

Towards Gamifying MOOCs for Professional Development: The Case of the Learn2Analyze MOOC

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Abstract

Massive Open Online Courses (MOOCs) can be a valuable tool for professional development (PD) as they can offer flexible and cost-effective opportunities for professional competence development at large scale. Nevertheless, certain shortcomings are reported in the literature for MOOCs4PD, such as low completion rates, limited engagement and social participation and lack of credible assessment, mostly inherited by the design of MOOCs targeting the general audience. This paper contributes to the discussion of gamification as a potential solution to the shortcomings of MOOCs4PD and proposes introducing certain gamification elements to the educational design of the Learn2Analyze (L2A) MOOC, a competence-based MOOC on Educational Data Literacy for online education professionals, as well as, indicators that could be used to evaluate the potential effect of each proposed gamification element.

Keywords: MOOC, Gamification, engagement, retention, Professional Development.

1. Introduction

Massive Open Online Courses (MOOCs) are widely used by professionals as an affordable and, in some cases, low risk and low cost way to improve their professional competences in emerging areas (Littlejohn & Milligan, 2015). Professional development, along with personal interest and curiosity, are the key motives for those enrolled in MOOCs (Laurillard, 2016). Typically, MOOCs provide professionals with open, flexible and self-directed access to learning resources and, in some cases, also to experts in the profession, as well as, an opportunity to be active in a global learning community (Jobe, Östlund, & Svensson, 2014; Kalz, 2015). However, despite their success in attracting high numbers of enrolments, MOOCs often face certain issues mainly concerning low completion rates, limited engagement

of the participants to the MOOC activities and the MOOC community, and the lack of credible assessment of the learning outcomes (Jansen, Rosewell, & Kear, 2017).

As a result, the educational design of MOOCs specifically developed and offered for professional development (MOOCs4PD) should be paying attention in handling these known limitations. To address the professional development needs of their participants, MOOCs4PD need to be competence-based in terms of learning objectives, engage participants to authentic and meaningful learning activities and provide credible means of professional competences accreditation.

Incorporating gamification principles into the MOOCs4PD's educational design has been proposed as a way for addressing goal achievement and enhancing engagement and social participation towards increasing completion rates (Antonaci et al., 2018; Aparicio et al., 2019). According to Werbach and Hunter (2012, p. 26), gamification is “*The use of game elements and game-design techniques in non-game contexts*”. In the context of education, it is mainly used in order to enhance participants' engagement and motivation (Dicheva et al., 2015)

The purpose of this paper is to investigate how gamification can be applied to the design of a MOOC for professional development, to address the specific shortcomings of MOOCs4PD, towards improving the overall learning experience of the participants for stimulating the development of certain competences, promote their collaboration and social presence in the MOOC community and collect evidence for the credible assessment of the competence-based learning outcomes. More specifically, we propose introducing gamification elements to the educational design of the Learn2Analyze (L2A) MOOC, a competence-based MOOC on Educational Data Literacy for online teaching professionals and discuss indicators that could be used to study the potential effect of each gamification element.

2. MOOCs for Professional Development in the Educational Sector

Nowadays, Continuing Professional Development (CPD) is widely delivered via online and blended learning methods and, more recently via MOOCs (Kalz, 2015). MOOCs offer the potential for flexibility and variety of training opportunities to large numbers of participants, in contrast with other traditional CPD courses (Castaño-Muñoz et al., 2018).

MOOCs for professional development (MOOCs4PD) have been widely used for Teachers' CPD. Castaño-Muñoz et al. (2018) have studied the use of MOOCs for Teachers' PD in Spain and identified benefits and barriers. Wang et al. (2018) have analysed participants' behaviour based on data from 20 MOOCs for teachers' PD in China. Laurillard (2016) has conducted a study on a pilot UNESCO CPD MOOC for

teachers to assess the potential of MOOCs for addressing the needs for cost-effective, large-scale teachers' training in developing countries.

Although *completion rate* is the most cited MOOCs' shortcoming, it is a remnant of formal educational contexts, where students enroll in courses designed to be completed and achieve the learning outcomes set by the institution (Rabin, Kalman, & Kalz, 2019). Apart from the completion rates, issues related to the recognition, validation and accreditation of competence-based learning goals are also significant in MOOCs4PD (Jobe et al., 2014). In the same research, the potential benefit of the extended peer professional learning community that can be formed within MOOCs for teachers' CPD is highlighted, but the reality of MOOCs differs: the participants, especially those who drop out the course, report problems with lack of interaction and isolation (Hone & El Said, 2016). Hew and Cheung (2014) have studied the challenges in MOOCs from learner's perspective and reported that most students fail to participate in the online discussions. Due to massiveness in terms of participants and its implications to teaching workload, there is limited student-instructor interaction in the form of tutoring, guidance and feedback (Kop & Fournier, 2011). As a result, the educational design of MOOCs specifically developed and offered for professional development should be paying attention in handling these known limitations.

3. Gamification of MOOCs Educational Design

Zichermann and Cunningham (2011) define gamification as “*the process of game-thinking and game mechanics to engage users and solve problems*”, while Kapp (2012) refines this definition of gamification as “*the use of game-based mechanics, aesthetics, and game-thinking to engage people, motivate action, promote learning, and solve problems*”. It is worth mentioning, that gamification differs from “serious games” like educational games.

Gamification in the context of MOOCs, is mainly proposed to enhance motivation to the achievement of the learning goals and to increase the engagement to the learning activities (Romero-Rodríguez, Ramírez-Montoya & González, 2019), but also to support collaboration among participants, handle isolation and improve social participation (Antonaci et al., 2018). Hew et al. (2016) claimed that the use of game mechanics had a positive effect on motivating students to engage with more difficult tasks. Voulgari and Sampson (2014) have examined how elements of Massive Multiplayer Online Games (MMOGs) could be utilized as gamification elements in the design of MOOCs to enhance motivation for participation. Sergis, Sampson, and Pelliccione (2017) have categorized the characteristics of MMOGs and associated them with educational design for MOOCs. Chang and Wei (2016) created a concept map of 40 gamification mechanics in MOOCs and using a survey of 5,000

participants identified the top most engaging among them: *Virtual Goods, Redeemable Points, Team Leaderboards, Trophies and Badges*.

Points, badges and leaderboards are the most common gamification elements used in online environments (Dicheva et al., 2015). Integrating into MOOCs' educational design, gamification elements like points, increase enjoyment and influence how the learners perceive their progress (Borrás-Gené, Martínez-Núñez, & Martín-Fernández 2019). *Points* can be collected and used as status indicators (*experience points*), spent on virtual goods or gifts (*redeemable points*) or indicate how much the community trusts the participant (*reputation points*). *Badges* "allow badge owners to digitally show and publicize online an achieved knowledge or skill" (Jobe et al., 2014, p. 1582). They are credible graphical icons that appear to learner's profile and indicate his/her level of achievement. *Leaderboards* refer to high score tables that indicate a learner's performance compared to his/her peers (Zichermann & Cunningham 2011).

4. Applying Gamification to a MOOC for Professional Development: The Case of the Learn2Analyze MOOC

Educational Data Literacy (EDL) is a core competence for all education professionals, including school teachers, instructional designed and tutors of online and blended learning course, as well as educational institutions' leaders. Nevertheless, existing professional competence frameworks for educators pay little attention to EDL, missing out the potential of using emerging EDL methods and tools in online and blended teaching and learning. Learn2Analyze (L2A) (<http://learn2analyze.eu>) is an Academia-Industry Knowledge Alliance for enhancing Online Training Professionals' Competences in Educational Data Literacy, co-funded by the European Commission through the Erasmus+ Program of the European Union. The key objectives of the Learn2Analyze (L2A) initiative are (i) to develop comprehensive proposal for an Educational Data Literacy Competence Framework for instructional designers and e-trainers of online and blended learning courses, and (ii) to design, develop and offer a competence-based Professional Development MOOC for cultivating these competences. To this end, the initial version of the L2A MOOC consists of 8 modules (as illustrated in Figure 1) combining EDL theory (Modules 2-4) and practice with EDL tools in 3 widely used Course Management Systems, namely, Moodle, the Exact Suite and the IMC Learning Suite (Modules 5-7) following a self-directed MOOC educational design.

4.1 Gamification Proposal for the L2A MOOC

During the 2nd phase of the Learn2Analyze initiative, an implementation of gamification mechanics to the L2A MOOC will be considered to improve the participants' overall learning experience by enhancing their engagement in authentic activities that stimulate persistency in competences achievement, promoting their

collaboration and social presence and, finally, collecting evidence for the credible assessment for competence-based learning outcomes. Figure 1 presents the generic educational design of the gamified version of the L2A MOOC.

COMPETENCES EDL-CP							
Learn to Analyze Educational Data and Improve your Blended and Online Teaching							
L2A MOOC	Login/Registration	MODULE 1 Orientation	MODULE 2.4 Theoretical knowledge		MODULE 5,7 Practical experience		MODULE 8 Concluding the MOOC
	Onboarding tutorial	Pre-course survey	Content Text, Graphics, Videos	Activities Discussion forum, MCQ	Content Text, Graphics, Videos	Activities Discussion forum, MCQ	Concluding activity (Boss battle) + Post-course survey
GAMIFICATION PROPOSAL for the L2A MOOC	Create an Avatar						
	Enter a Team						
	Quests Short individual tasks usually discussion forum activities Missions Collaborative assignments	Redeemable points -RD points for non regular chod in	Experience points +XP points for every video watched	Experience points +XP points for MCQ submission	Experience points +XP points for every video watched	Experience points -XP points for every Quest +XP points for MCQ	Badge for winning the "boss battle" Concluding activity successfully reviewed
		Redeemable points +RD for completing the pre-course survey online	Competence Badge for achieving a competence	Badge Talk of the town if a post gets a certain no. of replies	Competence Badge for achieving a competence	Badge Mission Accomplished	Badge "Community trust" for collecting over a certain amount of reputation points
	Experience points (XP) are connected to the progress	Redeemable points +RD points for finishing a topic in one day	Redeemable points +RD points for every post/reply	Redeemable points +RD points for finishing a topic in one day	Redeemable points +RD points for every mission accomplished		
	Reputation points (RP) is a measurement of how much the community trusts you RP can only be given from other users	Treasure hunt Collect hidden coins between the text pages	Redeemable points +RD for getting over 50% in the MCQ	Treasure hunt Collect hidden coins between the text pages	Redeemable points +RD points for every peer-assessment		
	Redeemable points (RD) Can be used to get feedback from instructor Can be used to unlock mini games Can be traded for hints for the MCQ Can be used to get the concluding activity reviewed by the instructor	Redeemable points +RD points for getting all the hidden coins of the module	Reputation points -/+ RP points from other users for the contribution to the discussion	Redeemable points +RD points for getting all the hidden coins of the module	Reputation points -/+RP points from other users for fair peer-assessment		Certificate of Achievement
	Progress bar						
	Leaderboard						

Figure 1: Gamification proposal for the L2A MOOC

Next, each proposed gamification element is defined and discussed,

Quests and Missions: To support the learners in their self-directed learning and to enhance collaboration, the learning activities are gamified to **Quests** (short individual tasks like discussion forum activities) and **Missions** (collaborative assignments).

Badges:

- *Talk of the town:* This badge is proposed to promote discussion activities. The participant earns this badge when one of his/her posts receives a certain number of replies.
- *Competence badge:* This badge verifies that the participant has reviewed the basic learning content related to each L2A EDL-CP dimension (namely, Data collection, Data Management, Data Analysis, Data Comprehension & Interpretation, Data Application & Data Ethics).

- *Mission Accomplished*: This badge is proposed to promote collaboration. Missions are peer-assessed collaborative assignments. At the end of the course, the members of the team(s) with the highest score (cumulatively), earn this badge.
- *Community trust*: This badge is proposed to promote discussion activities and fair peer assessment. Community trust is measured by reputation points (see below).
- *Boss battle win*: This badge is proposed to promote participation to the concluding assignment (boss battle) and enhance engagement. This badge verifies that the participant has developed Educational Data Literacy Competences and she/he is able to apply his/her knowledge in real situations. To earn this badge the user must score over 80% to the concluding assignment.

Points:

- *Experience points (XP)*: this is an indicator of progress.
- *Redeemable points (RD)*: A participant can earn redeemable points for (i) finishing a topic within the designated timeframe, (ii) collecting all the hidden items from the text pages of a module, (iii) for each post/reply in the forum, (iv) scoring over 90% to the Multiple Choice Quizzes (MCQ) of the module, (v) for every mission (collaborative assignment) accomplished and (vi) for every peer-assessment. The participant can also lose redeemable points for non regular participation. The redeemable points are used (a) to get additional feedback from the tutors, (b) to unlock mini-games, (c) to get hints for the MCQ, and, (d) to receive an expert's feedback on his/her concluding assignment (boss battle).
- *Reputation points (RP)*: this is a measure of how the community trusts a participant. A participant can receive positive reputation points from his/her peers as a reward for proper and fair peer-assessment and for the contribution to the discussion forum (or negative RP points if he/she is just copying answers).

Treasure hunt: The participant can collect **hidden items** (coins) from exploring carefully MOOC's content. When a participant manages to collect all the hidden items of a module he/she gets redeemable points. Treasure hunt is used to stimulate and reward engagement, with the MOOC's content.

Progress bar: It is used to display progress towards next or ultimate performance level.

Leaderboard: It is used to display the ranking of the participants.

Levels: There are 5 levels according to the EDL experience (Novice, Advanced-Beginner, Competent, Proficient, and Expert)

4.2 Evaluation Plan for the Gamified L2A MOOC

To be able to evaluate the proposed gamified educational design of the Learn2Analyze MOOC, we need to collect and evaluate measurable indicators based

on the recorded participants' actions within the MOOC. Table 1 presents these indicators (system data) for each gamification element introduced in relation to the targeted shortcomings to be handled.

Table 1. Indicators for the proposed Gamified L2A MOOC

Targeted MOOC4PD Shortcoming	Indicators (System Data to be collected and analysed)	Gamification Element
Social Presence	Logins Time spent in the MOOC Posts/Replies to the discussion forum	Points that expire (RD), Reputation Points (RP), Talk of the Town Badge, Community Trust Budge
Collaboration	Collaborative assignments	Missions, Redeemable Points (RD), Mission Accomplished Badge
Competence Development	Videos, HTML pages, Activities completed Topics completed	Experience Points (XP), Redeemable Points (RD), Treasure Hunt, Progress Bar, Leaderboard, Competence Badge, Quests, Boss Battle, Boss Battle Win Badge
Evidence for Credible Assessment	MCQ, Peer assessments, Concluding assessment	Redeemable Points (RD), Quests, Reputation points (RP), Boss Battle Win Badge, Community Trust Budge

5. Conclusions

In this paper we presented a gamified educational design proposal of the Learn2Analyze (L2A) MOOC, a competence-based MOOC on Educational Data Literacy for online education professionals, as well as, indicators that could be used to evaluate the potential effect of each proposed gamification element. Our scope is to deal with the known shortcomings of MOOCs for Professional Development, given that MOOCs are currently attracting global attention for their potential to support professionals in developing new competences. From this point of view, successful gamification design aims to improve learning experience, enhance satisfaction and retention, promote collaboration and support credible assessment, ensuring that the gamification design is aligned to the competence-based learning objectives. This proposal will be implemented and evaluated within the Learn2Analyze initiative to assess its potential for building generic guidelines for gamifying MOOCs4PD.

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Περίληψη

Τα Μαζικά Ανοικτά Διαδικτυακά Μαθήματα (ΜΑΔΜ) μπορούν να αποτελέσουν ένα πολύτιμο εργαλείο για την ανάπτυξη επαγγελματικών ικανοτήτων σε μαζική κλίμακα. Παρ' όλα αυτά, στη βιβλιογραφία αναφέρονται ως αδυναμίες των ΜΑΔΜ, τα χαμηλά ποσοστά ολοκλήρωσης, η περιορισμένη εμπλοκή και αλληλεπίδραση με την κοινότητα του ΜΑΔΜ και η έλλειψη αξιόπιστης αξιολόγησης κατάκτησης των επαγγελματικών ικανοτήτων. Το παρόν άρθρο εξετάζει, ως πιθανή λύση, την παιχνιδοποίηση και εισαγείται την εισαγωγή επιλεγμένων στοιχείων παιχνιδοποίησης στον εκπαιδευτικό σχεδιασμό του Learn2Analyze (L2A) MOOC, ενός ΜΑΔΜ που στοχεύει στην ανάπτυξη ικανοτήτων αξιοποίησης εκπαιδευτικών δεδομένων και απευθύνεται σε επαγγελματίες ψηφιακής εκπαίδευσης, ενώ παράλληλα, προτείνει δείκτες για την αξιολόγηση κάθε στοιχείου παιχνιδοποίησης που προτείνεται.

Λέξεις κλειδιά: Μαζικά Ανοικτά Διαδικτυακά Μαθήματα, Παιχνιδοποίηση, Επαγγελματικές Ικανότητες