Once Upon a Tip… A Story of MOOCs and Gamification

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Abstract

This paper discusses the future of MOOCs based on recent research and acknowledged affordances of videogame's design. The interest in MOOCS for educational purposes has increased over the last few years, with researchers identifying key pedagogical features that make the success of these inherently powerful learning tools. However, low student motivation and high dropout rates have somehow changed the original expectations of many researchers, despite the MOOC user base doubling in 2015. So, in this study we survey recent literature looking for answers, and discuss the evidence gathered from specific MOOCs with over one thousand participants, namely, pioneering iMOOC courses at Universidade Aberta (the Portuguese Open University). Finally, we look at the gaming world and discuss some findings that may benefit the learning design of MOOCs, considering that, besides the huge appeal of these (free) courses, there are recurring shortcomings that we have to alleviate. We follow up on the tip that gamification, and other emerging strategies, such as social networking and digital storytelling, may be vital to assure a sustainable future for open education and MOOCs.

Keywords: MOOCs, learning design, open learning, games, gamification.

1. Introduction

In this paper we briefly discuss the recent history and status of Massive Open Online Courses (MOOCs), and consider the need for change towards alleviating existing shortcomings in learning design. In the wake of the Open Educational Resources (OER) movement in the beginning of this century, we witness today the emergence of MOOCs all around the globe, mostly based on the notion of "connectivism" – a term coined by George Siemens and Stephen Downes in the context of a networked and digital world (Conole, 2014; Bell, 2011). But more recently, following up on the MOOC Research Initiative study (2014), it has become apparent that MOOCs have clear shortcomings, for instance, a very high dropout rate and little evidence of student's success in broad academic terms. So, notwithstanding the worldwide MOOC user base doubling in 2015, with a total number of students who signed up for (at least) one course reaching over 35 million[1], the results seem to be unsatisfactory and there is a need to rethink the learning design of these courses, perhaps evolving towards more engaging designs that include the "gamification" of content and the use of social awareness strategies (Krause et al., 2015; Staubitz et al. 2014; Gené et al., 2014).

After the boom of 2012, the evidence on MOOCs (Lane, 2013) showed that these courses triggered a re-conceptualisation of higher education study amongst traditional universities that was previously mainly found in "open" universities. A balanced view is provided in a chapter by Tony Bates (2014), notably

[1] https://www.class-central.com/report/moocs-2015-stats

highlighting the characteristics and disruptive power of this innovation, namely, that MOOCs are forcing higher education institutions to think carefully about its approach to open education and that there are considerable differences in the design of MOOCs, reflecting different purposes and philosophies. This author argues that MOOCs, as powerful models of open education, could well replace some forms of traditional teaching (such as large lecture classes) but more likely they will remain just an alternative to other conventional education methods. A change of pace has occurred in the meantime, with MOOCs evolving from 10 weeks long courses and weekly or bi-weekly assignment deadlines to shorter courses with flexible deadlines (Shah, 2016). So MOOCs are gradually being transformed from virtual classrooms to a Netflix-like experience. Courses are now offered in a self-paced format or switched to a regular schedule with new sessions starting automatically on a bi-weekly or monthly basis (e. g. Coursera). So, if a student can't finish a session, he/she can be transferred to a new session.

The high dropout rate in MOOCs called attention to a number of issues, perhaps one of the most salient and easier to solve is the need to support social presence. According to Shah (2016), while 40% of learners in FutureLearn MOOCs interact in their courses, less than 5% of learners tend to engage in Coursera MOOC forums[2]. Social presence must be established and sustained in order for students to build the trust that will allow them to comfortably engage into deeper levels of social knowledge construction and group-based problem solving. However, the short duration of MOOCs and the "light" engagement of students tends to limit the opportunities for establishing a sense of trust between learners, as this likely leads to much more self-serving relationships (Siemens et al., 2015).

Many educational researchers today would define open education as a multidimensional construct of learning skills and cognitive learning results, for instance, procedural, normative and strategic knowledge, and attitude (Pivec & Dziabenko, 2004). Learning is, from this perspective, about building up knowledge, skills, beliefs and attitudes that together, form an identity as someone who is a capable consumer, and perhaps even producer of scientific knowledge. Some have even speculated that this "identity-level" is a good way for educators to think about transfer. Perhaps if students experience the development of identities as competent performers, acquiring knowledge, skills, and beliefs congruent with those valued by various scientific communities, they will take on these practices outside of formal school contexts.

On the other hand, teaching presence is somehow non-existent, and scaffolding strategies may be needed for learners to progress in MOOCs. Some of the pedagogical strategies proven in other situations may not fit to the MOOC context as they are tied to assumptions that the collaboration and/or group inquiry will happen in small groups, as in the typical classroom teaching/learning context. In this regard, face-to-face is an ideal situation to deploy and explore OERs, with the option of having the teacher as facilitator.

The current trend towards learner centred strategies and collaborative learning shows the way to MOOC designs that should incorporate factors of knowledge construction (predominantly in group activities), authentic learning, and personalized learning experience, which merges agreeably with the integration of other factors such as games, digital storytelling, science inquiry, and immersive technologies that are able to engage students in rewarding activities. There is also a need for the incorporation of social media technologies as enablers of deeper interactions among learners. Unfortunately, the pedagogical models in use by many universities fail to capture interactions that are possible via many cloud applications that are part of a student's personal learning environment (Bidarra & Araújo, 2013).

[2] http://mfeldstein.com/mooc-discussion-forums-barriers-engagement

From this standpoint, and based on relevant research, we contemplated the benefits of solutions emanating from the realm of videogames. A current perspective, in line with our experience of MOOCs and the use of new digital media, recognizes a tendency in education that acknowledges the emergence of new learning experiences that games may turn out and seeks to understand their consequences for how we think, act, play, and learn (Shaffer et al., 2005). It has also been widely established that well-designed interactive media tools such as games, simulations, and virtual environments may provide learners with relevant and engaging paths to content mastery (Bidarra & Martins, 2010).

2. Gamification in MOOCs

We already know that games are inherently and intrinsically motivating (Connolly, Stansfield, & Hainey, 2011) and every player knows that good games provide fun, pleasure, and intense emotional rewards. From this perspective, educational game researcher James Gee (2003) shows how good game designers manage to get new players to learn their long, complex, and difficult games. A well-designed game entices players into the "reality" of the game world and keeps them there until the goals of the game have been met (Salen & Zimmerman, 2004). Gee points out that incorporating appropriate challenges that are "doable," and other widely accepted effective learning principles that are supported by research in cognitive science, are in fact a large part of what makes good games motivating and entertaining (Gee, 2004). So, we argue that the transformation of curriculum and instruction processes must be based on the new digital media capabilities and its patterns of use by students, namely through interactive and rich content embedded in game-like learning experiences, or even using adequate serious games. These educational games should be able to coexist in environments that follow the OER model and have elevated pedagogical value (Moreno-Ger et al., 2008). As an alternative to the direct use of educational games, the process of game-thinking to engage users and solve problems in education has more recently been (re)defined as "gamification" (Zichermann & Cunningham, 2011). Under the mark "gamification" an intense public debate is spawning as well as numerous applications developing – ranging across productivity, business, health, education, computer science, and entertainment media (Krause et al., 2015; Usart & Romero, 2014; Gené et al., 2014; Vaibhav & Gupta, 2014; Corpeño et al., 2014).

Like the evolving notion of "MOOC", "gamification" is also a relatively new concept that has acquired considerable momentum over the last years (Bidarra, Figueiredo & Natálio, 2015; Kapp, 2012; Deterding et al., 2011; Lee & Hammer, 2011). It's a concept that integrates the mechanics of gaming in non-game activities to make these more effective and enjoyable. Three general gamification principles are: mechanics (systems of goals, rules, and rewards), dynamics (the way players enact the mechanics), and emotions (the feelings generated during the gamified experience). When used in the educational field, gamification seeks to integrate game dynamics and game mechanics into learning activities, for example, using tests, quizzes, exercises, quests, badges, etc., in order to drive the intrinsic motivation and foster participation of students. In a way, educational processes have always applied gamification in learning activities when using scores (points) on marked assignments. However, these solutions are not very engaging for the students. There is a need for contributions of other education processes using tangible "game play" factors such as digital storytelling and interactive technologies, as these are able to engage students in a way that is more intense and memorable.

Many strategies have been used to revert the shortcomings of the traditional MOOC pedagogical model, which is almost exclusively a reproduction of the lecture-oriented approach. For instance, authors Usart & Romero (2014) introduced a Game-Based Learning approach in a MOOC aiming to encourage entrepreneurship based on five gamified activities during the course. The final results showed a good

perception of the MOOC value for entrepreneurship studies, and an acceptable overall degree of satisfaction with the use of games. In another experiment by Corpeño et al. (2014), gamification and Fun Theory strategies were embedded into the structure of a MOOC for technology enthusiasts, titled "Introduction to Raspberry Pi". In order to enhance student motivation three strategies were used: a double-track scheme for managing different student type; an automatic classification of students into leagues according to their accumulated grades; and a repeated-attempt policy for quizzes and labs. A recent paper by Freire et al. (2014) reports on the integration of a more developed game as a type of MOOC activity, using the well-known eAdventure platform, while providing increased engagement and a valuable source of learning analytics. The authors found that the inclusion of a serious game had positive implications for both courses and games.

Choosing the best of two worlds, authors Gené et al. (2014) proposed a model to motivate MOOC students based on content gamification, using the most attractive and addictive elements of games but avoiding the pitfalls of pointless recreational play. Some of the features included are: ranking rating, voluntary activity (collaborative work), course progress, certification, and number of "likes" (as in social networks). Interesting to note that these authors admit that the Moodle platform already offers different types of modules and blocks that are adequate for gamification, for instance, through the use of groups, status bar, badges and quizzes. In order to enhance Moodle platform features, they installed two additional modules. The first one was called "block ranking," and was associated with the completion of course activities. This module monitored course activities and gave points to the students if they completed HTML pages or submitted a grading assignment, in this case the points were added to the grade points. The second module was called "certificate" and allowed for the dynamic generation of certificates. Once the course was completed, depending on the conditions set by the authors, the student could then download the certificate. Along the same lines, authors (Vaibhav & Gupta, 2014) also found that if the actual learning platform has potential to be "gamified" it does not only drastically increases the user enrolment but also increases user engagement throughout the course.

In another sense, the growing open education movement is contributing to the demand for alternative certification and recognition mechanisms such as open badges. An open badge is an ''online record of achievements, tracking the recipient's communities of interaction that issued the badge and the work completed to get it'' (The Mozilla Foundation and P2PU, 2012). For instance, Udacity, a well-known MOOC provider introduced the concept of "nanodegrees", a form of micro-credentials very similar to open badges (Shen, 2014). The use of badges was also tested in the Carpe Diem MOOC (Lokuge et al. 2014) with the aim of introducing participants to a learning design process that would successfully enable teams to quickly and effectively design for learning. The findings showed that many participants were motivated by the use of digital badges making them progress through to course completion. In a previous study (2013) Sheng had already described how the game Ingress (Google) could be incorporated in a MOOC, through the use of mobile devices and augmented reality, where badges, crowd learning, seamless and geo-learning were used as gameplay elements.

Other recent experiments tested the potential of gamification within interactive environments for increasing retention and learning success (Krause et al., 2015). In a controlled experiment with 213 students majoring in psychology or computer science, researchers found that students had a significant increase of 25% in retention period and 23% higher average scores whenever the course content was gamified. As expected they also concluded that social networking elements showed a significant impact in retention and learning ability. Also Staubitz et al. (2014) found that using a leaderboard as gamification element is an advantage

when a user finds himself amongst a list of friends rather than a list of random strangers. These authors argue that social leaderboards are more motivating when students are able to visualize the competition amongst friends rather than amongst random strangers to whom the individual user cannot relate.

Another, more radical perspective, is to redefine the whole MOOC concept and put forward the position that it may be fully structured as a game (Tan, 2013). In view of the shortcomings of MOOCs, a design framework for creating a "MOOC game" is suggested by Tan (2013). Instead of just choosing to gamify some MOOC's content, his idea was to extract some of the most crucial elements of good game design and applying them to MOOC design at macro level, not just to activities and user interactions.

3. Status of MOOC's design

There are currently two approaches to MOOC learning design, the "connectivist" MOOC, or cMOOC - a participatory and highly interactive course - evolving from Siemens and Downes ideas (Bell, 2011). This type of course requires a continuous and high-level involvement by teachers and students. On the other hand, the more recent xMOOC is closer to a traditional e-learning course (Bates, 2014). More specifically, the xMOOC is characterized by using new technologies, such as automated peer review, programmed feedback activities, and learning pathways in which the interaction between students is not essential. There is also a fair amount of time flexibility for the students in an xMOOC so a very intense intervention on the part of teachers is not required.

Instructor oriented xMOOCs closely resemble large lecture courses as the instructor provides course content in a detailed and prescribed format, following a conventional curriculum (Pence, 2012). In a cMOOC a high level of student interaction is required, there is more flexibility, and there is no way to confirm that a given student has made the course, and thus earn a valid certificate in the end, since the infrastructure is rather open (Ahn, Weng, & Butler, 2013). In the xMOOC there is a marked learning pathway, and this lack of flexibility makes it more difficult to satisfy some of the interested public. Previous research (Rodriguez, 2012) suggests cMOOC students are mainly adult, lifelong learners not specifically concerned with the conclusion of the course. This indicates that cMOOCs may develop a large group of involved participants, but these may not show as participating actively when compared to online courses that are instructor driven (Ahn, Weng, & Butler, 2013).

By removing the collaborative component an important dimension in education is reduced, and this is a cause for quitting according to the MOOC Research Initiative (2014). Another of the major reasons for dropping out is the lack of time to study difficult subjects, and both xMOOCs and cMOOCs do not allow for periods of "suspension". So, we think there should be a more refined approach with fewer limitations, blending the advantages of both models, and allowing for periods of unavailability of learners attention.

To address the deficiencies of typical learning designs used in MOOCs, at the Portuguese Open University (Universidade Aberta) we developed an innovative MOOC about climate change, also a pilot for the specific iMOOC pedagogical model (Coelho et al., 2015). The iMOOC is a hybrid model which incorporates elements from existing cMOOCs and xMOOCs but adds other features drawn from Universidade Aberta's experience with online learning, such as "e-folios" and "gamified" learning activities. Technically, the iMOOC is supported by two platforms - Moodle and Elgg – integrated in a seamless web interface, thus becoming a "new platform" within the university e-learning system (which is Moodle-based). The first edition of the course had more than one thousand participants, and at the time it was the largest MOOC course in Portuguese language delivered in the world.

4. From *iMOOC* to *Aula Aberta*

The iMOOC was first tested in 2013 at Universidade Aberta, consisting of a course on climate change (Coelho et al., 2015). It was followed by other instances of courses using the same model, later integrated in the ECO European project (Brouns et al., 2014), an initiative to disseminate MOOCs in Europe[3]. The iMOOC model has some unique features that make it different from other MOOCs. The first characteristic is openness. All resources and interaction are open to visitors without forcing them to subscribe the course. In fact, after the enrolment period all users that want to access the course are allowed to do it with a visitor status. After the course ends all content remains accessible to any visitor. Secondly, before the course starts, all students must participate in a short preparation module that takes one week, where interaction technology and instructional issues are discussed. This allows them to have first hand training with the platform as online students. The prep stage is already common practice at Universidade Aberta since the inception of its virtual pedagogical model, which already prescribed this kind of preliminary module (Pereira et al., 2008). This practice attempts to greatly reduce the dropout rate because of its gradual course integration path. The third unique feature of the iMOOC is the blend of two known models. The iMOOC has the advantages of a cMOOC and those of a xMOOC, as it relies on the integration of a social network platform (Elgg) with a learning management system (Moodle). In Moodle the course is designed like an xMOOC, with the activities and the learning path structured, and in Elgg the freedom of social interaction is guaranteed, following the model of a typical cMOOC.

In iMOOC as in other MOOCs, teacher intervention must be limited otherwise the course cannot be massive. But the teacher is not away from the course either, as there is provision for "once a week" teacher feedback based on data gathered from forums, blogs, and short messages. Assessment is based on tests and assignments as usual. Essentially the tests have autocorrecting mechanisms and the assignments are peer-reviewed by three students. This way the teacher workload during the course is limited to the weekly feedback, and the students have two standard types of learning activities: tests and assignments. The students that accomplish all the activities have an informal certificate of participation. The students that request a formal certificate need to build a portfolio with the work done during the course and ask to be assessed by means of a supervised exam (requires payment).

Researchers observed that, as in most MOOCs and standard online courses, the number of page views and user actions decreases over time as expected. But in the case of the first iMOOC open course some findings were not so common: 25% of the participants had only one page view and no interventions; 4% of the participants had many page views and no messages; 40% of the participants did not post any message but had page views during the all course. This revealed a clear type of interest in the course, meaning that 40% of participants that stayed in the course just wanted to do some browsing but were not interested in grading or in activities. Another set of relevant data from the course deals with learning activities. Four activities were proposed, two tests and two assignments. The first test was completed by 9% of the participants; the assignments and other tests were taken by only 3%. The supervised exam (to get a certificate) was attended by only 0,3% of the participants. But if we consider the success rate from another perspective, we may realize that reaching the end of the course was the goal of most participants, and in this case the success rate would be 48%. It was also pointed out in that study (Coelho et al., 2015) that 50% of the students were from outside the university, and 1,5% of them enrolled in formal university courses in the following months. The study concluded that a shorter and more flexible course might decrease the dropout rate, since a long and fixed schedule of learning activities tends to reduce student time flexibility and increase dropout.

[3] http://ecolearning.eu

Borrowing from the realm of videogames, it would be interesting to compare the progress of students in a MOOC with what takes place in a multiplayer online game. Let's start by popping a trigger question: how do we compare a massive online game with a MOOC?

Firstly, in the online game a returning player is always welcome. It's all set to continue playing where he left the game before, and eventually he may receive something extra by returning to the game, as compared to starting over from scratch. In a MOOC, a returning student would only have to face all the activities that he missed, all the interactions and discussions not followed, and any intervention by him would just reveal that he had become an outsider, by ignoring course materials and peer interaction. Recovery from a period of one week of inactivity would be very complicated for the student, as usually the best strategy is to look for another course in a following date, and take that course instead of trying to come back.

Secondly, in an online game no one can talk with everyone as the players are organized in groups, and they can talk to each other within the same stage in the game. A win-win advantage exists for all members in the group as they share resources and evolve in the game. In a MOOC the communications are global and all participants must be in the same stage of the course, furthermore, each student performance is independent of the others, there is some chaos in the process and a great deal of empathy is lost.

Thirdly, in online games normally there is some incentive to return to the game every day, for instance by making decisions and getting results after some time, as this allows for more accurate decision-making and better results. If after sometime the results are not collected, they may be gathered later without any type of compromise. In a MOOC the norm is usually a fixed schedule of activities that must be fulfilled in time to avoid loosing pace and place.

Last but not least, it is not uncommon to find a global ranking of individuals and teams competing in a game, and the scoreboard is always up-to-date. This serves as a strong incentive for the players to evolve in their game play and face new challenges. Almost every task allowed in any given moment can change the ranking, and normally there are several ways to increase the number of points. In a MOOC such a ranking is not usually present, and if it exists would be updated only after the learning activities were finished. In fact, outside the period of tests and assignments there is nothing in a MOOC that a participant could do to improve the ranking in the course.

In 2017, to overcome some of the previous iMOOC limitations, we created a new course model for the recent *Aula Aberta*[4] open educational resources programme by the Portuguese Open University, consisting in an "Introduction to Informatics" (*Introdução à Informática*, in Portuguese). This model is based on a gamified structure with video, images, auto-corrected multiple-choice questions, use of hash tags, accumulation of points and a ranking of best achievers. The *Aula Aberta* initiative started this year and is already a success story, having reached about 4000 students in just a few months. The topic areas covered in the courses are environment, maths, statistics, computer science, European studies, management, humanities, education and languages. Upon completion of each course, and having a score of 75% or more, students can get a (paid) certificate of attendance. So far, the course "Introduction to Informatics" seems to be the way ahead, having many students interacting steadily with the resources, but it's still early for definitive results and the new model needs some further investigation.

[4] http://aulaberta.uab.pt/eimooc

5. Conclusions

In this paper we looked at some issues currently associated with MOOCs and surveyed recent literature looking for answers. We also examined the evidence gathered from specific MOOCs with over one thousand participants, namely, pioneering iMOOC courses at Universidade Aberta (the Portuguese Open University). We also looked at the gaming world and reviewed some findings that may benefit the learning design of MOOCs. We followed up on the tip that gamification, and other emerging strategies, such as social networking and digital storytelling, are crucial to the future of open education and MOOCs. However, most attempts seem to be very experimental. Furthermore, "gamifying" a course requires a deep understanding of games and this poses a problem for many instructional designers who must have knowledge of a few essential aspects, for instance, know-how concerning storytelling, engagement, motivation, achievement, and game mechanics.

On a more positive note, while the proliferation of MOOCs is still increasing, it is also becoming clear that certain changes are occurring and that more effective instructional designs are being tested. Courses are now shorter and more flexible, and the major MOOC providers show some innovation, such as credentials connected to real world outcomes (like career advancement), Coursera started "Specializations", Udacity coined "Nanodegrees", EdX has "xSeries", and FutureLearn offers "Programs". These are the perfect ground for the introduction of gamifcation devices, such as points, levels, badges, rankings and other means that have proved successful in the gaming world, hopefully encouraging learners to try different ways of learning and thinking while promoting empowerment, problem solving and understanding of content.

6. References

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