

Supporting Teachers in the Gamification of Collaborative Learning in MOOCs

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Abstract. Massive Open Online Courses can be conceived as a new form of learning on demand which bring together thousand of students in the same course. Despite the advantages shown by such courses (*e.g.*, open access to education), the research community has detected some current drawbacks in MOOCs such as the lack of students' motivation and collaboration. The use of gamification strategies could potentially motivate and promote students to perform certain actions that could lead to collaboration, as already shown in low-scale educational contexts. Nevertheless, current MOOC platforms and existing gamification implementations hinder the inclusion of gamification in collaborative activities in MOOCs. This PhD thesis addresses the problem of how to help teachers and other stakeholders in the design and implementation of gamification in collaborative activities in MOOCs. This paper presents a brief motivation, the work plan and the current state of the thesis.

Keywords: Gamification - MOOCs - Collaboration - Teachers - System.

1 Motivation and Problem Description

Massive open online courses (MOOCs) are being consolidated as a new form of teaching and learning in higher education. The high enrollment rate and the increasing number of courses [16] has made researchers pay attention to the contents, pedagogies and technologies that can be used in such courses, as well as their potential benefits [5]. However, the research community has also detected several shortcomings in MOOCs such as the lack of students' engagement, motivation and interaction [8], and the lack of collaborative strategies beyond those activities involving forums and peer reviews [10][9]. The benefits of collaboration are well-known in the community [4] but the features of MOOCs (*e.g.*, self-paced character, high drop-out rates) hinder their implementation and completion [15]. Gamification is a technique that has shown benefits in overcoming similar problems (lack of engagement and collaboration) in other educational environments (*i.e.*, encouraging students to perform certain actions and increasing their engagement) [6][7].

Gamification is defined as the inclusion of elements and structures that frequently appear in games (*e.g.*, rewards, lifes, engagement loops) in non-game

contexts [3]. Over the last years, a number of studies have analyzed the effects of gamification in massive contexts due to its potential benefits. The results show that gamification in MOOCs can have positive effects on students similar to those shown at lower-scale contexts. For example, the work described in Zufferey et al. (2016) shows how students that played gamified question competitions watched more videos and completed more modules than the students who never played [18]. Also, the gamification implemented by Anderson et al. (2014) significantly increased the activity in discussion forums in a MOOC (*i.e.*, contributing, reading and voting content), and increased the students' engagement compared with earlier versions of the same course [1].

However, current MOOC platforms and existing implementations limit the students' actions that can be gamified to individual actions (*e.g.*, view a page, get a score upper than a threshold in a quiz, or submit an assignment) and simple collaborative activities (*i.e.*, the reward of points and badges for posting and replying in forums, submitting peer reviews and question and answer students duels). Thus, teachers have a narrow range of actions when they try to motivate students and promote collaboration with game elements in MOOCs.

Also, current MOOC platforms and existing gamification tools limit the creation and implementation of gamified learning designs in such platforms. Although there are some works that provide useful guidelines that could help teachers in the design of gamified activities [17], these works are neither focused nor tested on promoting collaboration in massive scale courses. Furthermore, most of the current gamification implementations are tied to specific contexts (*i.e.*, specific platforms, courses or activities). Therefore, teachers cannot re-use the existing gamified learning designs or implementations for their courses.

As a consequence of the aforementioned shortcomings, teachers, instructional designers and instructors of MOOC courses face limitations in the design and implementation of gamified activities that may involve collaboration in MOOCs. Therefore, the underlying research questions of this doctoral thesis is: ***How can teachers, instructional designers and instructors be supported in the design and implementation of gamified collaborative activities in MOOCs?***

Fig. 1 shows an overall view of the thesis, including the aforementioned context, the research problem, and the aimed objectives and contributions. The general objective (to help teachers, instructors and instructional designers in the design and implementation of gamified collaborative activities in MOOCs) is divided into three particular objectives: (1) To help stakeholders in the design of gamified collaborative activities in MOOCs, (2) To provide stakeholders technological support for the design and implementation of gamified activities in MOOCs, and (3) To provide stakeholders technological support for reusing existing gamified learning designs.

The next section describes the proposed methodology to be followed for this phd. Sect. 3 exposes the achievements so far. Finally, some conclusions are outlined from this phd proposal.

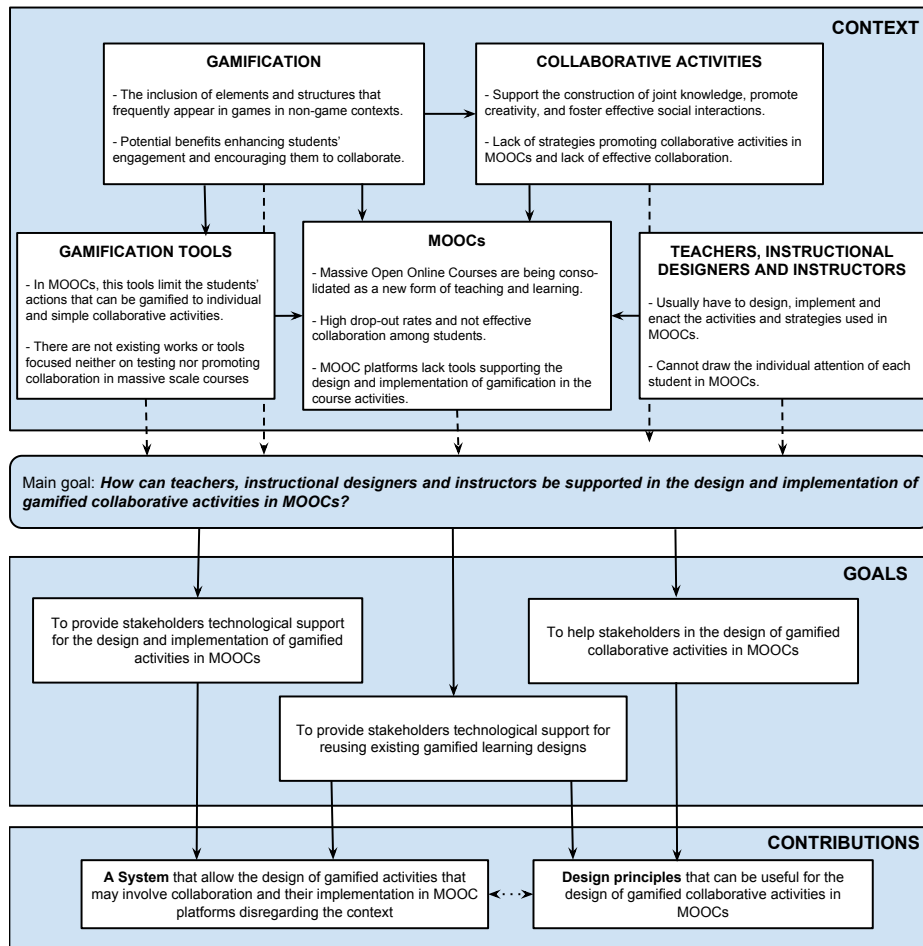


Fig. 1. Overall view of the thesis, including the context, the research problem, and the aimed objectives and contributions.

2 Methodology

The proposed methodology to achieve the aforementioned objectives is Design-Based Research (DBR) [2]. DBR aims to improve the educational practices through iterative analysis, design, development and implementation stages together with other stakeholders (*e.g.*, researchers, teachers) in real educational contexts. This methodology leads to the generation and validation of contextual-sensitive design principles, theories and artifacts that characterizes the design in practice.

The overarching objectives of this thesis and its collaborative and iterative nature make DBR a suitable methodology to frame this thesis work. First, this

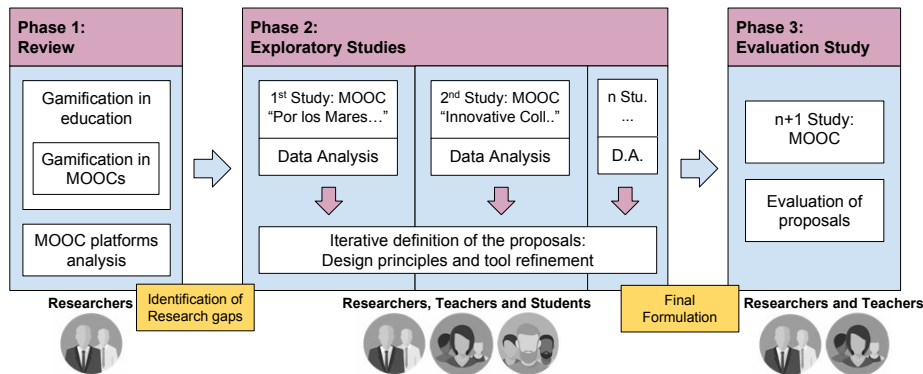


Fig. 2. Overall view of the thesis methodology.

study aims to study the gamification approach to support learning at large scale, with a particular focus on exploring its potentials for supporting collaborative learning in MOOCs. A close collaboration with the MOOC teachers will be maintained to design relevant practical solutions in real MOOC contexts, and these solutions will be refined and matured through several iterations. DBR methodology will help to organize the work in this comprehensive research study while ensuring an effective collaboration with the instructors to create stable interventions in MOOCs. Another important goal of this study is to generate design principles and propose a technological tool that embodies these design principles. Continuous collaboration between the researcher and the practitioners will help to obtain a solid understanding of the educational context and the learner needs, leading to design principles and theories about the effective use of gamification for supporting collaborative learning at large scale

It is still not clear the number of iterations that will be carried out since launching a MOOC is not an easy task and depends on third-party people. However, we foresee three iterations, following general practice in DBR projects [2]. Figure 2 shows the preliminary iteration plan. The first iteration consists on a literature review on gamification practices in MOOCs to identify research gaps. Moreover, such literature review is complemented with an exploration of the tools offered by the current MOOC platforms to examine their affordances for gamification. The second iteration which is currently being carried out is a preliminary attempt to (i) understand the design and implementation process of gamification at large scales; (ii) explore students' experiences and perceptions of gamification used in individual and collaborative activities; and (iii) suggest design principles based on the lessons learned from the current iteration and the relevant literature, and use these design principles to develop a first architecture and prototype of a tool that will help the design and facilitation of individual and collaborative gamification in MOOCs. In the following iterations the plan consists on using this tool in practice, and examine its effectiveness (*i.e.*, usefulness and benefits) from teachers and students perspectives, continuously refine it based on their feedback.

3 Current Progress

So far, the author has carried out a review of gamification in low-scale educational contexts [11], an exploratory study about the collaboration and gamification capabilities of different current open source MOOC platforms, and a systematic literature review regarding gamification in MOOCs [13]. Also, the author has performed a first exploratory iteration (MOOC “Por los mares de la traducción económico-financiera (EN-ES)”) focusing on the design and implementation of a MOOC that involves both individual and collaborative gamified (*i.e.*, badges and a leaderboard) activities [14] [12]. The next step within this iteration is the analysis of the data collected (*i.e.*, MOOC platform and game analytics and pre- and post- questionnaires filled by the teachers and students of the course about the gamified activities, their implementation and the effects of gamification). This data can lead to useful information to start defining the design principles and featuring the prototype.

In the next exploratory studies, the author wants to analyze which are the gamification design strategies that better promote collaboration in some different activities such as those involving small groups and CSCL scripts in MOOCs. Finally, it is expected that the aforementioned expected contributions (the design principles and the system) can be evaluated with MOOC teachers in the last iterations.

4 Conclusions

This thesis proposes a model and a system to help teachers, instructors and instructional designers design and implement gamified activities in MOOCs. The PhD thesis is in an initial step. The main topic of the research has been identified and a preliminary exploratory study has been carried out but the implementation and evaluation is still not clearly defined. Further discussion about the proposals, the evaluation strategies for the proposed artifacts and the methodological work could greatly benefit the author for progressing in this dissertation.

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