actualize these factors might differ among the courses, these factors are necessary for promoting student engagement. An understanding of these design factors and strategies could provide practical suggestions to instructors who are interested in engaging their students in other online, blended or even face-to-face settings (Educause, 2013). At the very least, it is expected that the factors and strategies presented in this paper could possibly offer solutions that might have otherwise have been overlooked.

In this paper, three most highly rated MOOCs were selected out of the entire available corpus of computer programming languages courses ($n = 853$), literature courses ($n = 84$) and art & design courses ($n = 180$) listed on *coursetalk*, an open public MOOC review and rating website (http://coursetalk.org/) on May 15, 2014. (The author is not affiliated with any of the courses).

How might we understand the factors behind the popularity of these MOOCs?

Using my experience as a participant observer in the three MOOCs, I will first describe the structural features of the courses such as the course resources used. I will then report the findings based on grounded analyses of reflection data from 965 course participants to uncover the specific factors related to MOOC design, use of course resources and instructor attributes that could engage open online students. In this study, the participants' reflection data were deemed to

be an appropriate source of data because the *reasons* for an individual's perceptions of being engaged in a course could not really be observed.

Based upon these qualitative insights and the analysis of the courses' materials, five factors were found in order of important from the greatest to the least: (1) problem-centric learning with clear expositions, (2) instructor accessibility and passion, (3) active learning, (4) peer interaction, and (5) using helpful course resources. The specific strategies that are used for each factor are described.

The rest of the paper is organized as follows. In the next section, the notion of student engagement and the self-determination theory (SDT) of motivation will be discussed. Next, I discuss some of the previous related works on student engagement in online courses and MOOCs in particular. Then, in the method section, I described the features of the three highly rated MOOCs, as well as how the participants' reflection data were obtained and analyzed. Next, the identified factors and strategies that engage students are reported and discussed in the results and discussion section.

Engagement and motivation

Student engagement is considered by many educators to be an important aspect of a teaching and learning context because it can influence students' retention, learning, achievement test scores and graduation (Appleton, Christenson & Furlong, 2008; Fredricks, Blumenfeld & Paris, 2004). Being an abstract construct, student engagement has been defined in various ways. Despite the different definitions, scholars have largely identified student engagement as a construct that contains three components: behavioral engagement, emotional engagement and cognitive engagement (Fredricks *et al*, 2004).

Behavioral or physical engagement involves the idea of participation in an activity and includes the student completing an assignment, or attending classes. Emotional engagement refers to students' affective responses or feeling towards teachers, peers, the course and learning, whereas cognitive engagement refers to the task-specific thinking that a student employs while undertaking in an activity (Helme & Clarke, 1998). It is important to note that in reality these three components are dynamically interrelated within the individual; they are not isolated processes (Fredricks *et al*, 2004).

The term engagement is also sometimes used interchangeably with motivation. However, both terms can be distinguished. Student engagement may be viewed as the observable display or manifestation of motivation (Reeve, 2012), whereas motivation can be understood as the "why" or reason behind a given physical, emotional or cognitive response (Darr, 2012). But what motivates a person to act? Based on the tenets of SDT, all individuals regardless of gender, age or culture possess three fundamental psychological needs that move them to act or not to act—the needs for autonomy, relatedness and competence (Deci & Ryan, 1985). Figure 2, adapted from Hew (2014), shows a possible model of how the three psychological needs posited by SDT might influence the three aspects of engagement.

Autonomy refers to the need for freedom or perceived choice over one's action (Deci & Ryan, 1985). The need for autonomy provides a motivational basis for students' behavioral engagement because an individual can choose to participate or not to participate in an activity (Skinner, Furrer, Marchand & Kindermann, 2008). Individuals need to feel that they are acting from their own volition and voluntarily participating in an activity, instead of being forced into doing something. However, the notion of autonomy does not imply that guidance from an authority is not needed at all. For some individuals, having autonomy over their own learning may prove to be a bane as they may not know how to proceed in learning a subject matter. It may be the case that learner autonomy is best achieved when, among other things, the teacher acts as a

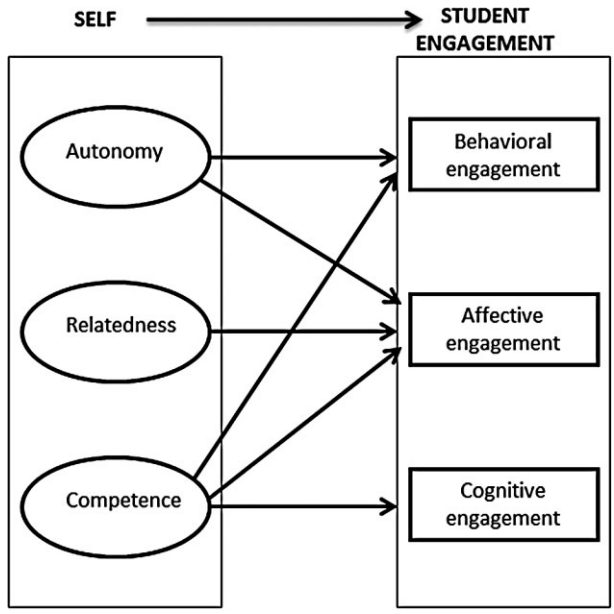

Figure 2: A proposed model of student engagement organized around SDT

counsellor or a resource (Thanasoulas, 2000). Autonomy also provides a motivational basis for emotional engagement because it is reasonable to assume that the sense of psychological freedom over course activities would likely to engender positive student feelings towards the course itself (Skinner *et al*, 2008).

Relatedness refers to the need for an individual to connect with other people such as with their peers and the instructor. It can predict students' levels of emotional engagement. Frequent interactions between students and students or between students and the instructor could lead to more positive feelings (ie, stronger emotional engagement) towards the course and learning. The level of interactions can be influenced by the degree of familiarity students have with one another or with the instructor (Cheung, Hew & Ng, 2008). Students tend to interact more with other people they are familiar with. This degree of familiarity may be compromised in courses with large student numbers because it is harder to get to know other people more intimately in the class. Consequently, this could lead to fewer student interactions and eventually weaker emotional engagement towards the course.

Competence refers to the need for a person to master one's pursuits or learning (Helme & Clarke, 1998); hence it may be considered to be a critical motivation factor for students' cognitive engagement. Competence also provides a motivational basis for behavioral and affective engagement because it is reasonable to assume that a sense of mastery about the topic being studied would encourage a learner to further participate in the course activities, as well as foster positive learner feelings about the course.

Related work

Previous research that examined traditional online courses has suggested several factors that could influence student engagement. These factors include instructor presence (Das, 2012), instructor humor (Baker & Taylor, 2012), availability of feedback (Sull, 2012), choice of activities (Kelly, 2012), extra course resources (Sull, 2012) and active learning (Harrington & Floyd, 2012). Within the MOOC literature, a number of studies have also been conducted that examined

student engagement. The focus of these studies may be loosely grouped into three main categories that correspond to: the registration phase of MOOCs, the activity phase of MOOCs and the completion phase of MOOCs.

Studies that fall under the first category (registration phase) generally explore the extent of students' engagement at the sign-up phase of MOOCs such as the number of student enrolment in MOOCs, and the reasons why students sign up for them in the first place. For example, based on data from 279 courses from several popular MOOC providers such as Coursera, edX and Udacity, Katy Jordan found that the average MOOC enrolment to be about 43 000 students (Ferenstein, 2014). Hew and Cheung (2014) observed four reasons why students sign up for MOOCs: the desire to learn about a new topic or to extend current knowledge, being curious about MOOCs, the desire for personal challenge and the desire to collect as many completion certificates as possible.

Studies that fall under the second category (activity phase) examine the types or patterns of student behavioral engagement during the progress of the MOOCs. These include an examination of student video views, assignment submissions, and participation in discussion forums. For example, Coffrin *et al* (2014) found that there were many more students viewing the videos than working on the assignments and that there was a noticeable and consistent decline in the number of students participating in the course every week.

Studies that fall under the third category (completion phase) examine the extent of student outcomes at the end of a MOOC such as student completion and dropout rates, or grades achieved. The use of discussion forums was found to correlate with better student grades and higher student retention (Coetzee, Fox, Hearst & Hartmann, 2014). Coffrin *et al* (2014) reported that students' marks in the first 2 weeks were a good predictor of the final grade in a course. Breslow *et al* (2013) found no relationship between age and student achievement, or between gender and achievement. Other studies found that about 90% of students drop out mainly due to two main reasons: time management issues (eg, conflicting real-life responsibilities) and the loss of course rhythm (eg, left behind due to work travel or illness) (Nawrot & Doucet, 2014).

Purpose of the present study

Many MOOC instructors have hitherto focused primarily on using student dropout rates or completion rates as a metric of measuring student engagement. Completion rate may be considered a measure that indicates student behavioral and cognitive engagement. However, there is increasing number of researchers who question if mere completion rate is a relevant metric to measure student engagement in MOOCs (Haggard, 2013). There are many students who stay engaged with the MOOC video lectures, even though they have no intention to complete the assignments and earn course certificates (Kizilcec, Piech & Schneider, 2013). Other students only wish to learn particular topics and are not interested in the rest of the material (Wang & Baker, 2014). These students may still find a particular activity or topic engaging.

The present study moves beyond the mostly quantitative analyses of student completion rates, or dropout rates. Quantitative measures such as these are useful, but they could not adequately explain the *reasons* why participants find the whole course or certain segments of the course engaging.

Method

This present study adopts a qualitative multiple case study approach. It is based on the grounded approach analysis of participants' review comments collected on May 15, 2014, using *coursetalk*. *Coursetalk* was selected as the data source because it tracks as well as provides ratings and reviews

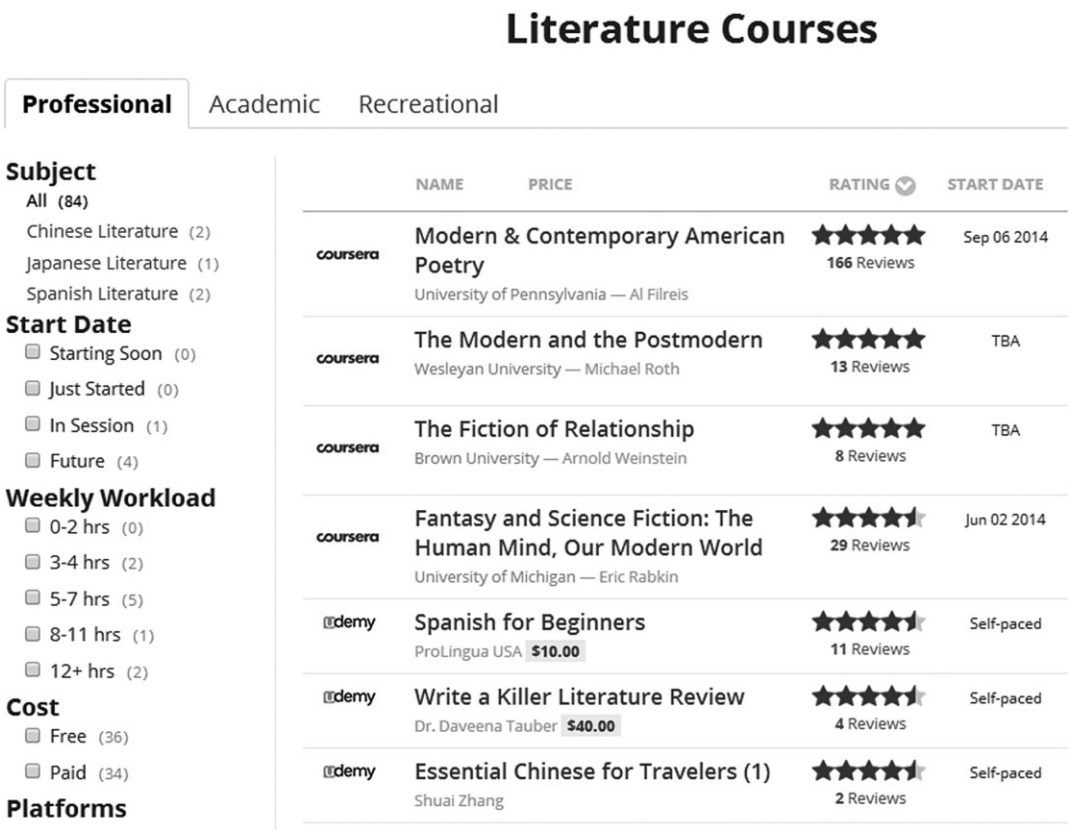

Figure 3: A list of Literature MOOCs (n = *84) on* coursetalk *as at May 15, 2014*

from MOOC participants from diverse providers such as Coursera, edX, Udacity, Udemy and Canvas Network. *Coursetalk* is currently considered the leading search and discovery platform for learners to explore the broadest variety of online courses (Business Wire, 2014), and it is particularly contemporary and user driven (Costello, 2013). It features a gamified leader board that enables students to review courses and gain clout through upvotes (Costello, 2013).

In the present study, a course is defined as highly rated if it (1) has the highest number of star ratings in terms of course quality, *and* (b) garners the most number of reviews within the *entire course corpus* of a particular subject discipline. I assume that if a course has *both* elements, the course has been found to be more well received by students compared with other courses within the entire subject discipline.

Although it may appear to some people that the ratings could be slightly subjective, the provision of reviews from a wide range of informants, particularly concerning the first-ranked MOOC, serves as a form of data triangulation (Shenton, 2004) to provide evidence that the first-ranked course is indeed more popular to students as compared with the second- or third-ranked courses.

For example, the most highly rated literature course was "*Modern & Contemporary American Poetry*" (out of a total of 84 courses), which achieved 5-star ratings in terms of quality and garnered 166 reviews from participants who enrolled in the course (see Figure 3). Table 1 lists the three MOOCs along with their respective subject discipline, course title, the university that offers the MOOC, as well as the ratings, number of reviews and course purposes.

Table 1: List of the highly rated MOOCs as at May 15, 2014

Subject discipline	*MOOC title, and university that offers the MOOC*	*Ratings and number of reviews*	*Purpose of course*
Programming languages	*An Introduction to Interactive Programming in Python*, Rice University	5⋆, 598 reviews	Introduces the basics of Python programming. Focuses on building simple interactive games such as Pong, Blackjack and Asteroids
Literature	*Modern & Contemporary American Poetry*, University of Pennsylvania	5⋆, 166 reviews	An introduction to modern and contemporary US poetry, from Dickinson and Whitman to the present
Art & design	*Design: Creation of artifacts in society*, University of Pennsylvania	5⋆, 201 reviews	Explains the key purpose and process of design as a problem-solving method to address real-world issues

Course	Length	Estimated workload	Certificate	Pre-requisite	Video lecture	Other resource	Assessment (required)	Remark
An Introduction to Interactive Programming in Python (Teaching staff - 4 professors)	9 weeks	7-10 hours per week	Free or paid certificate[i]	Yes, high school math	• Yes, video lectures with English, Spanish, Portuguese, or Chinese subtitles • Videos can be slowed or speeded up by user • Length of video ranges from 3-16 min. • In video-embedded questions (MCQ format) that ask students to respond before continuing the video	• Course forum • CodeSkulptor • Practice exercises (14) • Class notes • Code Clinic	• Weekly lesson quizzes (10 questions each, untimed) • 5 mini projects (peer & self assessed)	• 20 attempts given for weekly quizzes • Effective score is the highest score of all allowed attempts on weekly quizzes made before the hard deadline • Hard deadlines for quizzes & mini projects • Evaluate 5 peers' projects each week • Evaluate own project
Modern & Contemporary American Poetry (Teaching staff - 1 professor, 12 TAs)	10 weeks	5-10 hours per week	Free certificate[ii]	No	• Yes, video lectures with English subtitle • Video lectures focus on the instructors doing close readings of a poem • Videos can be slowed or speeded up by user • Length of video ranges from 9-29 min.	• Course forum • Instructors' office hours • Live webcast sessions • Glossary and further readings	• Two weekly lesson quizzes (untimed) • Four writing assignments (peer assessed)	• Hard deadlines for quizzes & writing assignments • Effective score is the highest score of all allowed attempts on weekly quizzes made before the hard deadline • For writing assignment, grade as many essays as assigned by the instructor
Design: Creation of Artifacts in Society (Teaching staff - 1 professor, 1 TA, 5 community TAs)	8 weeks	5-10 hours per week	Free or paid certificate [iii]	No	• Yes, video lectures with English and Spanish subtitles • Videos can be slowed or speeded up by user • Length of videos typically 5, 8 or 15 min • Video-embedded question to get students to think about issues/concepts before continuing the video.	• Course forum • Project forum • Project example	• A total of 7 design projects • One design project for each week for 7 weeks (peer assessed)	• Hard deadlines for submission of design projects • Grade 5 peers' projects each week • Failure to grade all 5 peer projects each week will render a participant receiving an automatic 20% penalty on grade.

Note:
[i] *Python programming MOOC*: A certificate of accomplishment will be awarded if a participant earns at least 70% of total possible points. Each mini project is worth around 8% of your total possible points for the class. Each quiz is worth around 2%. Participants who score over 90% will receive a Statement marked "with distinction". A verified certificate of accomplish via signature track will cost US$49.
[ii] *American poetry MOOC*: A certificate of accomplishment will be awarded if a participant writes four essays and submit them on time; writes at least four peer reviews during each of the four peer review periods, takes all the quizzes and receive a score higher than 0.0 on each one of them; and participates in online discussions by posting a comment at least once each week to any of the poem-specific forums.
[iii] *Design MOOC*: A certificate of accomplishment will be awarded if a participant earns at least 70% of total possible points and grade 5 peer assignments each week. The points for the assignments add up to 50. A verified certificate of accomplish via signature track will cost US$49.

Figure 4: Summary of the three MOOCs analyzed

Description of the MOOCs

To date, MOOCs may be classified into two broad groups of courses, which are known as xMOOCs and cMOOCs (Conole, 2013; Daniel, 2012). Basically, xMOOCs follow a cognitivist-behaviorist approach, and rely primarily on video, discussion forums, multiple-choice quizzes or other types of assignments (Conole, 2013). The three MOOCs examined in this study can be classified as xMOOCs. Figure 4 shows the main details about the three MOOCs.

Learners who enroll in an xMOOC will generally perceive the course to be structured very similar to a traditional higher education course (Hew & Cheung, 2014). For example, instructors of the

three xMOOCs analyzed in this study provided a clear description of the course including (1) the duration of the entire course, (2) the expected hours of workload per week (eg, 5–9 hours/week), (3) the specific recommended prerequisites for the course (if any), (4) the course syllabus (eg, the specific topic for a particular week), (5) suggested reading list, and (6) the course format that included information about how the course would be conducted, the type of assessments and their deadlines. The role played by the instructor of an xMOOC resembles a tutor (Rodriguez, 2012).

Students who completed each MOOC would receive a Statement of Accomplishment signed by the professor or professors teaching the course. All Statements of Accomplishment are provided free of charge. However, students in the Python and Design MOOCs could choose to sign up for a Signature Track option at the time of enrolment for a small fee of US$49.00 to earn a verified certificate issued by Coursera and the participating university.

The Signature Track option attempts to eliminate cheating by creating a Signature Profile for each student to link a student's identity to each piece of coursework he or she submits. The Signature Profile is created by recording a student's unique typing pattern, and taking a webcam photo of the student's picture ID (eg, driver's license). The Signature Profile concept is based on the assumption that an individual's typing pattern is unique and different from someone else's. The students will need to use a webcam throughout the course.

cMOOCs, on the other hand, are based on the philosophy of connectivism, the belief that learning is a network phenomenon that is aided by socialization and technology (Siemens, 2004). Instructors of cMOOCs also provide a course outline, but the actual course materials and course content are defined by students as the course progressed (Rodriguez, 2012). As a result, a learner will find it difficult to know in advance if a course is suitable for them or not (Rodriguez, 2012). Furthermore, as it is difficult to give credit when all participants are not doing the same work, learning in many cMOOCs is not assessed as it was (Rodriguez, 2012). The high degree of learner autonomy, and flexibility required to learn from cMOOCs (Mackness, Mak & Williams, 2010), suggests that cMOOCs are unlikely to be widely used at this moment (Bali, 2014).

Data collection and analysis of participants' data

To understand the *reasons* for an individual's perceptions of being engaged in a course, this study conducted a qualitative study of the publicly available comments posted on *coursetalk* by participants who completed the courses, who were currently taking it, as well as those who partially completed or dropped out. The following guiding questions were provided to help participants in giving their comments: (1) what was your prior experience with the subject?, (2) how does this course compare with others?, and (3) what did you like/dislike about the course?

Altogether, available comments from a total of 965 participants were analyzed. Of these 965 participants, 908 indicated that they completed at least one of the MOOCs, 53 taking now, and 14 partially completed or dropped out. Each participant's comment was analyzed using the inductive iterative coding method to allow common themes to emerge from the data (Corbin & Strauss, 2007).

Results and discussion

Analysis of the qualitative data yielded a number of design factors that participants perceived as engaging. These factors were: (1) problem-centric learning with clear expositions, (2) instructor accessibility and passion, (3) peer interaction, (4) active learning, and (5) course resources to address participant learning needs. The specific strategies that can be used for each factor are described in Table 2.

Problem-centric learning supported with clear expositions

Engagement is promoted when learning is problem-centric and supported with simple-to-understand explanations of procedures or concepts. The definition of problem differs among

various scholars. Following Merrill (2002), I use the term *problem* to refer to a range of activities, with the most critical characteristic being that the activity is representative of what a learner might encounter in the world. A problem-centric instruction is therefore concerned about teaching learners the necessary concepts or skills in order to understand or solve some real-world tasks.

The instructors of the Python MOOC accomplished this by concentrating on building simple interactive games and providing clear expositions (eg, step-by-step instructions of particular coding procedures and relevant examples and nonexamples of concepts). Realizing that simple interactive games such as Memory and Asteriods were entities that many participants could identify in the real world as well as would enjoy playing, the Python instructors specifically

Table 2: Summary of strategies used

Factor	*Strategies used*
Problem-oriented learning with clear and comprehensive expositions	*Focusing on problem-solving rather than teaching a topic/concept in isolation* Python MOOC Concentrates on something functional in the real world and is familiar to most students (eg, building simple interactive games such as Pong, memory and Asteroids). Carefully walk a learner through a particular concept or procedure via step-by-step instruction, along with useful programming tips. Provide examples and nonexamples of concepts. Poetry MOOC Concentrates on the key process of inquiry and meaning-making instead of merely telling the answer. Focus on the use of Socratic questioning to help students analyze poems from the perspectives of history, culture. Employ panel-style discussions of poems to demonstrate or model the process of inquiry and meaning making. Incorporate the perspectives of guest poets whose works were discussed in the course to add insights to the poems via live webcasts. Design MOOC Focuses on the key process of design as a practical and systematic problem-solving method to address real-world issues, rather than merely creating decorations. Employ examples of real world application to illustrate concepts, along with useful practical tools, techniques and tips.
Instructor accessibility and passion	*Instructor accessibility* Python MOOC Provide a dedicated class service "Code Clinic" that allows students to email a link to their work to the course staff and receive help related to their code. The average response staff time to a help request in "Code Clinic" was 45 minutes. Poetry MOOC Organize weekly *live* interactive discussions via webcasts to directly address students' questions. Students from around the world could participate in discussions via telephone, discussion forums, as well as other social media tools. Hold virtual office hours in dedicated forums to discuss poems. Each course tutor held his/her own office hour of 1 hour each every week. Employ panel-style discussions that were spontaneous and not rehearsed, helped participants feel like they were in the class participating in the dialogue. Design MOOC Provide a dedicated sub-forum "Urgent Matters & Technical Issues" that allows students to seek help for time sensitive matters. *Instructor enthusiasm* Python, Poetry, Design MOOCs Projects enthusiasm or love in teaching the course. *Instructor humor* Python MOOC Injects humor into the lectures
Peer interaction	*Augmenting student assessments with a social approach* Python MOOC Give students the chance to discuss the quiz problems in the specific quiz sub-forum before the deadline. Students could discuss the problems in detail with the only restriction being explicit answers should not be posted. Poetry MOOC Provide students the opportunity in dedicated sub-forums to follow-up or seek clarification from peers regarding the review comments received. Post all students' essays along with the reviewers' comments onto a sub-forum pertaining to each assignment question so that many more students could respond to them. *Live discussions* Poetry MOOC Use of live interactive discussions via webcasts to directly address students' questions.

Table 2: Continued

Factor	*Strategies used*
Active learning	*Projects, writing assignments* Python MOOC Developed a web-based environment—*CodeSkulptor*—for the class to practice Python easily. This specially created web environment helps achieve consistency of the programming platform by removing individual problems that would arise from different computer operating systems. It also removed the environmental issues (eg, installing or importing files) that students might encounter if they install Python on their own. Use of weekly mini-projects that required students to build real interactive games based on the concepts taught. The assignments were carefully calibrated to be challenging but not impossible by: (1) ensuring that everything that is needed to complete them is covered in the lesson, (2) providing a walk-through of the strategy required to complete the project, and (3) providing a template that contained a general outline of the algorithm to build the project. Use of a required self-assessment activity as part of a student's mini-project submission. Students would first evaluate five of their course mates' projects before self-evaluate their own work. Purpose of self-assessment was for students to judge the quality of their own projects after they had seen and graded some of their peers' work. Use optional practice exercises related to each week's lesson contains a programming problem that students need to solve. Each problem contains two links: one for a template that students could use as a starting point, and the other the instructors' solution to the problem. Interpolating a majority of video lectures with questions (ungraded) that require students to reflect and respond and to sustain student attention. Poetry MOOC Do four "close reading" of assigned poems that considers how key lines, phrases and/or terms contribute to the central argument of the poem in a short essay of about 500 words. Design MOOC Employ each weekly assignment so that it not only covered the key concepts taught in a particular week but also built on each other to yield an actual artifact in the end. Interpolating video lectures with questions to get students to think about issues or concepts before continuing the video. *Machine-graded quiz* Python and Poetry MOOCs Use machine-graded weekly quizzes that tested the relevant concepts taught in a particular week to provide immediate feedback to students on their performance. Quizzes contain a mixture of questions that assess the following types of cognitive processes: understanding, analyzing, applying and evaluating. Allow multiple attempts at quizzes to encourage mastery of content material. *Peer review* Python, Poetry and Design MOOCs Use peers to evaluate course mates' mini-projects or essays with the aid of a grading rubric associated with the particular work. Python MOOC Require students to give written comments on items that did not receive full scores. Poetry MOOC Provide students the opportunity in dedicated sub-forums to follow-up with peers regarding the review comments received.
Course resources to address participant learning needs	Catering to participants' learning needs Python, Poetry, Design MOOCs Use of bite-size videos that cover usually one or two main concepts or issues Provide a rich resource of relevant course information, including suggestions for further reading, glossary of terms, optional videos. Online video lectures can be slowed down or speeded up to suit students' listening preference. Provide clear course information particularly course objectives, course duration, assignment instructions, deadlines, and estimated workload (ie, hours per week) so that students know exactly what they are supposed to do, and how much effort is expected of them. Availability of slides, notes or transcripts that accompany the video lectures to allow students to review the materials. Python MOOC Organize a student video tutorial competition (to explain certain concepts taught in the course) each week to cater to students who desire additional challenge. The weekly winners of a student video tutorial would be qualified for the end of class playoffs where the winner will receive a $500 tablet computer. Organize a 'Hall of Fame' challenge in a special class forum to allow more advanced students to go beyond the basic mini-projects required in the class. In the 'Hall of Fame' challenge, participants could enhance existing class mini-projects and/or create original games. Original games with the most upvotes would be posted in the Demos section on codeskuptor.org under the particular student's name. Design MOOC Organize an Innovation Tournament Challenge to address the question "In what way might we create a carrying device for 'an armful' of stuff that is almost invisible to the user when not in use?"

organized the course to help learners learn the concepts required to build similar games. These games essentially served the purpose of bringing tangible meaning to the concepts or principles taught, as well as a motivator to sustain participants' interest.

> Rather than other courses that focused on general programming, this course aims to achieve a specific goal: creating games. So the whole purpose of the course is to teach programming in such a way to help you create simple games. (Student N, Python MOOC)

The instructor and the teaching assistants of the Poetry MOOC were also similarly concerned with building a problem-centric slant in their course by focusing on the following purpose: *how do we understand poems in general?* Rather than teaching the meaning of each poem in isolation, they focused on using the Socratic Questioning technique using key questions that concentrated on historical and cultural perspectives:

> This MOOC has become legendary in the MOOC universe, deservedly. This is due primarily to the participative energy and enthusiasm that the professor and his assisting TAs bring to the enterprise, and the somewhat unorthodox pedagogy, which uses videos of Socratic-based close readings to teach students not only what the poems may mean, but more importantly how to approach any "difficult" poem they might encounter. (Student M, Poetry MOOC)

In addition, guest speakers in the form of poets, whose works were discussed in the course, participated in the discussions of the poems via live webcasts. These poets were a welcome addition to the course because their inputs added valuable insights to the students' learning of poems: "*I am so impressed with everything: the course content, the interaction with poets whose writing we were studying!*" (Student K, Poetry MOOC).

The Design MOOC focused on the key process of design as a problem-solving method to address real-world issues, rather than the process of merely creating decorations or artifacts. Many participants found the techniques taught in the course a useful tool to address the challenges faced in their own lives:

> The most amazing thing was that all the processes and methods that were taught can be applied in simple everyday issues and you don't have to create the artifact that will save our planet, just the one that will improve our everyday life. (Student C, Design MOOC)

Instructor accessibility and passion

Engagement is promoted when the course staff is accessible and shows passion in teaching the course. Instructor accessibility may be defined as the extent an instructor is willing to interact with course participants. The lack of instructor accessibility is probably one of the greatest criticisms of large-scale education (Warren, Rixner, Greiner & Wong, 2014). A high degree of instructor accessibility is likely to increase the likelihood of student engagement. On the other hand, a low degree of instructor accessibility could cause students to feel that no one is addressing their questions, so why bother continue?

To enhance instructor accessibility, the course staff of Python MOOC created a dedicated class forum called "Code Clinic" that allowed students to email a link to their work to the course staff and receive help related to their code. "Code Clinic" was hosted by a professional help desk service (http://helpscout.net) that routed student email to a central website for course staff to view and respond. The course staff of the Design MOOC did not employ a professional help desk service but provided a dedicated sub-forum "Urgent Matters & Technical Issues" that allowed students to seek help for time-sensitive matters. The course staff of the Poetry MOOC also did not employ a professional help desk service but interacted with students via ways such as: (1) a dedicated 1-hour-long weekly virtual *office hour* forum, and (2) live webcasts.

The use of live webcasts, in particular, was well received by students. In the live webcasts, the professor and his Teaching Assistants (TAs) led live interactive discussions to directly address students' questions. These discussions were broadcasted live via the course website. Each live

Table 3: Summary statistics for the three MOOCs (collected on June 27, 2014)

MOOC	*Number of threads*	*Number of posts*	*Number of views*
Python	6028	47 178	863 207
Poetry	9654	59 053	406 962
Design	412	3 083	50 063

webcasts lasted approximately 1 hour. During the live webcasts, students from around the world could participate in discussions via telephone, discussion forums, Twitter, Facebook and YouTube boards. Many students commented that the use of such live webcasts helped foster a sense of connectedness with the course staff and other students:

The live webcasts provide an extra feeling of connectedness and commitment. (Student L, Poetry MOOC)

In addition, one of the most frequently mentioned traits of instructors who taught the highly rated MOOCs was their passion. Specifically, these instructors exhibited a genuine love for their respective subject matters *and* interest in teaching the students. As a result, many students were engaged by the excitement that the instructors had about the subject as well as their enthusiasm in teaching it. To some extent, the following comments summed up the sentiment of many students regarding their instructors:

I've since started a couple of other online courses, and this one is by far the best. I think the key here is that the professors really love teaching this course, and programming in general. It comes across in their videos, in their presence on the forums, and in the course itself. (Student M, Python course)

Foremost, the passion of the instructor fueled the course—passion for poetry, for teaching, and for students. (Student N, Poetry MOOC)

You really get a sense that the instructor cares about design, which is infectious. (Student H, Design MOOC)

Peer interaction

Peer interactions could encourage knowledge sharing and construction among participants. Probably the most common social component of online courses is the discussion forums (Warren *et al*, 2014). Analysis of the participants' data suggested that a high degree of student interaction was generally found in the three MOOCs:

There's so much support in the forums. It's almost like having a personal tutor. You have a question, well someone will answer it! Questions in the forums were usually answered by other students within 10 minutes of being posted. (Student G, Python MOOC)

We have over 100 student study groups on the online forum that are organized by geography, language and special interests including a group for poets, one for professors, and one for feminist study. Many students, like me, also skype with classmates throughout the course. Many of the student groups meet offline as well. (Poetry course)

I found it amazing that when I asked about technical issue (ie, converting files) I got over 80 helpful responses. (Student D, Design MOOC)

Table 3 shows the number of threads, posts and views for each MOOC. The Poetry MOOC registered the most number of posts, followed by the Python MOOC.

The higher incidents of student interactions in the Poetry and Python MOOCs appeared to be fostered by two key strategies. First, the course staff of both MOOCs augmented student assessments with a social approach. For example, the course staff of the Python MOOC allowed students to discuss the quiz problems in substantial detail with the only restriction being that explicit answers could not be posted in the sub-forum (Warren *et al*, 2014). Analyses of the quiz forums revealed substantial and detailed discussions of questions that were perceived as difficult or ambiguous (10–20 threads per quiz with 5–20 responses) (Warren *et al*, 2014).

The course staff of the Poetry MOOC provided students the opportunity to follow-up or seek clarification from peers regarding the review comments received. In addition, all students' essays along with the reviewers' comments were posted onto a sub-forum pertaining to each assignment question so that many more students could respond to them.

Second, the course staff of the Poetry MOOC employed the use of live discussions via webcasts every week, which provided students from around the world the opportunity to ask questions and exchange ideas using telephone, forums or other social media tools.

Active learning

Engagement is promoted when active learning is emphasized and supported. Bonwell and Eison (1991) define active learning as any task or activity that involves students in doing things and thinking about the things they are doing. Two MOOCs (Python and Poetry) employed computer-graded quizzes that provided immediate feedback. Effective quizzes do not merely test recall. Unlike some other MOOCs, the quizzes used in these two MOOCs mostly assessed the following types of cognitive processes: understanding, analyzing, applying and evaluating.

What is worth noting is the purpose of these quizzes, which was to help students review the course content via one or more of the following strategies: (1) the quizzes reviewed or reinforced the main points covered in the lectures, (2) the quizzes gave clear answer explanations, and (3) the quizzes allowed multiple retakes of the questions.

All three MOOCs also involved assignments that required students to apply what they had learned. Specifically, students in the Poetry MOOC were required to complete four close reading of assigned poems by considering how key lines, phrases and/or terms contributed to the central argument of the poem in a short essay of about 500 words. Students in the Design MOOC were given the opportunity to work on one major self-selected project throughout the course. To support student active learning, each weekly assignment was crafted to take students through the complete design process, beginning with finding a gap related to a problem or challenge in the students' daily life, and cumulating in a final tangible artifact to address the gap.

Students in the Python MOOC were required to complete weekly mini-projects to build simple interactive games based on the concepts taught each week. Specifically, students used a specifically created web-based programming environment called "CodeSkulptor," which allowed students to easily save their work in the cloud and share their programs with the instructors and peers with a single URL. The use of "CodeSkulptor" provided a consistent programming platform for students to view each other's work conveniently without the need for any download or installation of files.

In order to assess students' papers and projects, the instructors of the three MOOCs relied mainly on peer assessment with the help of rubrics and deadlines to speed up the feedback loop. Although peer assessment is not without problems, it does provide human assessments at scale (Cooper & Sahami, 2013). To help reduce the subjectivity in grading, two methods were used: (1) rubrics, and (2) multiple peer assessments.

Leveraging on the fact that computer programs have fairly precise behavior, the Python MOOC course staff designed a grading rubric that essentially mimicked the specificity of machine-based unit tests in order to reduce the scope of judgment on the part of a human assessor (Warren *et al*, 2014). The rubric was very specific and had a small point range (see Figure 5). Students were required to provide written explanations on items that did not receive full scores.

The course staff of the Poetry and Design MOOCs, on the other hand, did not have the advantage of the Python course because the work being assessed was essays and design artifacts without the precision of computer behavior. Figures 6 and 7 show fragments of the rubrics used in the Poetry and Design MOOC respectively.

- 1 pt - The program successfully opens a frame with the stopwatch stopped.
- 1 pt - The program has a working "Start" button that starts the timer.
- 1 pt - The program has a working "Stop" button that stops the timer.
- 1 pt - The program has a working "Reset" button that stops the timer (if running) and resets the timer to 0.
- 4 pts - The time is formatted according to the description in step 4 above. Award partial credit corresponding to 1 pt per correct digit.
- 2 pts - The program correctly draws the number of successful stops at a whole second versus the total number of stops. Give one point for each number displayed.

Figure 5: A fragment of a rubric used in the Python MOOC

We have included an optional set of questions that you may use when reading your peers' essays. Use these questions as a general guide to your peer review: answer any or all of these questions, and of course feel free to comment on aspects of the essay not listed here:

1. **Form**: Does the essay explain how the poem's form expresses O'Hara's apparent preference for being a poet? (When we use the word "how," we emphasize the importance of thinking about what a poem does – *how* it uses its formal elements – as much as we think about *what* it says.)

2. **Painting vs. poetry**: Does the essay identify ways in which writing a poem is different from painting a painting, in O'Hara's view? Does the essay, for example, compare the poem by O'Hara called "Oranges" and the painting by Mike Goldberg called *Sardines*? How successful and/or interesting is the comparison?

Figure 6: A fragment of a rubric used in a writing assignment in the Poetry MOOC

- Award 2 points if the student committed to a design direction (award only 1 if it was unclear)
- Award an additional 2 points if the student built a representative prototype that a user could try (award only 1 if it was unclear)
- Award an additional 3 points if the prototype is able to uncover refinements that need to be made for the beta/final prototype
- Award an additional 1 - 3 points based on the quality of the prototype (i.e., how well it conveys the design intent and how well it was crafted)

Figure 7: An example of a rubric used in the Design MOOC

Overall, analysis of the participants' reflections suggested that many students were positive about the use of peer assessment because it helped to generate diverse ideas or suggestions:

You write—and receive—peer reviews for each round of essays, which are so helpful. You share feedback with your fellow students. You begin to see the rich variety of students taking the course, and you learn from everyone. (Student C, Poetry MOOC)

I found peer review of other people's codes particularly interesting and informative. (Student A, Python MOOC)

> What was incredibly interesting to me was seeing some of what my classmates were doing via the peer assignment mechanism. Classmates come from all over the world and have all kinds of ideas, so this made the peer assessment requirement actually an additional highlight of the course. (Student B, Design MOOC)

A multiple peer-assessment method was used in each MOOC. For example, every student in the Design course was required to grade five peers' projects each week. Five students would grade the student's work in return. The use of multiple peer-assessments helped mitigate the possible variance in the peer reviews. However, the multiple peer-assessment method was not perfect. There were some students who voiced their frustrations concerning two major issues: superficial reviews from peers, and misunderstanding about the submitted work, which resulted in poor reviews.

Superficial review

Although some students take the peer assessment responsibility seriously and gave meaningful comments, others are hardly engaged at all. For example, one student commented:

> I tried to be very explicit when giving my review in terms of suggestions and reasoning behind the grades I gave. I wished more people would give me useful and constructive critique for my submissions. (Student U, Design MOOC)

One possible suggestion to curb this problem, which was utilized by the instructor of the Poetry MOOC, is to post all students' essays along with the reviewers' comments onto a sub-forum pertaining to each writing assignment question so that many more students could respond to them. This helped to mitigate the possible variance in the peer reviews.

Misunderstanding about submitted work

Some participants in the Python and Design MOOCs complained that their assigned peer reviewers failed to understand their work that resulted in their getting a poor review result. No provision was made to allow further interaction between the reviewer and the one being reviewed to discuss the work or comments further.

> There were two evaluators who deducted points from me incorrectly in their evaluation of Pong. They claimed that my scoring was flipped, and that the wrong player is getting the point. But the goal of Pong is to successfully hit the ball with the paddle. If the ball goes off screen on the right hand side, for example, that means the player on the right hand side lost that round. Therefore, the player on the left hand side of the screen should be awarded a point. Before evaluating others' projects, please make sure you understand what you should be looking for. (Student H, Python MOOC)

One suggestion to address this problem, which was also utilized by the instructor of the Poetry MOOC, is create sub-forums dedicated to each assignment for students to follow-up or seek clarification from the peers regarding the review comments. This helped minimize the risk of misinterpretation of the work and increased the degree of peer interaction in the Poetry MOOC.

Using helpful course resources

The course resources also play a major role in fostering student engagement in online courses. The instructors employed a wide variety of resources and activities such as video lectures, online discussion forums and/or chats or live webcasts, video-integrated quizzes, standalone quizzes, weekly assignments, course readings and links to other valuable materials to help engage students and maximize their learning. According to Bangert (2004), using an array of relevant resources and activities is one approach to address the diverse range of learning preferences and skills that participants may bring to the learning environment. In addition, the Python and Design MOOCs included optional competitions or challenges (eg, "Hall of Fame," Design Innovation Tournament) to cater to students who desire to complete further course activities.

The main course resource for teaching each week's topic was the online video of lectures or panel-style discussions. The use of videos, which presented the image and voice of the instructors,

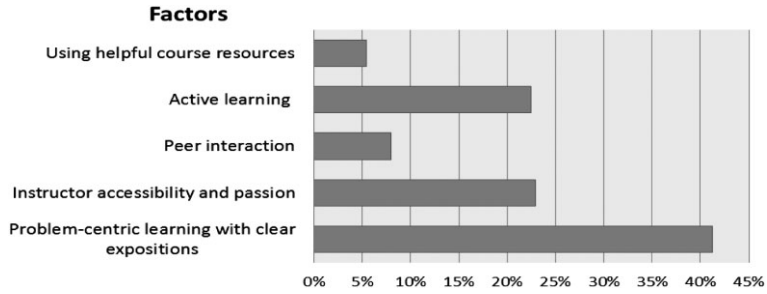

Figure 8: Types of factors and frequency across the three MOOCs

Table 4: Percent of comments related to each factor in each MOOC

Factor	*Python (%)*	*Poetry (%)*	*Design (%)*
Problem-centric learning with clear expositions	28	29	69
Instructor accessibility and passion	25	40	11
Peer interaction	9	18	2
Active learning	30	8	16
Using helpful course resources	8	5	2

served as a useful tool to project an instructor's social presence into the MOOC learning environment. Despite the large class size, the personal aspect (ie, the student feeling that the video was being directed directly at them) was obtained when the instructor appeared "to be only addressing me." This effect was largely achieved by filming the instructor in an informal setting such as a design studio as in the Design MOOC, or an office room as in the Python MOOC where the instructor often made direct eye contact with the camera. Such a technique gave the impression that the instructor was speaking directly to a student that helped to engage the students (Guo *et al*, 2014).

Other video design-related strategies included the following: (1) using "bite-size" videos that cover usually one or two main concepts or issues with relevant examples to illustrate concepts (although the length of the videos in the Poetry were longer, the use of spontaneous and unrehearsed panel-style discussions helped mitigate boredom), (2) using optional subtitles on video to help student follow the presentation of materials, (3) downloadable video lectures to avoid potential online stall or crash, (4) providing slides or notes that summarize the main concepts covered, and (5) providing students the ability to vary the speed of the video presentations.

Further analysis of the types of factors across all three MOOCs revealed that the three most critical factors that could engage open online students were: problem-centric learning with simple-to-understand expositions, instructor accessibility and passion, and active learning (see Figure 8).

Table 4 lists the percent of comments made by course participants regarding each factor according to the *individual* MOOC.

Higher proportions of comments about *instructor accessibility and passion*, and *peer interaction* factors were reported in the Poetry MOOC than the Python and Design MOOCs.

This is probably due to the use of the live webcasts employed in the Poetry MOOC that enabled students to participate in live discussions with the course staff via telephone, discussion forums, Twitter or Facebook. A higher proportion of comment related to the *active learning with feedback* factor was reported in the Python MOOC. This is very likely due to the more frequent use of

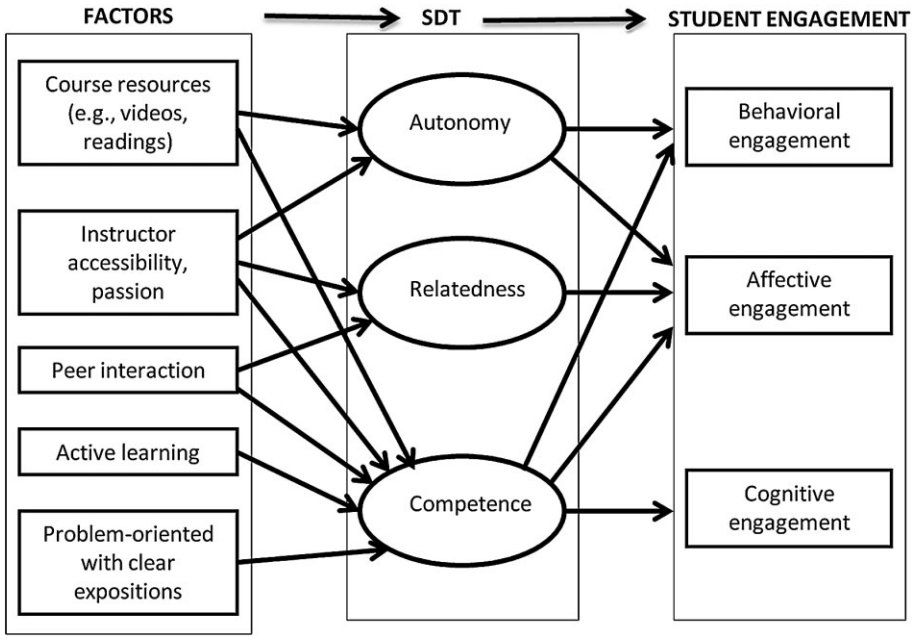

Figure 9: Model showing the main factors that engage students in a MOOC

activities including 10 mini-projects, practice exercises and self-assessment tasks compared with the Poetry MOOC (only four essays throughout course), and seven design assignments in the Design MOOC.

Figure 9 shows a possible model, based on the findings of this study, which suggests how the factors affect each of the three psychological needs (autonomy, relatedness and competence) as well as the three aspects of engagement (behavioral, affective and cognitive).

The provision of course resources would give students a clear idea of what they are actually supposed to do in the course. The availability of extra course resources also allows students who are interested in a topic to explore it further. These cater to a student's need for autonomy. Furthermore, the use of various online resources and activities also helped students achieve a sense of mastery of the topics covered. This caters to a student's need for competence. In addition, instructor accessibility and peer interactions would foster the sense of relatedness which in turn affects students' affective engagement. Instructor and peer interactions could increase students' positive feelings towards a course and help them stay engaged. Furthermore, an instructor's enthusiasm in teaching the course, as well as his/her willingness to interact with students (eg, answer student questions) also plays an important role in meeting students' need for competency. The use of active learning strategies and problem-oriented learning with clear expositions that focus on making meaningful connections to real world helps foster a students' sense of competence in mastering the subject being studied.

Conclusion

This study examines how instructors of highly rated MOOCs promoted student engagement in fully online courses. This study points to the important role that instructors, course resources and pedagogic practices that focus on providing problem-centric and active learning play in engaging online students. The findings of this study suggest that factors that could influence student engagement in traditional online courses (eg, instructor presence and active learning) also matter

in massive and open online environments. The findings of this study also corroborate with five of the seven principles of effective teaching suggested by Chickering and Gamson (1987), namely student–faculty contact, student–student contact, active learning, prompt feedback and respect for students' diverse talents and ways of learning. For example, the availability of various social tools (eg, discussion forums and chats) as well as the willingness of the professor and teaching assistants of the MOOCs to interact with students matches the principle labeled student–faculty contact. The use of computer graded quizzes that provides immediate comments matches the principle referred to as prompt feedback.

This study has broadened and extended related literature in the online learning field. As we examined the perspectives of students who enrolled in at least one of three highly rated MOOC courses and examined the three major themes discussed in previous sections, a framework of how to promote student engagement in fully online courses has emerged. This framework includes the following three propositions that are closely intertwined.

First, instructors need to have an in-depth knowledge of the subject, genuine enthusiasm in the course topic and interest in teaching the course. These three elements are important because they help build an atmosphere of valuing the subject, as well as excitement for the course. Second, although the instructors' having a genuine interest serves to build up excitement for the course, it is important that instructors do not stop there. Instead, instructors need to explicitly help students to achieve a sense of competence, such as using bite-sized weekly lessons that cover one or two main concepts, building on each lesson progressively, making meaningful connection to authentic real-world applications, frequently monitoring student learning and providing an array of relevant course resources and activities to address the diverse range of students' learning preferences and skills. Third, instructors need to have a desire to interact with their students in such a way that they know their instructors are concerned about them and their progress.

This framework, based on three related propositions, provides a useful guide for other educators who are interested in engaging their students in other online or blended courses. Specifically, this study has suggested some strategies (see Table 2) for other educators to use and to further examine their effectiveness.

Limitations and future research

Reflection data from 965 participants from three highly rated MOOCs is, of course, not sufficient to warrant strong conclusions. The author is currently involved in analyzing other highly rated MOOCs in other subject disciplines to examine if these engagement factors hold true and draw out other additional factors (if any).

The current study focused solely on student engagement with MOOCs. It would be useful for future research to also find out what factors could disengage students. A study on student disengagement would yield complementary information about MOOCs.

Another limitation of the study was that it only analyzed data from participants who were willing to post their course reflections. Consequently, the findings reported may have been biased in terms of the participants being favorable towards the MOOCs. It would therefore be useful to survey some of the other participants who did not post their reflections. Despite these limitations, I believe that the findings can provide useful guidance for instructors and are a worthwhile subject for further experimental validation.

Statements on open data, ethics and conflicts of interest

a. All data are open and publicly available on http://coursetalk.com.
b. Ethical clearance was granted by the Human Research Ethics Committee for Non-Clinical Faculties at the University of Hong Kong. No participants' personal identifier (eg, name) is reported in the study.

c. The author is not affiliated with any of the MOOCs examined. There is no conflict of interest in this study.

Note: This paper is an extended and revised version of a keynote speech delivered at the 2014 International Conference on Knowledge and Education technology, Jeju Island, Korea. More than 50% of the original content has been revised and expanded.

References

Agarwal, A. (2012). "Circuits and electronics," MITx. *Chronicle of Higher Education*, *59*, 6, B10.

Allon, G. (2012). "Operations management," Udemy. *Chronicle of Higher Education*, *59*, 6, B10–B11.

Appleton, J. J., Christenson, S. L. & Furlong, M. J. (2008). Student engagement with school: critical conceptual and methodological issues of the construct. *Psychology in the Schools*, *45*, 369–386.

Baker, C. & Taylor, S. L. (2012). The importance of teaching presence in an online course. *Online student engagement tools and strategies*. Faculty Focus Special Report (pp. 6–8). Magna Publication.

Bali, M. (2014). MOOC pedagogy: gleaning good practice from existing MOOCs. *Journal of Online Learning and Teaching*, *10*, 1, 44–55.

Bangert, A. W. (2004). The seven principles of good practice: a framework for evaluating on-line teaching. *Internet and Higher Education*, *7*, 217–232.

Bonwell, C. C. & Eison, J. A. (1991). Active learning: creating excitement in the classroom. Washington, DC: ASHE-ERIC Higher Education Report no. 1.

Breslow, L., Pritchard, D. E., DeBoer, J., Stump, G. S., Ho, A. D. & Seaton, D. T. (2013). Studying learning in the worldwide classroom. Research into edX's first MOOC. *Research & Practice in Assessment*, *8*, 13–25.

Business Wire (2014). *Coursetalk and edX collaborate to integrate online course reviews platform*. Retrieved September 30, 2014 from http://www.businesswire.com/news/home/20140417005360/en#.VCohj2eSx8F

Cheung, W. S., Hew, K. F. & Ng, S. L. C. (2008). Toward an understanding of why students contribute in asynchronous online discussions. *Journal of Educational Computing Research*, *38*, 1, 29–50.

Chickering, A. W. & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin*, *39*, 7, 3–7.

Coetzee, D., Fox, A., Hearst, M. A. & Hartmann, B. (2014). Should your MOOC forum use a reputation system. In *Proc. CSCW 2014* (pp. 1176–1187). New York: ACM Press.

Coffrin, C., de Barba, P., Corrin, L. & Kennedy, G. (2014). Visualizing patterns of student engagement and performance in MOOCs. In *Proc. LAK 2014* (pp. 83–92). New York: ACM Press.

Conole, G. (2013). MOOCs as disruptive technologies: strategies for enhancing the learner experience and quality of MOOCs. *RED, Revista de Educación a Distancia. Número*, *39*. Retrieved January 15, 2014 from http://www.um.es/ead/red/39/conole.pdf

Cooper, S. & Sahami, M. (2013). Reflections on Stanford's MOOCs. *Communications of the ACM*, *56*, 2, 28–30.

Corbin, J. & Strauss, A. C. (2007). *Basics of qualitative research: techniques and procedures for developing grounded theory*. Thousand Oaks, California: Sage Publications, Inc.

Costello, L. (2013). *Coursetalk. New learning times*. Edlab: Teachers College, Columbia University. Retrieved September 30, 2014, from https://newlearningtimes.com/cms/article/897

Daniel, J. (2012). Making sense of MOOCs: musings in a maze of myth, paradox and possibility. *Journal of Interactive Media in Education*. Retrieved January 10, 2014 from http://wwwjime.open.ac.uk/jime/article/viewArticle/2012-18/html

Darr, C. W. (2012). Measuring student engagement: the development of a scale for formative use. In S. L. Christenson, A. L. Reschly & C. Wylie (Eds), *Handbook of research on student engagement* (pp. 149–172). New York: Springer.

Das, S. (2012). Increasing instructor visibility in online courses through mini-videos and screencasting. *Online student engagement tools and strategies*. Faculty Focus Special Report (pp. 8–9). Magna Publication.

Deci, E. L. & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press.

Educause (2013). *7 things you should know about MOOCs II*. Educause. Retrieved July 14, 2014 from http://www.educause.edu/library/resources/7-things-you-should-know-about-moocs-ii

Ferenstein, G. (2014). Study: massive online courses enroll an average of 43,000 students, 10% completion. Retrieved on June 20, 2014, from http://techcrunch.com/2014/03/03/study-massive-online-courses-enroll-an-average-of-43000-students-10-completion/

Fredricks, J. A., Blumenfeld, P. C. & Paris, A. (2004). School engagement: potential of the concept: state of the evidence. *Review of Educational Research*, *74*, 59–119.

Garrison, D. R., Anderson, T. & Archer, W. (2000). Critical inquiry in a text-based environment: computer conferencing in higher education. *The Internet and Higher Education, 2*, 2–3, 87–105.
Guo, P. J., Kim, J. & Rubin, R. (2014). How video production affects student engagement: an empirical study of MOOC videos. In *Proc. L&S 2014* (pp. 41–50). New York: ACM Press.
Haggard, S. (2013). *The maturing of the MOOC*. Research paper number 130. Retrieved May 1, 2014 from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/240193/13-1173-maturing-of-the-mooc.pdf
Harrington, S. J. & Floyd, K. S. (2012). Enhancing engagement and the value of the course to the student through course organization and active learning. *Online student engagement tools and strategies*. Faculty Focus Special Report (pp. 15–17). Magna Publication.
Hawkins, J. D., Gou, J. G., Hill, K. G., Battin-Pearson, S. & Abbott, R. D. (2001). Long term effects of the Seattle social development intervention on school bonding trajectories. *Applied Developmental Science*, 5, 225–236.
Helme, S. & Clarke, D. J. (1998). *We really put our minds to it: cognitive engagement in the mathematics classroom, Teaching Mathematics in New Times* (pp. 250–257). Brisbane, Qld.: Mathematics Education Research Group of Australasia.
Hew, K. F. (2014). *Towards a model of engaging online students: lessons from MOOCs and four policy documents*. Keynote address at the 2014 International Conference on Knowledge and Education Technology, Jeju Island: Korea.
Hew, K. F. & Cheung, W. S. (2014). Students' and instructors' use of Massive Open Online Courses (MOOCs): motivations and challenges. *Educational Research Review*.
Hill, L. G. & Werner, N. E. (2006). Affiliative motivation, school attachment, and aggression in school. *Psychology in the Schools, 43*, 231–246.
Jacobs, A. J. (2013). Two cheers for Web U! *New York Times, 162*, 56113, 1–7.
Kelly, R. (2012). Tips from the pros: 4 ways to engage students. *Online student engagement tools and strategies*. Faculty Focus Special Report (p. 10). Magna Publication.
Kizilcec, R., Piech, C. & Schneider, E. (2013). Deconstructing disengagement: analyzing learner subpopulations in massive open online courses. In *Proceedings of the Third International Conference on Learning Analytics and Knowledge* (pp. 170–179). New York: ACM.
Kolowich, S. (2013). The professors who make the MOOCs. *Chronicle of Higher Education, 59*, 28, A20–A23.
Krause, S. D. (2013). MOOC response about "Listening to world music". *College Composition and Communication, 64*, 4, 689–695.
Lam, S.-F., Wong, B. P. H., Yang, H. & Liu, Y. (2012). Understanding student engagement with a contextual model. In S. L. Christenson, A. L. Reschly & C. Wylie (Eds), *Handbook of research on student engagement* (pp. 149–172). New York: Springer.
Mackness, J., Mak, S. & Williams, R. (2010). The ideals and reality of participating in a MOOC. In L. Dirckinck-Holmfeld, V. Hodgson, C. Jones, M. De Laat, D. McConnell & T. Ryberg (Eds), *Proceedings of the 7th International Conference on Networked Learning 2010* (pp. 266–275). Lancaster: University of Lancaster.
Maddox, S. J. & Prinz, R. J. (2003). School bonding in children and adolescents: conceptualization, assessment, and associated variables. *Clinical Child and Family Psychology Review, 6*, 31–49.
Marks, H. M. (2000). Student engagement in instructional activity: patterns in the elementary, middle, and high school years. *American Educational Research Journal, 37*, 153–184.
McMinn, S. (2013). MOOCs being embraced by top U.S. universities. *USA Today*. Retrieved December 19, 2014 from http://www.usatoday.com/story/news/nation/2013/07/11/moocs-top-colleges-and-universities/2509883/
Merrill, D. M. (2002). First principles of instruction. *Educational Technology Research & Development, 50*, 2002, 43–59.
Nawrot, I. & Doucet, A. (2014). Building engagement for MOOC students. In *Proc. International World Wide Web Conference* (pp. 1077–1082). New York: ACM Press.
Reeve, J. (2012). A self-determination theory perspective on student engagement. In S. L. Christenson, A. L. Reschly & C. Wylie (Eds), *Handbook of research on student engagement* (pp. 149–172). New York: Springer.
Rodriguez, C. O. (2012). MOOCs and the AI-Stanford like courses: two successful and distinct course formats for massive open online courses. *European Journal of Open, Distance and E-Learning, 2*. Retrieved on May 13, 2014 from http://www.eurodl.org/
Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information, 22*, 63–75.

Siemens, G. (2004). Connectivism: a learning theory for the digital age. Retrieved January 15, 2014 from http://www.elearnspace.org/Articles/connectivism.htm
Skinner, E. & Belmont, M. J. (1993). Motivation in the classroom: reciprocal effects of teacher behavior and student engagement across the school year. *Journal of Educational Psychology, 85*, 571–581.
Skinner, E., Furrer, C., Marchand, G. & Kindermann, T. (2008). Engagement and disaffection in the classroom: part of a larger motivational dynamic? *Journal of Educational Psychology, 100*, 765–781.
Sull, E. C. (2012). Teaching online with Errol: a tried and true mini-guide to engaging online students. *Online student engagement tools and strategies*. Faculty Focus Special Report (pp. 6–8). Magna Publication.
Thanasoulas, D. (2000). What is learner autonomy and how can it be fostered? *The Internet TESL Journal, 6*, 11. Retrieved October 15, 2014. from http://iteslj.org/Articles/Thanasoulas-Autonomy.html
Voelkl, K. E. (1997). Identification with school. *American Journal of Education, 105*, 204–319.
Wang, Y. & Baker, R. (2014). *MOOC learner motivation and course completion rates*. Retrieved September 4, 2014 from http://www.moocresearch.com/wp-content/uploads/2014/06/MRI-Report-WangBaker-June-2014.pdf
Warren, J., Rixner, S., Greiner, J. & Wong, S. (2014). Facilitating human interaction in an online programming course. In *Proc. SIGCSE 2014* (pp. 665–670). New York: ACM Press.
Whitehead, K. (2014). Local and regional universities look to offer MOOCs as trend goes global. *South China Morning Post*. Retrieved on May 30, 2014, from http://www.scmp.com/lifestyle/family-education/article/1515667/local-and-regional-universities-look-offer-moocs-trend
Young, J. R. (2013). What professors can learn from "hard core" MOOC students. *Chronicle of Higher Education, 59*, 37, A4.