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AN EXPERIMENT OF SOCIAL-GAMIFICATION IN MASSIVE OPEN ONLINE COURSES: THE ECO IMOOC

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Introduction

Massive Open Online Courses (MOOCs) represent a disruptive new trend that has brought scalability and openness to non-formal education. In fact, MOOCs have the potential to widen participation in higher education, thus contributing to social inclusion, the dissemination of innovation and the internationalization of higher education institutions. These courses have three main properties: they are (a) scalable, because they are intended for several thousand participants; they are (b) open, since enrolment is free of charge and there are no admission barriers; and they are (c) online because participants use the Internet to access content, resources and assignments, as well as to interact with other participants (Saltzman, 2014; McAuley, et al., 2010).

However, designing and running a MOOC also requires facing several logistical, technological, pedagogical and financial issues (Jordan, 2013). For instance, participants do not invest money in enrolling in a course, so it is very easy for them to drop it at any time without facing the consequences typically experienced in traditional courses (North, Richardson, & North, 2014). Participants' expectations and goals regarding their learning output in MOOCs are substantially different from conventional formal education. This also implies that completion rate is extremely low (between 5% and 20%) (Daradoumis et al., 2013; Malan, 2013; Jordan, 2013) when compared to traditional formats, which makes it challenging to determine whether MOOCs are successful (Daradoumis et al., 2013; Sahami et al., 2013).

On the other hand, over time education researchers have conducted many theoretical and empirical studies on the videogames subject. These studies have disclosed many potential advantages of videogames in education like immediate feedback, information on demand, productive learning, motivating cycles of expertise, self-regulated learning or team collaboration (Gee, 2003; Rosas et al., 2003); but also some issues related to educational content, learning transfer, learning assessment, teacher implication and technological infrastructure (Facer, 2003; Squire, 2002; 2003).

Due to the aforementioned issues, some researchers do not use only videogames to educate; instead they seek to export the positive aspects of videogames to non-gaming educational contexts. This concept is commonly called *gamification*. Some researchers generically defined

it as "the use of game design elements and game mechanics in non-game contexts" (Domínguez et al., 2013; Deterding et al., 2011), although this broad definition has been further redefined to reflect the most common objective of gamification: increase user experience, facilitate engagement with a system and motivate actions (Kapp, 2012). Attending to these facts, it could be more accurately defined as incorporating game elements into a non-gaming software application to increase user experience, engagement and motivation.

Gamification seems thus to be a natural next step towards the development of engaging and collaborative learning experiences, making it perfect for MOOCs, where learning experiences are of this type. Furthermore, since motivation is one of the advantages provided by gamification, it would be desirable to apply it to MOOCs in order to increase the motivation of students and to decrease the dropout rate. Therefore, this paper presents the results of an experiment using gamification in a real MOOC. This has been developed by an international team composed by researchers from Universidade Aberta (Portugal) and University of Alcala (Spain). The course selected for the experiment is a sMOOC developed by Universidade Aberta (Portugal) in the framework of the ECO project partnership, which draws their pedagogical approach from the iMOOC pedagogical model created by Teixeira and Mota (2013).

The paper is structured as follows: next section shows the experimental design of this research. Results section shows the results obtained in the two iterations of the course carried out in the experiment. Finally, the Conclusions section introduces the conclusions obtained in the experiment.

Experimental design

Based on the iMOOC methodology (Teixeira & Mota, 2013) and on its use by the ECO project, which leads to the development of a new approach called ECO sMOOC, an ECO iMOOC environment was designed, serving as a test bed for a number of pilot courses such as *Digital skills for teachers* (Figure 1). This environment uses the Elgg framework for providing social networking and community building functionality in the course (e.g. friends, stream, blogging, microblogging, etc.).

A first version of the MOOC *Digital skills for teachers* was carried out from 24th October 2014 until 10th January 2015. This was considered as the first iteration of the course with 427 participants in total. The environment of this first iteration was created using Moodle and the Elgg framework. A second iteration of the course was carried out from 27th April 2015 until 7th June 2015 with 591 participants in total. This second iteration included the components of the first one as well as gamification components that were added. Some of these gamification components have already been tested in other scenarios with positive results (De-Marcos et al., 2014; 2016). The details of the elements used in the iterations are explained in the next sections.

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Instrument of the first iteration: Moodle + Elgg

The first iteration of the course was built using the Elgg framework and Moodle. Moodle was used for delivering learning contents and the tasks for completing the course. Elgg was used for including the functionality of social networks: followers, short messages (tweets), blogging, etc.

Figure 6. ECO iMOOC Platform in the first iteration of the MOOC

Instrument of the second iteration: Moodle + Elgg + Gamification

The MOOC in this second iteration was built based on the components of the first iteration, but in this case we developed and included a plugin with some extra functionality about gamification. We added to the platform some game elements, such as achievements and the leaderboard. The aim was to improve the use of the platform and to increase the number of students that completed the course.

Achievements

A list of achievements was developed with the aim of establishing some challenges or "missions" that students had to complete to get points. The objective of using the achievements was to increase the participation of the students in the platform (Figure 2).

The list of achievements implemented in this experiment is showed in the Table 1.

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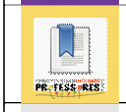
Table 1: List of achievements created for the MOOC

	iPerfil	Given to all who complete their profile during the bootcamp module.
	iPic	Given to all who upload their picture during the bootcamp module.
	iBlog	Given to all who post at least 1 entry in their blog during the bootcamp module.
	iPotencial	Given to all who complete iPerfil, iPic and iBlog achievements during the bootcamp module.
	iComentador	Given to all who post at least 15 entries in their blog.
	iColaborador	Given to all who post 15 entries in the bookmarks.
	iTweeter	Given to all who post 50 entries in the short messages stream – curtas.
	iFilósofo	Given to all who post at least 25 comments to other participant's posts.
	iSociável	Given to all who follow at least 25 other participants.
	iPopular	Given to all who are followed by at least 25 other participants.
	iEstrela	Given to all who receive at least 25 likes by other participants in one of his/her post.
	iReferência	Given to all who receive at least 5 replies by other participants in one of his/her post.
	iFator	Given to all who obtain the previous badges.

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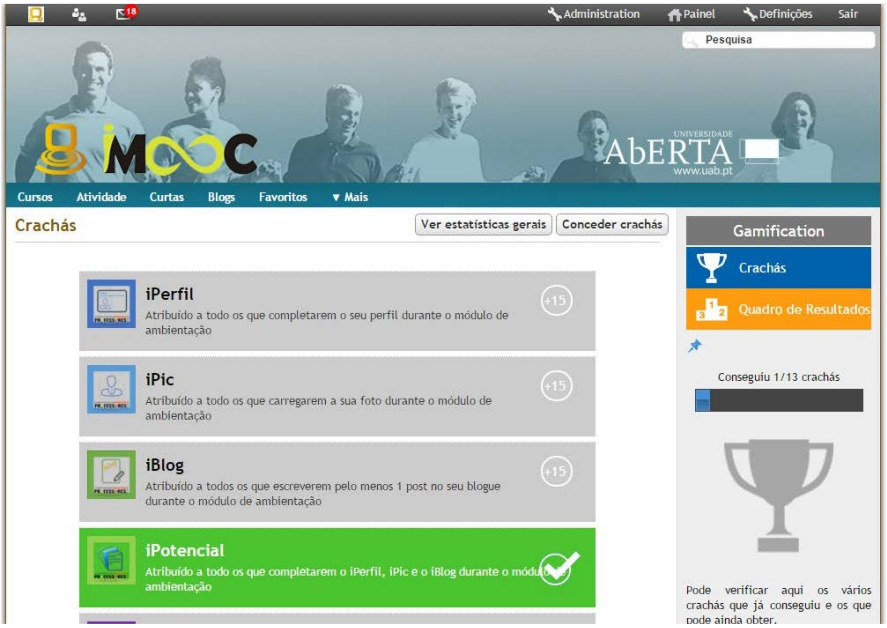

Figure 7. ECO iMOOC Platform with the achievements implemented

Leaderboard

A leaderboard was created (Figure 3) with the aim of showing the status of each student in the course and for encouraging the competition between students. Four different metrics were created to be showed in the ranking: (a) number of points obtained completing the achievements, (b) number of friends (follows) with other participants, (c) number of comments written in the platform and (d) number of short messages (tweets) in the platform.

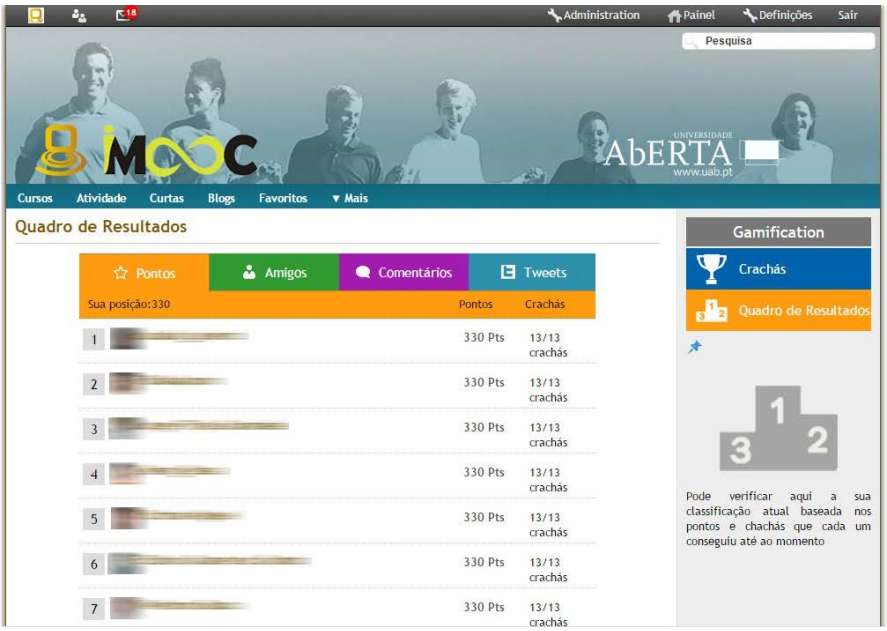

Figure 8. Leaderboard implemented in the ECO iMOOC Platform

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Results

This section shows the results obtained in the two iterations of the course. The first iteration is considered as *social group* (it includes social network mechanisms but no gamification) and the second iteration is considered as *social-gamified group* (it includes both social network mechanisms and gamification techniques).

Table 2 shows the results of these iterations. 3.51% of the students completed the course in the first iteration and 5.07% of the students completed the course in the second iteration. Therefore it can be observed that the number of students who passed the course was higher in the *social-gamified group*. Although this fact is positive, and obviously the results in the second iteration are better than in the first one, it has to be further improved because it is between the normal values considered in this kind of courses.

Table 2: Results of the social and social-gamified groups

	Social Group	Social-Gamified Group
# Total participants	427	591
# Participants passed the course	15	30
% Participants passed the course	3.51%	5.07%
# Participants asked formal evaluation (official certification)	3	0
% Participants asked formal evaluation (official certification)	0.70%	0%

Results of participation in the platform are shown in Table 3. It can be observed that, in all cases, the participation in the platform (blogs, Tweets, messages, etc.) is higher in the social-gamified group than in the social group. In general terms, it is important to highlight that the mean of total interactions in the social group is 117.0281, while in the social-gamified group the mean is 486.82 interactions. This means that the participants interacted more than four times more in the second iteration than in the first iteration.

Table 3: Results of participation in the social and social-gamified groups

	Social-group			Social-gamified group		
N	427			591		
	Total	Mean	Std. Dev.	Total	Mean	Std. Dev.
Blogs	292	0.68	2.41	1126	1.90	5.03
Tweets	524	1.22	6.25	2591	4.38	15.88
Likes	405	0.94	4.41	4134	6.99	33.14
Messages	1468	3.43	21.73	16805	28.43	164.32
Comments	478	1.11	4.92	1829	3.09	11.39
Followers	628	1.47	2.03	2964	5.01	9.85
Following	292	0.68	3.03	2849	4.82	15.54
Login	2645	6.19	15.81	5559	9.40	19.73
Total interactions	49971	117.02	409.04	287712	486.82	1851.20

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Conclusions

Two iterations of the *Digital skills for teachers* course were carried out. The first iteration was done using social network techniques based on the use of Elgg platform. The second one was performed using also social network techniques as well as some gamification mechanisms.

The results obtained in the second iteration are positive (regarding the percentage of participants who passed the course) with respect to the first iteration but the dropout rates are still low and they considered as "normal". Furthermore, the participation in the platform was higher in the second iteration with respect to the first one. Therefore we can conclude that the use of gamification techniques promote the use and participation of the social platform. It is also important to highlight that there is a need to continue researching in this field including more gamification techniques to reduce the dropout rate.

As future work we are planning to include Open Badges mechanisms (Mozilla Open Badges: http://openbadges.org), because this kind of reward can be kept after the course finishes, and this could be a good motivation for the participants in the MOOC. The possibility of integrating mobile devices in the courses will also be studied, as done in previous research (Garcia-Cabot et al., 2015).

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