

Designing Online Teaching for Equitable Distribution of Student Engagement in Collaborative Small Groups: The Effects of Group Building and Reciprocal Feedback

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Abstract: The unequal distribution of workload in groups is a phenomenon that affects all areas of life. At universities, group work constantly leads to dissatisfaction among participants in collaborative groups and often influences the outcome of their work. In this study, we tested different settings, which can influence the contribution of members in blended learning courses in higher education. We used a questionnaire, asking for the assessment of one's own and that of the group members contribution, conducted at two points of the course. In addition, the members of certain groups were asked to give reciprocal feedback in the middle of the course. Additionally we used log files for the evaluation of the activities in the Learning Management System. Groups with reciprocal feedback initially rated the participation of members higher and reduced their rating in the end. Without reciprocal feedback, participants rated the contribution of their group members higher at the end than during the course. The perceived own contribution increased over time across all groups. The actual activities, measured through log data from the Learning Management System showed that self built groups with reciprocal feedback exhibit lower participation in the online environment. The grounding effect is evident across all groups; the activities in the Learning Management System have strongly decreased during the courses.

Introduction

Online courses are becoming increasingly important in the academic environment, especially in higher education. The current pandemic has given a further boost to the development and raised the need for collaboration in online environments. The phenomenon of social loafing, meaning that individuals reduce their effort being part of a group is a well-evaluated effect (Latané, Williams, & Harkins, 1979). This phenomenon is also evident in online communities. Various studies have identified factors that can encourage or reduce social loafing. For example group evaluation and rewards and increased task difficulties can reduce social loafing (Mefoh & Nwanosike, 2012). Highly performance-oriented characters tend less to social loafing in group settings (Hart, Karau, Stasson, & Kerr, 2004). Individuals with a high degree of autonomy, on the other hand, are more disposed to social laziness (Huguet, Charbonnier, & Monteil, 1999, p. 124). Each individual can influence the motivation and contribution of the other group members through his or her own characteristics and contribution to the common task. Early (1989) examined the differences in social loafing tendencies between Chinese and Americans and found that Chinese perform better in group conditions than as individuals, when they remain among themselves and groups are not mixed.

Three approaches for assigning students to teams have been investigated: self-selection, random assignment, and teacher assignment (Decker, 1995). Each method has advantages and disadvantages. In self-selection, students could choose each other because they have had positive experiences with their fellow students before, or they choose students who are consciously experienced in order to get through the seminar with little effort. Another disadvantage is that teams can possibly be too homogeneous and suffer from a lack of diversity. There are different opinions about randomly composed groups. Some randomly selected teams may happen to receive a desirable combination of students, but others may not (Bacon et al., 1998, p. 69). However, this is also the case with self-assembled groups. The third system for assigning team members is the teacher assignment method. Criteria for this method vary widely and can be difficult to implement. In our study we use the two

methods self-selection and team assignment by the instructor. Since no special criteria were applied in the second case, this procedure is equivalent to a random division.

It is generally accepted that reciprocal feedback is a good measure to reduce social loafing. The knowledge about the observation from outside increases the pressure to provide better performance. But feedback can also have the opposite effect. Negative feedback can affect performance and motivation and even lead to a lower rating of other group members (DeNisi, Randolph, & Blencoe, 1983). It matters when feedback is given during a task. Feedback can also encourage undesirable behavior if it happens at the end of a course. Without mutual confrontation with these habits, students tolerate the behavior and think that their poor performance at the end of the semester has no relevance in the peer evaluations. (Bacon, Stewart, & Silver, 1999).

These results in mind, the composition of groups can have a great influence on the cooperation and the outcome of a task. In this study we want to investigate to what extent it makes a difference if groups are formed by the teacher or if the participants are allowed to form groups themselves. As a second factor, we want to investigate to what extent reciprocal feedback during group work influences the participation and the perception of the contribution of the group members. We used two questionnaires that have been established in earlier studies. Høigaard (2006; 2010) developed the Self-Reported Social Loafing Questionnaire (SRSLQ) for the assessment of the own level of contribution and effort in a handball team. Brooks (2003) used a questionnaire to evaluate the team members contribution of a group in a business course. We applied both questionnaires in a German translation.

Learning Management Systems (LMS) offer comfortable possibilities for online collaboration. The access of each user is documented with the help of log files (Lerche & Kiel, 2018). We used these logfiles for our study to find out if there is a correlation between real activity in online collaboration and settings in the design of courses, in our case group formation and reciprocal feedback. We assume that grounding will take place, as it is a typical phenomenon in communication and is evident in all collective activities (Clark & Brennan, 1991). A new situation or a new environment requires an increased need for communication. Over time, this demand decreases, as basic information is available, to which only new input needs to be added. (Kraus & Fussel, 1991). The need for knowledge is intensive at the beginning, decreasing along the learning process (Kraus & Fussel, 1991). If students have already worked together in previous academic activities, they may need less grounding than if they meet for the first time in a collaborative group.

Research questions

Within the theoretical framework outlined above, in this study we investigate two research questions (RQs):

What are the effects of group building (by instructors vs. by students) and reciprocal feedback (absent vs. present) on students' changes of the perceived engagement (RQ1) and of the actual engagement (RQ2) in online groups during a collaborative learning process?

As suggested in the introduction, we expect both the perceived and the actual engagement to decrease in time along with grounding, and to be stronger in self-built groups and with reciprocal feedback.

Methodology

The present quantitative study has a 2x2 factorial design. The participants were graduate students of educational sciences, $N = 114$ ($N = 110$ female, $N = 4$ male) at a large German university. $N = 62$ ($N = 59$ female, $N = 3$ male) agreed to participate in the study and completed all surveys. The students attended the graduate course "Training Methods". This course covered the development of a training concept using realistic cases from various areas of life. Each case had a different problem as a starting point. The students had to use current scientific methods and concepts for the analysis and development of the training. They acted as potential contractors in the form of a fictitious start-up. The tasks were solved within groups of 3 to 5 students. Each group received a different case or a different training proposal. The course covered the areas of need/task analysis, training objectives, instructional concept, media concept and evaluation concept. The students were encouraged to realize the mutual exchange via the forum of the Learning Management System (LMS), in this case Moodle, and had to deliver the tasks at certain deadlines. The course was offered four times, but the setting was changed with two independent variables: composition of groups and reciprocal feedback. There were following settings: Group building by students with reciprocal Feedback (GSt_FB), Group building by students, no reciprocal Feedback (GSt_NoFB), Group building by instructor with reciprocal Feedback (GIN_FB), Group building by instructor, no reciprocal Feedback (GIN_NoFB).

In one of these two courses, the students had to assess each other individually within the LMS parallel to the first survey (reciprocal feedback). All groups had to complete a questionnaire in the middle and at the end of the course in which they assessed their own participation on the task with 7 items (SRSLQ) (Høigaard & Ingvaldsen, 2006), $\alpha = 0.75$ and that of the group members with 6 items (PSLQ) (Brooks & Ammons, 2003),

$\alpha = 0.93$, which represents the dependent variable. The possible answers were based on a 7-point Likert scale. The scale ranged from 1 (Not applicable at all) to 7 (Fully applicable). To get comparable results we reverse scored items in the Self Evaluation, in order to receive the value of the contribution and not the value of the Social Loafing for both questionnaires (see Table 1). In addition, the log files of the LMS were used to determine the actual participation of each student within the online-forum of the LMS. We measured the contribution to the result of the work by using the datasets ForumThemeView and ForumPostCreate from the log files. They were split into data until the first evaluation and data from the first to the second evaluation.

Table 1: Questionnaires for self-evaluation and group member evaluation

Self Evaluation	Team Member Evaluation
In a team,...	Group members...
1. I am not indispensable	1. prompt in attendance at team meetings.
2. I will try as hard as I can	2. delivered agreed-upon parts of project in a complete fashion.
3. I will contribute less than I should ^a	3. met deadlines.
4. I will actively participate in the discussion and contribute ideas	4. volunteered appropriately during team meetings when tasks needed to be accomplished.
5. it is okay even if I do not do my share ^a	5. pulled fair share with regard to overall workload.
6. it does not matter whether or not I try my best ^a	6. showed enthusiastic and positive attitude about team activities and fellow team members.
7. given my abilities, I will do the best I can	
^a Items reverse scored.	

Findings

All dependent variables were tested for normal distribution. A transformation with a square root was necessary to receive satisfying results ($p > .05$). Skewness and kurtosis were within ± 3 . The Z-standardized value was smaller than ± 1.96 for all variables ($p < .05$ for $n < 200$). The Levene Test showed homoscedasticity for all questionnaires. We found few large residuals, that we decided to keep and replace the value through the mean.

RQ1. To measure the influence of the independent variables group building and reciprocal feedback on the evaluation of one's own contribution and that of the group members, we conducted two separate repeated measure ANOVA.

For the own assessment there was a significant main effect, $F(1, 58) = 8.81, p = .004$, partial $\eta^2 = .13$. A significant interaction could not be observed with group building, reciprocal feedback, nor with group building * reciprocal feedback. The ANOVA delivered no significant between-subject effects. For the assessment of the group members, no significant main effect was found. There was significant interaction with feedback, $F(1, 58) = 8.15, p = .006$, partial $\eta^2 = .12$, but no effect with group building, or group building * reciprocal feedback. Feedback had a significant between-subjects effect, $F(1, 58) = 9.16, p = .004$, partial $\eta^2 = .13$.

RQ 2. There was no homoscedasticity in the log data, so a non-parametric test was used. The Kruskal-Wallis H test showed that there was a statistically significant difference in the course settings until the first survey, $H(3) = 20.58, p = 0.001$, with a mean rank activity of 42.81 for GIN_noFB, 34.12 for GST_noFB, 33.88 for GIN_FB and 11.50 for GST_FB. The pairwise comparison showed a significant effect for GSt_FB - GIN_FB ($p = 0.027$), GSt_FB - GSt_NoFB ($p = .001$), GSt_FB - GIN_NoFB ($p = .001$). No significant differences ($H(3) = 7.69, p = .053$) were found among the four group settings (GSt_FB, GSt_NoFB, GIN_FB, GIN_NoFB) in the log data from the first to the second survey.

Conclusions

This study had the aim to show that the way of group building and mutual feedback can influence the perceived collaboration of students in group settings. The study revealed that, regardless of these factors, students rated their own performance during the course relatively similarly and gave themselves an even slightly higher rating at the end of the course. The evaluation of the group members, however, differed depending on the reciprocal feedback. If there was no reciprocal feedback in the course, the students assessed the performance of their group members similarly to their own performance at both measurement points. The score for the performance increased at the end of the course. However, if the students had to give reciprocal feedback at the first survey, they even attested the group members a higher contribution than themselves. At the end of the course they corrected this assessment and adjusted it to their own performance. Overall, the evaluation of the group members is rated higher with feedback than without feedback. The phenomenon could be explained by the fact that, due to the awareness that one is being evaluated oneself and the fear of receiving a bad evaluation, the group members' performance is

considered very high as a precaution. At the end of the course, the evaluation no longer matters and has no influence on the result of their work. They can therefore return to a more realistic assessment.

Participation in the LMS fluctuated widely between the course settings. In the GSt_FB course, online activity was significantly lower than in the other constellations. This explains the statistical significance of the pairwise comparison at the first measurement interval. It is quite possible that students used other communication channels in addition to the LMS, or met privately for collaboration. Between the first and the second part of the courses the log data evaluation of the LMS showed a strong difference in the amount of data created. The grounding effect was evident across all settings. Activity was approximately halved in all courses.

The results of our study provide important recommendations for educational practice. The impact on performance in collaborative communities is highest when the instructor assigns the students to groups, and when there is reciprocal feedback during the course.

There are some limitations in this study. The relatively small sample size does not allow a generalization of the result. The study does not examine real Social loafing, as it only considers the perceived contribution to group work and not the actual outcome. The log data evaluation does not provide an exploitable result. Furthermore, social loafing tendencies can diminish if mean values of all participants, the hard working and the lazy ones, are considered. In a further investigation, it should be considered to filter the values that clearly indicate social loafing and to examine them separately regarding group settings and reciprocal feedback.

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