Supporting MOOC Teachers in the Management of Collaborative Groups

Luisa Sanz-Martínez

GSIC-EMIC Research Group, Universidad de Valladolid, Valladolid, Spain.
luisa@gsic.uva.es

Abstract. One of the main challenges for the adoption of Collaborative Learning strategies in MOOCs is related to the management of groups. The massive scale and its variability during the course enactment (due to latecomers and dropouts), the irregular level of engagement of the students and their different learning paces motivate the need of a unified pedagogical and technological support in order to perform group activities in these educational contexts. Our thesis proposal intends to support teachers in the management of groups both in the design and the enactment phases of the course. The proposal seeks to tackle the problem with a global perspective, taking into account all the relevant aspects of the problem, but focusing primarly on the dynamic aspects regarding the activity of the students during the course. Applying an iterative DSR Methodology we have already generated a conceptual framework and we have performed an intervention in a real MOOC in order to evaluate the first artifacts produced.

Keywords: MOOCs, collaboration, CL, teams, group formation.

1 Introduction

The emergence and popularity of MOOCs (Massive Open Online Courses) have fostered many discussions in the educational technology community regarding, among others, their low instructional quality and their high dropout rates [5]. Currently most MOOCs follow a behaviorist pedagogical approach where the instructors add the educational content to the course stream and the students self-assess their learning with questionnaires [4], limiting the interaction between participants and instructors to discussion forums. Active learning and peer interaction can promote students' engagement [8], and collaboration can enrich learning through the achievement of social and cognitive competences [18]. Therefore, many authors are trying to include Collaborative Learning (CL) in MOOCs identifying important research challenges related to the promotion of social interactions that generate knowledge [13] or to the development of new pedagogical approaches which take advantage of the benefits of large scale [21]. These authors have explored the benefits of using active pedagogies in this type of courses claiming that these pedagogies have a positive influence in various facets such as student engagement [6] or performance [1]. Some studies have

focused on the students' preferences [7] finding that learners demand more opportunities for discussion in groups. Nevertheless, the inclusion of effective collaboration in MOOCs is still a challenge [12] due to the specific characteristics of the MOOC context. The massive scale and its variability, caused by latecomers and dropouts, the heterogeneity of the enrolled students, their different learning paces and their irregular engagement level [2] hinder the adoption and effective use of CL strategies in MOOCs.

Several studies on CL have shown that group formation is a crucial factor when teachers design for and put in practice collaborative learning activities in small groups [14,15] because successful collaboration depends, to a large extent, on the suitability of the peers included in the group [11,10]. There exist three approaches that can be used to create groups in educational contexts [15]: (i) random selection of groups, (ii) self-selection of groups and (iii) teacher selected groups, also known as criteria-based grouping. Criteria-based group formation has been largely explored at small-scale educational environments [14,16,9,10], employing different types of criteria (*e.g.*, student's profile, student's learning style). However, MOOCs have particular characteristics, such as their massive and variable scale or the variations of the engagement levels and learning paces of the students, which hamper a direct extrapolation of conclusions derived in small-scale studies.

Due to the interest for including CL in MOOCs, several authors have tackled the group formation problem in these contexts [22,23,25,24] with different and fragmentary perspectives. These perspectives include a variety of criteria (*e.g.*, knowledge, personality, preferences, affinities, location, motivation), grouping approaches (e.g., criteria-based homogeneity or heterogeneity, random grouping) and technological aspects (*e.g.*, social network metrics, natural language processing, classification algorithms) which suggests there are a variety of factors that can be considered [19] for group creation in MOOC contexts.

Currently, only a few platforms offer facilities to create groups for collaborative activities (*e.g.*, Canvas, NovoEd, edX). The grouping facilities offered by these MOOC platforms include features for: (i) self-selection of teams by students, (ii) manual allocation of the members of each group by the teacher - which does not scale well with the number of students of these courses-, and (iii) splitting out the students into random teams. Nevertheless, the criteria-based approach for grouping which, as discussed above, is the preferred method at small-scale contexts due to its pedagogic capabilities, is not covered by MOOC platforms at the moment.

Due to the particular difficulties for configuring groups in MOOC contexts we decided to address this question by investigating the issues involved in the management of groups at massive and variable scale. To that aim, we deem it necessary to acquire a holistic view of the problem by studying the relevant aspects that can be taken into account for the group management in MOOC contexts. Because of the aforementioned MOOC peculiarities (*e.g.*, irregular engagement level and different learning paces of the students) group management problems are expected to occur in MOOCs even if such groups were formed

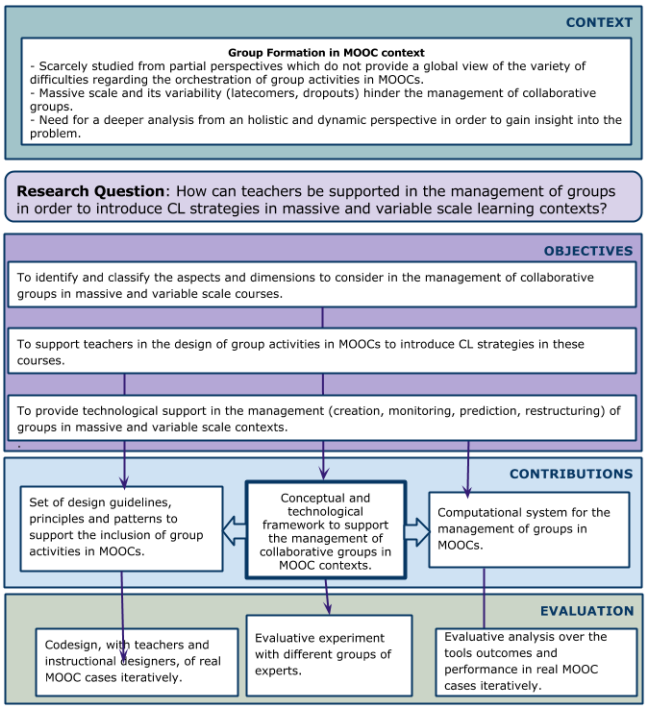

Fig. 1. Schema of the thesis proposal.

using sound criteria. Thus, a method for dynamic group management (initial formation and eventual restructuring) might contribute to the solution of the aforementioned problems. Our research goal is focused on providing support to teachers interested in introducing collaborative activities performed in groups in MOOCs. This support will focus on two stages of the course lifecycle: (i) the design phase, by giving advice to teachers on how to structure groups to carry out collaborative activities, and (ii) the enactment phase, by supporting the orchestration of group activities by means of tools which facilitate the creation, monitoring and even restructuring of the groups.

2 Thesis Proposal

Figure 1 depicts the context that motivates our research question, the objectives we want to accomplish, the expected contributions of the research work and the processes we plan to carry out in order to validate the contributions while acquiring a deeper understanding of the problem.

In our approach, we look for a holistic perspective which provides us a global view of the variety of difficulties regarding the orchestration of group activities. Furthermore, we want to focus on the aspects related to the dynamics of the

course activity, because they can reflect some specific contextual features which distinguish MOOCs from other contexts (*e.g.*, the irregular level of engagement of the students, their variable learning paces, or their high dropout rate). These dynamic data based on the course activity performed by the students, may be interesting criteria to be considered in the group management.

We expect to contribute to the solution of the group management problem in MOOCs by generating three artifacts: (i) a conceptual and technological framework, oriented to set the basis for the other two artifacts, and which could be helpful for other reseachers who want to tackle this problem; (ii) a set of design guidelines, which can help teachers in the design phase of the courses; and (iii) a computational system, in order to support teachers in the management of groups during the enactment phase.

2.1 Methodology

The primary research methodology adopted to conduct our work is based on the Design Science Research Methodology (DSRM) [17].This methodology is used in information systems research and it is aimed to develop different types of artifacts in order to solve human problems. We will iterate over the six phases of the process: (i) problem identification and motivation, (ii) definition of a research goal (iii) design and development, (iv) demonstration, (v) evaluation and (vi) communication. We have begun with explorative iterations in order to gain a deeper understanding of the problem and we move towards more evaluative iterations, so that the artifacts generated during the process can be evaluated.

We use quantitative and qualitative methods in the design, demonstration and evaluation phases in order to gain a deeper understanding by means of complementarity. This mixed-methods approach is a consequence of our underpinning pragmatic worldview, centered in the problem and oriented to real world practice [3].

2.2 Preliminary Results and Future Work

In the first stage of the thesis we have proposed a conceptual framework [19] that identifies and classifies the factors that could be taken into account in group formation, when the scale is large and presents significant variations during the course enactment. The framework considers four dimensions where grouping factors can be allocated: (i) **learning design**, (ii) student's **static data**, (iii) course activity **dynamic factors** and (iv) **technology**. This framework has been partially validated and it will be refined in subsequent phases.

We have firstly focused on the dynamic factors of the framework (which can be obtained from the platform analytics) since we consider that they reflect specific contextual features which distinguish MOOCs from other contexts, such as the irregular level of engagement of the students, their variable learning paces, or their high dropout rate. In order to test this approach, we have carried out an intervention in a real MOOC [20] to analyze a grouping approach based on some dynamic factors used as criteria. We have applied these criteria in order to create

homogeneous groups regarding these dynamic factors. We have developed a first prototype of the envisioned tool to carry out the experiment. The intervention has allowed us to gain insight into the impact of using dynamic criteria for grouping students (which will be useful to give advice to teachers) as well as to test and refine our framework and the first tool prototype.

We are now designing a new intervention where we will use both, **dynamic** and **static** data as criteria, considering both homogeneity and heterogeneity as well as various **learning design** factors. We plan to continue iterating to explore the problem and to validate the prior artifacts generated.

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