

Chapter 11

MOOCs vs MMOGs

Chek Tien Tan

Abstract Much hype has been centered on MOOCs, or Massive Online Open Courses, in higher education recently. They possess the noble aim of bringing top quality education to the masses, often for free, but suffer from several drawbacks that include student motivation and a lack of team-based activities. Other than to alleviate some of these shortcomings, the main goal of this paper is to explore what the design of Massively Multiplayer Online Games (MMOGs) can offer for the design of MOOCs. A review of MOOCs is first presented, followed by a dissection of the general structure of MOOCs with a formal game perspective. A comparative analysis with MMOGs is then provided which finally leads to a set of design guidelines for creating more engaging MOOCs.

11.1 Introduction

MOOCs (Massive Online Open Courses) are widely considered to be the potential game changers in higher education and have been given much attention recently, with some of the world's leading colleges competing to offer a rapidly increasing number of online courses as well as build the supporting technical framework behind them. On the contrary, MMOGs (Massively Multiplayer Online Games) have been around since the dawn of computer gaming in the 1980s. Good MMOGs are well known for their ability to engage players for countless hours and provide a heightened sense of intrinsic motivation, amongst other qualities from the concept of flow by Csikszentmihalyi [1], which is used widely to explain positive gaming experiences.

Although MOOCs have enjoyed wide positive reception, they are mostly well received for their potential benefits rather than currently perceived benefits. For example, Vardi highlighted that MOOCs might be seriously lacking pedagogy and popular only for getting a fast and free education from prestigious colleges [14]. In

C. T. Tan (✉)
Games Studio, University of Technology, Sydney, Australia
e-mail: chek@gamesstudio.org

one case, a MOOC that had over 40,000 students was stopped halfway due to massive student complaints¹. Ironically, it was a MOOC that taught online education. Indeed, as we will see in the review of MOOCs in the next section, current MOOCs lack some of the important components that provide essential graduate attributes. Nevertheless, if designed properly, we believe MOOCs do possess the potential to revolutionize the way tertiary education is being delivered and also how accessible quality education is to the masses, hence this paper hopes to provide some insights into how to design it better.

In the rest of this paper, a review of some of the most prominent MOOCs is first presented. We then introduce MMOGs and analyze their game design strategies in terms of formal and dramatic elements. We then dissect MOOCs with the same game design perspective and finally conclude with a set of design guidelines for creating more engaging and complete MOOCs.

11.2 MOOCs

Although the notion of MOOCs originated sometime in 2008, the term MOOC only became widely popular when Stanford University launched three official courses for free public enrolment in the year 2012. These three courses received a massive reception around the world with enormous enrolment numbers. From then on, many initiatives followed suit with some of the world's leading colleges like Stanford, MIT and Harvard heavily invested in the development of MOOCs. Hence it is no surprise that the more successful and well-known MOOCs have roots in these universities, which includes Coursera², edX³ and Udacity⁴. Hence MOOCs are largely known to represent full-blown university courses that are offered for public enrolment online. This means a typical MOOC comprises of lectures, assignments, quizzes and final examinations, but are delivered using online mediums. It is worth noting that there are a number of popular online educational resources, like Khan Academy⁵ and MIT OpenCourseWare⁶, which do not possess strict enough structures to fit into this modern definition of MOOCs, but have very similar goals. In general, MOOCs can certainly take on a large number of variations depending on how loose one wishes to define it but we will limit our discussions to the typical notion of full-blown university online courses. Hence we will look at Coursera, edX and Udacity in more detail.

¹ <http://www.insidehighered.com/news/2013/02/04/coursera-forced-call-mooc-amid-complaints-about-course>.

² <https://www.coursera.org>

³ <https://www.edx.org>

⁴ <https://www.udacity.com>

⁵ <https://www.khanacademy.org>

⁶ <http://ocw.mit.edu>

11.2.1 Coursera

Coursera was founded by Stanford University professors Andrew Ng and Daphne Koller. It started offering courses from only Stanford University, the University of Michigan, Princeton, and the University of Pennsylvania, but has since expanded to become the largest MOOC portal offering over 350 courses from a large variety of disciplines from more than 60 universities, at the time of writing. Coursera courses represent typical MOOCs with courseware organized into lectures, assessments and discussion forums. The courses run at fixed periods with a clear start and end date with weekly content and assessment deadlines given as they are released. Enrolled students have to adhere to the stipulated schedule.

Lectures are video recordings delivered via an advanced web player that allows the student to change playback speeds. The lectures look mostly professionally edited, and feel more engaging than a traditional voiceover slide presentation. For example, in the course *Statistics: Making Sense of Data*, the lecturer speaks in a self video overlaid on top of content material. He even appears to be looking at the correct locations of text he is referring to in the content behind him. The content material also often involves animated digital handwriting used to engage the attention of student viewers.

A prominent feature of the video lectures is that they contain breakpoints that require students to answer short quizzes before continuing. The videos in Coursera are simply short-circuited and an online form is presented to the user to prompt for an answer to a question. Students can also choose to skip the quizzes to continue viewing the video. The only feedback the student gets in these quizzes is the correctness, and the results of these quizzes do not affect the video afterwards

The assessment items often includes automatic software graded multiple choice questions as well as peer graded work that have more complex submission formats. Students will get grades for these items that count toward their final course grades.

The discussion forums are simple online threaded discussion forums that are commonly seen on the web. This non-real-time interaction seems to be the only mode of communication between the instructors and the students, as well as between students.

11.2.2 edX

edX is a not-for-profit organization founded by Harvard University and the Massachusetts Institute of Technology. It has since expanded to include a total of 12 universities as partners. Compared to Coursera, edX has a much smaller number of courses, around 33 at the time of writing. edX has a very similar structure to Coursera with similar courseware content whereby students need to adhere to the strict timelines of each course.

The format of the videos in edX reflects most closely to traditional recorded university lectures. For example in the course *Stat2.1x Introduction to Statistics*, a

typical video shows PowerPoint slides guided by a virtual pointer with a voiceover from the lecturer, and in *CS188.1x Artificial Intelligence*, the video is a mix of PowerPoint slides and recordings of the lecturer appearing to give actual lectures to live audiences. Just to be clear, the videos are pre-recorded and not streamed live. The videos appear to be non-interactive, in that there are no embedded quizzes in the midst of viewing, unlike the ones Coursera has.

The graded assessments are similar to Coursera's, which include automatic and peer graded tasks. The discussion forum also appears to be of a similar type, which contains non real-time threaded posts.

One unique offering of edX is that its platform technology is also open-sourced, which includes a course authoring tool, assessment tools and even an Artificial Intelligence (AI) grader based in machine learning. This is an important feature of edX that aims to advance the state of the art in MOOCs by giving developers free access to a good starting framework.

11.2.3 Udacity

Sebastian Thrun, David Stavens and Mike Sokolsky, who are all prominent researchers in computer science, founded Udacity. Udacity started from a Stanford University experiment (which Sebastian Thrun was a part-time Professor at) with an online course, much like the story of Coursera. Udacity has an even smaller number of courses, 25 at the time of writing, and the structure of content in Udacity is very similar to those of Coursera and edX, with Lectures, assessment items and discussion forums at the core. However, Udacity's MOOC offering does differ quite a bit from those of Coursera's and edX's.

Firstly, Udacity does not require students to adhere to a fixed semester timeline. Students can complete the courses entirely in their own pace. This means more flexibility, but also means that it is harder for the instructors to coordinate, and that group-based assignments will be really complicated to implement. Currently, it seems like all assignments in Udacity are individual-based. That being said, most assignments in Coursera and edX are also targeted at only individuals.

Secondly, the video lectures in Udacity have a different level of engagement. One visible difference is that all courses are delivered in a very similar way, with the lecturer primarily using a digital pen to illustrate concepts, with the hand totally visible. Like Coursera, Udacity's videos have short quizzes that break up the lectures to engage the students. But unlike Coursera, the quizzes actually blend into the visuals of the content. For example, in the course *Introduction to Statistics*, each quiz actually involves the lecturer asking a question in the midst of his lecture, and writing the question digitally by hand on the screen. He then draws a text box by hand and asks for an input from the student. The text box then displayed to the user is actually overlaid onto the actual position where the lecturer draws his hand-drawn box. This most likely aims to provide a more seamless and engaging experience than the static one in Coursera. Whether it actually does provide this heightened experience is a research question to be uncovered by more formalized experiments, but from the personal usage experience of the author, he certainly thinks it does.

For the assessment items, the graded assessments also follow a similar video-based quiz approach, including assignments and final examinations. This aims to make the whole experience uniform and seamless to increase engagement. In all, the usability of the website also appears to be much more intuitive and simpler, as the student simply needs to follow the linear path depicted by the videos. The discussion forum however, is largely similar to Coursera and edX.

From the above review of the major players, the biggest advantage of MOOCs over traditional classroom seems to be the delivery of lectures. Using recorded video means students can watch them at their own time, scrub forwards and backwards and change playback speeds. One big advantage is that these capabilities make it more conducive for students to grasp difficult concepts where there is a need for repeated viewing. Also, the embedding of short practice quizzes within the videos makes it more engaging than static videos and also provides a more interactive experience, which has been known to improve learning [11].

Apart from the improved lecture delivery, the rest of the MOOC offering has several potential drawbacks however, including the following:

- The improvement in video lecture delivery does not guarantee a student will want to look at them if one is not motivated by the course nature. Making the course purely online might be worse if the student is not even motivated to start looking at it, but the course is essential for his overall studies. To make this point clearer, take for example a student studying a game development degree. Calculus is an important fundamental knowledge for many graphical techniques in games, but it is common that many students are not able to see the value when they are taking it in a foundational year. Hence if the degree was entirely online, this student might fare badly or in the worst case not even try to go through the calculus course. Hence the issue of motivating and engaging students is a bigger problem in online courses as the responsibility of learning falls entirely on the students.
- Current approaches seem to favor tasks that can only be performed individually, whilst most educators would agree that group work is an important aspect of learning in many disciplines [12].
- There is a lack of the human touch and the participation in a real community. Most current approaches to interaction revolve around the use of online discussion forums. When all interactions are non real-time and happens without knowledge of what the others look like or how the others sound like, learning feels like a solo endeavor. In addition, having all the assignments done individually reinforces this separation. Prior study has shown that there is a significant difference in learning perceptions when the notion of a social community is absent [2]. Provision for more interaction modes between students are needed, even if they are done in an online setting.
- In the online assessments there seems to be no requirements for presentations. Classroom presentations are an essential part of tertiary courses as public speaking is a core graduate attribute valued by many professions. Technology does allow for streamed presentations but perhaps the sheer size of the MOOCs poses a big practical challenge for developers.

In the first instance it seems like going back to a traditional mode of face-to-face classroom delivery solves some of these problems. Hence one solution might be the popular concept of blended learning [6], whereby face-to-face delivery mixed with online solutions have been shown to improve learning outcomes [7]. However, this paper proposes an alternative solution, and that is the use of MMOG design concepts to improve these aspects, and possibly even increase the value proposition beyond these problems.

11.3 MOOCs as MMOGs?

MMOGs take on a variety of genres but have several distinct characteristics can be implied by the name. Firstly the words “Massively Multiplayer Online” in MMOG means that it involves a large number of online players. The second part of the name, “Game”, naturally means that it is a digital game, and the notion of a game is what primarily empowers the MMOG experience.

Some of the most successful MMOGs currently include League of Legends, World of Warcraft, and Diablo III⁷. In 2011, 7 years after the release of World of Warcraft, it still had over 10 million paid subscribers⁸ with over 600 million hours played in the United States and Europe region. In these kind of games, concepts of engagement, immersion, and flow [8] are often used to explain the positive player experiences leading to their massive success. Hence, to understand how they have achieved these positive player experiences, we will need to analyze the components of such games.

The structure of an MMOG can be concisely decomposed using concept of formal and dramatic elements [3]. Formal elements include the online **players**, clear game **objectives**, software defined game **rules**, core gameplay **procedures**, game **resources**, artificial **conflict**, virtual game **boundaries** and clear **outcomes**. Dramatic elements a mix of mimicry, alea and agon **play**, progressively harder **challenges**, a game world **premise**, fantasy **characters** and an immersive **story**.

Now let us look at the structure of a MOOC in the same formal and dramatic element style used for games. It can be seen that formal elements are very similar to MMOGs, which includes online students (**players**), course **objectives**, course **rules**, study plans (**procedures**), learning **resources**, tests (**conflict**), course **boundaries**, and graded **outcomes**. However, dramatic elements seem to be drastically different from MMOGs:

11.3.1 Play

MOOCs basically provide just one form of “play” within a strict rule-based system, and that is the competitive “play” between each student and the course system. There

⁷ <http://www.forbes.com/sites/johngaudiosi/2012/07/11/riot-games-league-of-legends-officially-becomes-most-played-pc-game-in-the-world/>

⁸ <http://www.bbc.co.uk/news/technology-15672416>

is also a strong emphasis on attaining final grades that depend on single-attempt or limited-attempt assessment tasks. This limits the amount of free-play in the system. Failure to attain the required grades for each assessment also adds to the looming possibility of needing to repeat the course several months later only when it is next offered. Most would agree that the experience it provides can hardly be classified as play, and is closer to “work” instead.

Although MMOGs also provides play within a relatively tight rule-based system, MMOGs have a form of play that emerges from a mix of competition, chance-based play, and role-play. Players often have an almost unlimited number of tries at a quest or puzzle until they finally figure out how to conquer them. Moreover, players can often choose from various modes of play that involves different player interaction types. A well playtested ecosystem of play is hence a core component of successful MMOGs. MOOCs can perhaps incorporate a more flexible and varied nature of play.

11.3.2 Challenge

The types of challenges presented to students in MOOCs include practice quizzes (in the video lectures), graded assignments, and graded tests. Most of the time these challenges are just chronologically successive tasks given according to what was taught so far, and are not purposefully designed to cater to the increasing skills of the students. These tasks, especially the graded assessment items, are usually few in numbers, and are of moderately high difficulty, with the same difficulty presented to all students regardless of their ability, in order to fairly spread the grade distribution. This potentially hinders learning for slower paced learners when their skills do not match the time these assessments are given out.

In MMOGs or even most good games in general, balancing challenge is considered one of the most crucial aspects of design in order to achieve positive, engaging player experiences. Game designers spend a majority of time playtesting and meticulously tweaking each game parameter in order to get the level progression right so that players can easily get into the mental state of flow during play. In general, it means that as the player’s skill improves, the game should present an appropriate heightened challenge in order to motivate play progression so as to maintain an optimal experience that is constantly intrinsically satisfying. For example one strategy to achieve this is to keep player performance in close check as frequent as possible with game levels and quests kept small and contained, especially at the start. It is also important to understand different players might progress differently, so the design needs to take this into consideration. The correlation of flow to positive player experience has been shown by a large number of studies [4, 9, 13] and is hence a key notion MOOCs might be able to learn from.

11.3.3 *Premise, Character and Story*

MOOCs do not have a crafted premise, character or story. On the contrary, these elements are usually what stand out the most to players in many MMOGs. A large portion of any MMOG investment usually goes into the careful crafting of immersive game worlds with deep, compelling characters and storylines. Perhaps when compared to single-player Role-Playing Games (RPGs), stories in MMOGs are less well-received, but there is little doubt premise and characters play a big part in the play experience [10]. Moreover as mentioned, the stories in MMOGs can be treated as the emergent relationships in player-to-player interactions in the game world. When the premise and character design have enough depth, players can easily form stories around their interactions. Premise, character and story have also been shown to be important measures of immersion for games [5], and MOOCs might similarly use this to their advantage.

11.4 Designing MOOCs with MMOGs

With the comparative analysis in the previous section, we can now derive several guidelines to improve MOOCs from a design perspective.

- Focus on getting the challenge progression correct.
This might mean a major re-design of the quizzes, assignments and tests in order to have a gradually rising challenge that accumulates each additional set of knowledge presented via the videos. This also mean having a lot more points of practice throughout the MOOCs that are small and test concise portions of knowledge. Moreover, instructors should allow students to practice applying concepts a large number of times in different situations before going on to more difficult concepts. This adheres to good challenge design, whereby for example in games after a new mechanic is introduced, multiple successive levels will test the player in various ways, before requiring to combine the mechanic with the player's previous arsenal of skills for a next higher challenge.
There is also a need to recognize that every student progresses differently, so it might be good to ensure he/she is able to competently make use the current knowledge first, before allowing him/her to proceed, akin to the level progression system in games. Hence we suggest allowing for repeated tries in graded assessment tasks. To progress to the next task, it is important to ensure the student has acquired the required knowledge up to the current point. It is a pity that current MOOC assessments serve more as performance evaluators rather than learning facilitators. However, we recognize that this depends a lot on the goals of the instructor, as to whether it is more important to make sure every student has the best learning experience, or to make sure that students are judged, ranked and rewarded accurately.

Nevertheless, as with good MMOGs, a lot of user testing needs to be employed in order to get the challenge aspect right in MOOCs.

- Have different student interaction modes for assignments.

For example, include team assignment “arenas” in which fixed roles have to be taken in order to complete the assignments. Then groups of students can arrange for times to meet online and tackle these assignments together. This is much like the multiplayer dungeons in MMOGs. Another example might be student versus student assignments in which students go against each other in friendly competition much like the player versus player arenas in MMOGs. Care needs to be taken in distributing course credit however, as too much competition might deter learning instead. Having various student interaction types can also help develop different inter-personal skills common to many graduate attribute goals of universities.

In addition to the provision of more interaction modes, the use of technology familiar to MMOG players can be employed to enhance the way these interactions are performed. In MMOGs, especially intense dungeon battles that require a lot of coordination, live voice communication tools are often used, and players sometimes have to be in constant communication in order to conquer the challenges properly. Many multiplayer games have this feature built into the system as well. MOOCs can also consider integrating such technology such that it can increase the human touch and sense of participation in a community, which has been shown to be of great value in learning [2]. Coupled with group video streaming technology, group presentations in these assignment “arenas” will likewise be possible. Use of appropriate technology already prevalent in MMOGs would hence serve to enhance the social benefits of learning even more.

- Create premise and characters.

In the first instance this might be in the form of consistent aesthetics across all MOOCs in a MOOC university portraying a theme in which each student is required to have a character representation of themselves. Having a story around them might be even more compelling but as mentioned story can be built by the student interactions if a strong premise and rich characters are present. Moreover, designing story is especially time-consuming and the returns might not be high enough to justify the investment, hence we suggest that story be optional.

As discussed, it is evident that premise, character and story are central to immersion in MMOGs and using this to engage students in MOOCs might be something worth trying out. Increasing the immersive experience might also improve the intrinsic motivation required to “attend” the classes online, even if it was the Calculus course that students might hate in a game design online degree.

11.5 Conclusion

In this paper, we have provided a review of popular MOOCs and pointed out several shortcomings. We then perform a structural analysis of MOOCs from the viewpoint of MMOGs so as to compare the similarities and differences in order to extract the

elements of success from good MMOGs. We find that the main insights MMOGs can offer are the design of the dramatic elements in MMOGs, hence we have also provided an elaboration on ways to implement them. Note that we do not exclude the fact that a closer look at the formal elements might uncover more insights, but this paper limits the discussion on the areas that are most glaringly absent in MOOCs, and those are the dramatic elements.

On the whole, we are not claiming that this is the best or preferred way to resolve the current issues or is the best way to enhance MOOCs. What we aim to provide is an alternative lens to look at MOOC design and proposing that more can be done is this aspect to investigate the possibilities of applying MMOG design to MOOCs. We are also not advocating that MOOCs will take over tertiary education, but acknowledging that they will potentially have a big impact on education. We hence hope to contribute to that impact in a positive way.

In terms of limitations, development time is certainly a prohibitive factor in taking up our suggestions. We do recognize that a lot of the guidelines are easier said than done. However, they are at the most they are as hard as making a game, and the game industry is a well-established industry with many good processes to gather from. The implementations are certainly technically feasible, but business wise it might be a harder decision to make. One primary issue is also the fact that this has not been tried before and investing resources into it might be extremely risky for the MOOC providers. One way for instructors might be to collaborate with game companies to enhance their MOOCs.

Hence as future work, we aim to perform a formal investigation into the proposed benefits of our guidelines. We hope to embark on actually designing a simple MOOC, which we will coin gMOOC (gamified MOOC), that includes the dramatic element designs that we have discussed. We will then perform a formal user study on whether gMOOCs indeed have an edge over current MOOCs.

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