Gamifying Collaborative Activities in MOOCs

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Abstract. MOOCs can bring together thousands of students with different background in the same course. This fact presents a good opportunity for instructors to design and enact collaborative activities that may involve groups. However, MOOCs present some drawbacks that can hinder the completion of this kind of activities such as the high dropout rates, the self-paced character or the resistance of the students to abandon their comfort zone. The use of gamification in MOOC contexts has shown potential benefits to enhance students' engagement, encourage students to interact with others and promote activity submission, which can be useful for increasing the completion of such collaborative activities. This paper shows the gamification design, and the first outcomes, of a MOOC that involves gamified and collaborative activities. To carry this out, the course was configured with 15 badges that students can achieve when performing social and optional actions for completing the course.

Keywords: Gamification, MOOC, Collaboration, Group, Badges.

1   Introduction

The inclusion of collaborative activities in MOOCs can support the construction of joint knowledge, foster effective social interactions and enrich learning with social and cognitive dimensions [1]. In fact, the usage of collaborative activities was one of the purposes of the first MOOCs, which followed a connectivist pedagogical approach. The aim of the so-called cMOOCs was to promote students learning by the interactions with other students of the course and by the creation of joint artifacts [2]. Currently, many MOOCs can reach up to several thousands of students interested in the same topic. MOOCs can bring together people with same and different background, course expectations, working time, etc. This kind of courses presents a good opportunity to make students learn together by working and sharing their knowledge [3].

Some collaborative activities are frequently used in MOOCs, such as peer reviews, and activities using forums or wikis. However, in many cases, the students' interactions produced in these activities are limited. Therefore, it is also interesting to consider other collaborative learning designs that may involve more opportunities for students to interact such as activities involving small-groups

or collaborative learning scripts [4]. Although there are several MOOC platforms that allow group formation and complex collaborative capabilities (e.g., Canvas Network, open edX, NovoEd), these activities are still uncommon in MOOCs [1][5]. This absence of collaborative activities can be caused by different reasons inherent to MOOCs, such as low students' engagement, high drop-out rates, the self-paced character or the resistance of the students to abandon their comfort zone [3]. Precisely, a strategy that has shown it can enhance the students' social engagement and reduce the high drop-out rates is gamification [6].

Gamication is defined as the inclusion of elements and structures that frequently appear in games (e.g., narrative, badges, missions) in non-game contexts [7]. However, although there has been research exploring the use of gamification in collaborative activities in MOOCs [8] [9] [10], such research has been mainly focused on forums and peer-reviews, not exploring other more complex collaborative activities, such as those involving small-scale groups generating shared learning artifacts. In this sense, Ramírez-Donoso et al. (2015) developed a gamified mobile application external to the MOOC platform to gamify question-based group activities [11].

Therefore, the underlying research question of this work is *How can gamification be included in collaborative learning activities in MOOC platforms without restricting to forum activities and peer-reviews?* To explore this issue, we have gamified a 7-week MOOC that involves different collaborative activities (including two small-group activities). This paper presents the gamification design, and some initial results about the usage of gamification in that course (at the moment of writing this paper the MOOC enactment is still in progress).

The next section describes the context of the gamified and collaborative MOOC, the followed research approach, the gamification design, and the first gamification data of the experience. Finally, Section 3 summarizes some initial conclusions of this work.

2   Gamifying a Collaborative MOOC on Translation

The topic of the MOOC is an introduction to financial translation from English to Spanish. The MOOC is implemented in Canvas Network[1]. Apart from the recorded videos, readings and individual activities (*e.g.*, questionnaires), the course design included several collaborative activities: (i) general forums to introduce students, share contents and discuss doubts, (ii) peer review activities, (iii) collaborative glossaries, and (iv) small-group activities in which the students have to collaboratively extract terms from different texts[2].

2.1   Methodology

Since the instrcutors of the MOOC had no previous experience with gamification in educational contexts, we used a co-design approach, forming a design

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[1] Canvas Network: https://www.canvas.net/, last access: March, 2017.

[2] For further information about the course design and implementation see Ortega-Arranz et al., 2017 [12].

group composed of instructors and researchers. We used different data gathering techniques to explore the research question posed (see Section 1).

(i) Questionnaires: *(i.a)* previous to the gamification design of the course to know the instructors' background about MOOCs, collaboration and gamification, the original course design, the activities and the contents; *(i.b)* at the beginning of the course to collect the background students data of the students that were enrolled in the course to analyze if there is any relationship between the students' profiles and the badges earned; and *(i.c)* at the end of the course to deepen in the students' reasons for earning badges.

(ii) Collection of Canvas Network and Badgr database entries: *(ii.a)* from the Canvas Network logs, we plan to retrieve information regarding the number of active students[3]; the number of submissions per student; the number and url of the pages visited per student; the number of students that performed the rewarded collaborative actions; and their interactions. *(ii.b)* From the Badgr log, we plan to obtain information regarding the times that each badge is issued; and the id of the students that earned the badges.

2.2 Gamification Design

Badgr was used as a gamification platform for issuing badges as a reward of optional student's actions aiming to promote the students' interaction and activity submission. In addition, a badge leaderboard was enabled to let students share the number and type of badges they already earned. The Badgr platform can be easily integrated into Canvas through IMS LTI[4], allowing instructors to choose the students' actions that are gamified. Fig. 1 shows the fifteen badges that we included in the MOOC and describes the actions that students have to perform to be rewarded.

As shown in Fig. 1, several badges are issued for conducting the same actions in different activities. For example, badges Rookie Reviewer!, Intermediate Reviewer!, Advanced Reviewer! and Expert Reviewer! are issued for completing peer reviews in different activities. Therefore, the co-design team decided to make this structure clear for the students and creating suite of badges with a similar visual representation, also simulating the gold, silver, bronze approach typical in games [8][13].

The co-design team included ten badges related to collaborative activities. The remaining five badges were also included in the course trying to keep engaged the students during the weeks with only individual activities. Also, the team preferred to configure a range of badges instead of a single one for completing the course, thus allowing the students more possibilities for competing in the

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[3] Considering that each weekly module has a compulsory task for getting the course completion certificate, we have considered as active students those who completed the compulsory activity of the previous week. For the first week, we have considered those students that at least visited one page of the course.

[4] IMS Learning Tools Interoperability: https://www.imsglobal.org/activity/learning-tools-interoperability, last access: March, 2017.

Badge	Week	Rewarded Task	Badge	Week	Rewarded Task
	*	**Quiz Master:** Earn the 3 questionnaire badges: Quiz 0, Quiz 1 and Quiz 6.		4	**Good Colleague:** Interact with your group colleagues and submit the resulting collaborative artifact (term extraction - module 3).
	*	**Top Colleague:** Earn the 3 social badges: Welcome!, Good Colleague! and Awesome Colleague!		4	**Translator:** Translate the proposed descriptive public text at module 3.
	*	**Expert Reviewer:** Earn the 3 peer-review badges: Rookie Reviewer!, Intermediate Reviewer! and Advanced Reviewer!		5	**Rookie Reviewer:** Review one of the textual analysis performed by another student that have been assigned to you.
	1	**Welcome:** Introduce yourself in the Social Forum - Cafetería.		6	**Awesome Reviewer:** Interact with your group colleagues and submit the resulting collaborative artifact (term extraction - module 5).
	1	**Quiz 0 - 90%:** Get a grade equal or higher than 90% in the questionnaire at module 0.		6	**Intermediate Reviewer:** Review one of the term extraction analysis performed by another group (module 3) that has been assigned to you.
	2	**Quiz 1 - 90%:** Get a grade equal or higher than 90% in the questionnaire at module 1.		7	**Quiz 6 - 90%:** Get a grade equal or higher than 90% in the questionnaire at module 6.
	2	**Glossary:** Participate in the collaborative glossary of the course.		7	**Advanced Reviewer:** Review one of the term extraction analysis performed by another group (module 5) that has been assigned to you.
	3	**Searcher:** Search and share examples of descriptive private texts related to economy or marketing.			

Fig. 1. Badges configured for the MOOC.

leaderboard. It is important to highlight that the students performing the issued actions but not claiming the badge, are not rewarded[5]. This way, we can analyze whether the students are interested in the gamification.

Canvas Network has some limitations to automatically gamify some of the course collaborative activities. This would introduce burden for teachers and delay in the assignment of badges, which would hinder the benefits of gamification. Due to this reason, the co-design team decided to implement indirect methods to reward some badges, following a similar approach to the work presented by Dominguez et al. [13]. In our case, in order to assign automatically badges in some collaborative activities, we forced the students to write and submit, in a Canvas text field, a proof of the work they had carried out (*e.g.*, the terms introduced in the collaborative glossary with Google Forms).

2.3 Gamification Enactment

The total number of enrolled students in the course is 1018 (932 visited at least one page of the course). At the moment of writing this paper, the course is currently in the fourth week and the students have only been able to earn the badges related to these first weeks (see Fig. 1). As a consequence, in this paper we provide some initial insights of the gamification usage in the first weeks of the MOOC (excluding the two small-group activities). Table 1 summarizes the first students' data (*i.e.*, the number of active students, the number of students that completed the tasks to get the badges, and the number of students that finally claimed the badges).

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[5] In order to claim the badge, the students have to complete the required task and visit the gamification tab added in the course interface.

Open Week	Badge	Active Students	Students who did the task	Rewarded Students	%Badges Claimed
1	Welcome	932	285	269	94.39
1	Quiz0 (90%)	932	245	224	91.43
2	Glossary	479	130	100	76.92
2	Quiz1 (90%)	479	241	179	74.27
3	Searcher*	274	93	62	66.67
4	Translator*	167	22	12	54.54
4	Good Colleague*	167	2groups	1	8.33

Table 1. Statistics of the course badges. *Badges associated to activities that are still open.

The gamification is being used by the active students (373 students have claimed at least one badge, *i.e.*, 40,02% of students that at least visited one page of the course) although that usage seems to decrease during the time: around 90% of students claimed the the first week badges, and around 75% claimed the badges during the second one. However, this is a preliminary result and we will have to wait for the end of the course to see how gamification evolves during the remaining weeks.

3   Conclusions and Future Work

The gamification of collaborative activities beyond activities performed in forums or peer reviews in MOOCs can potentially encourage students to interact with other course students. The gamification design for these collaborative activities is still challenging for promoting the instructors' expected gamification outcomes. To this end, the co-design team full exploited the gamification capabilities of Canvas Network and Badgr for different types of collaborative activities in the described MOOC. However, such capabilities are limited. Aiming to automatically reward students, the gamification was implemented through indirect means. As a future work, we aim to further explore how different types of collaborative activities in MOOCs could be automatically gamified.

In this course we have decided to implement badges and a leaderboard. Nevertheless, it would be also interesting to analyze the outcomes of collaborative gamification with different game design elements such as points or duels, and in different activities. We also plan to further analyze after the completion of the MOOC enactment, quantitative and qualitative data (*e.g.*, Canvas Network logs can show if students claimed the badges after performing the rewarded actions, showing the interest of the students for earning them; and the questionnaires could help to understand why students wanted to earn the different badges and if such badges or the leaderboard encouraged them to keep on working in the collaborative activities) for exploring in depth the benefits of gamifying collaborative activities.

Acknowledgements

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