Gamification-based assessment of group work

I. INTRODUCTION

The importance and benefit of group work in education is nowadays widely recognized [1, 2, 3]: for students, group work allows them to learn from each other and it can also help them to develop transversal skills; for teachers, it can reduce the workload to provide feedback, assess and grade [1]. As raised in [2], online shared workspaces open the way to online group collaboration support, including students’ coordination and learning monitoring. However, the authors indicate also that students may be reluctant to effectively collaborate. Therefore, some strategies have to be defined in order to encourage and moderate students’ collaboration. One recommended way to do so is to take students’ contribution to the collaboration into account in the assessment and grading of the course [3]. Different strategies have been proposed. In this paper, we investigate how to apply some components of gamification to support students’ contribution to collaboration and group work.

II. GROUP WORK ASSESSMENT

Assessing group work requires addressing the following items: which aspects of the group should be assessed and more precisely how to assess individual contribution to the group and how to assess the contribution of the group. Among the six principles of group work assessment established in [3], one is raising that “a fair system should be used that rewards both individual effort and group collaboration”.

A. Group work assessment problem

Assessing the collaborative work encourages the participation of students. It can also have additional impacts such as supporting students in acquiring various skills gradually [4]. Group work is facing a huge challenge. The attribution of the same single score to all the members of the group may be felt unfair to some of them according to their personal engagement in the group work [2]. This problem is also known as the “free rider” or “passenger” problem [5, 6]. A free rider is a member of the group that does not contribute or does not contribute at an appropriate level according to his/her teammates. This behaviour can be deliberate or not.

B. Assessment strategies

Assessments strategies rely on a few basic parameters: what should be assess between process and content and what should be marked: individual or group contribution. The strategies vary according to the parameters they choose to assess and the way they score and weight each parameter. All assessment models have advantages and drawbacks. The main priority is to keep them fair and consistent [4]. However, in [6], the author conclude that an important aspect of the assessment it to acknowledge the student individual contribution to the group work process and not only the group product. An interesting effect is that it helps to address the free-rider issue by downgrading free riders in a group according to their individual contribution.

One popular strategy applied for group work assessment is intra-group peer assessment [6, 7]. The evaluation conducted in [7] concludes that peer assessment delivers reliable results provided that certain criteria are met. The approach proposed in [6] combines self and peer assessment and concludes that for the students, it increases their feeling of fairness of the evaluation and consequently their engagement in the group work. A more complex approach is defined in [1], where a semantic-based framework is setup to combine the global result of the group and the individual performances. Students are ranked and marked according to the quality of group work, quality of the individual work and relevance of the student in the group.

III. INTRODUCING GAMIFICATION FOR ASSESSMENT

Gamification is one among various approaches that are applied to engage and organize participation [8]. As reminded by [9], gamification consists in introducing game mechanics in non-game contexts. The main objective is to increase the user engagement. This approach has raised a lot of interest and development in education with the expectation to improve students’ engagement in learning activities [10].

A. Main principles

One of the techniques involved in gamification is based on user’s reward. The reward is usually based on a score that the user is earning throughout his/her interactions with the system. Whenever the user is acting positively his/her score is increasing. Once the score reaches a pre-defined threshold, the user is getting a reward (a badge that is displayed on his/her profile for example). Our basic idea consists in adapting the user points approach in order to estimate students’ individual contribution to the global effort. At the end of the group work, students’ scores are used to assign a mark that is then integrated to compute the final mark.

Group work is supported with an online shared workspaces platform similar to the one described in [2]. The platform is used for collaborative learning so that students can tutor their peers and provide them feedback during the group work project. The tutoring can apply to the activities of the work group assignment but also to the technical and organisational skills required to use the collaborative platform. We consider each activity that a student can have with the platform and evaluate it according to its contribution to the increasing of the global knowledge of the whole class. A student who publishes a public bookmark is considered as being willing to share a resource with the peers. A student who comments a content produced by another student is considered as being willing to provide a feedback to the peers. These two activities will be positively rewarded. We do not evaluate the quality of the production. Only the intention to contribute is rewarded. We
are aware that we may reward “useless” contributions. Our policy is to favour contributions by considering that learning students are not systematically able to perform efficiently from the beginning of the group work. The process takes aloso into consideration the actions that students can perform to increase their own knowledge. For example, when a student reads a content produced by a peer, we consider that the student is willing to learn from others. Therefore, his/her score will increase. A pre-defined ranking of all the possible actions is established. The ranking is defined according to the weight of the contribution that a given action may have to the global knowledge. Sharing a bookmark will be for example considered as a less significant contribution than commenting a content. The amount of points a student can earn for a given action is depending on the rank of the action. The teacher can monitor the assignment of the user points at any time and get the final amount for each student. He/She can then define by himself/herself how to integrate this scoring of the student’s individual contribution in the final mark of the group work. Students are made aware about the fact that their individual contribution and support to the global platform knowledge is evaluated.

B. Implementation

The collaborative platform is developed with the open source Elgg social network engine. The core engine is augmented with various plugins. Shared workspace is defined as groups. Each group has its own workspace and toolbox (the toolbox integrates wiki, blog, forums, question/answer, brainstorming tool…). Professors, teaching assistants and staff as well as students are given the same rights on the platform. They can for example create a group for formal or informal learning activities. A gamification plugin has also been partly integrated. The user points system is activated whereas the badges system is disabled. Students cannot access their score.

C. Tests and experiments

The platform has been used since 2010 for a 1st year bachelor course in Information Systems for students in commercial and management studies. Every year, the class varies between 300 to 400 students. They have to work in groups for the project semester. The project is organized into multiple phases. For each phase they have to produce outputs that are increasing in complexity. During the project they are continuously provided with resources and guidelines (online and face to face) so that they can gradually learn to use the platform and tools, and get used to collaborate. The final mark is computed from the individual contribution score and the evaluation of the final group production. The individual contribution is estimated by defining ranges of user points. The ranges correspond to different levels of contributions from inactive to very active. For each student the individual mark is assigned according to the user points range in which his/her score stands. Therefore, the students in the same group may receive different final project marks.

We have already raised the issue of useless contributions with the risk of rewarding them unfairly. From our experience, we have noticed that if we provide students with differentiated types of content, it is possible to discriminate and orient low-level contributions. For example introducing a shoutbox allows gathering most of the “logistics” messages (such as “where do we meet?”). Moreover, by assigning individual contribution marks according to pre-defined ranges of user points, we avoid fostering students who are over-contributing.

IV. Conclusion

We have described a framework based on gamification components to assess group work. The resulting collaborative learning platform encourages students to contribute and collaborate. It addresses the “free rider” problem by providing an indicator of the student’s individual contribution. This indicator allows defining a mark that can be taken into consideration for the final mark. Further developments include the refinement of the rules to assign user points and the introduction and evaluation of intra and inter-group peer assessment. The refinement of the user points rules is expected to bring a better estimation of students’ individual participation. The rules to define the ranges of user points to assign marks can also probably be enhanced. The intra-group peer assessment is expected to adjust the individual contribution score with the evaluation from the peers. The inter-group peer assessment is expected to adjust the global group contribution.

REFERENCES