Challenges in Implementing Small Group Collaboration in Large Online Courses

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Abstract: Large online courses typically suffer from a lack of possibilities for social interaction among participants. One approach for facilitating social interaction is small group collaboration. Successfully implementing small group collaboration in online courses, however, is not an easy task. In two iterations of a large online course, we first identified implementation problems and their possible causes (Course 1: N = 270), and subsequently tested possibilities of mitigation and corresponding improvements (Course 2: N = 111). The problems identified in Course 1 included a high dropout rate, low participation in group work, and low course satisfaction. These are typical problems in large online courses. However, their significance increases when they occur in the context of small group collaboration. Changes on the structural but also on the social level in Course 2 improved course satisfaction, but did not lower dropout rate nor did it increase participation in group work.

Introduction

Large online courses are increasingly used as a format of instruction in higher education. The presupposed affordances of these courses are that they are resource efficient and allow for more flexible time management than traditional courses. They are therefore assumed to fit every student's time schedule and thus to reach a broader student population (Hollands & Tirthali, 2014). However, typical problems in large online courses are that students exhibit motivational deficits, time management issues, and lack of individual accountability, which results in high dropout rates (Yang, Sinha, Adamson & Rosé, 2013). Research provides evidence that social interaction in the form of small group collaboration has the potential to counteract these problems (Rosé, Goldman, Zoltners Scherer & Resnick, 2015, Machemer, 2007). However, so far, in most large online courses the focus lies on individual learning activities.

Making small group collaboration successful is a major challenge, even in traditional classroom settings (Asterhan & Schwarz, 2016). When collaboration takes place in a computer-mediated setting, making the group work successful is an even greater challenge, because the cues that facilitate communication in face-to-face interaction are reduced. Thus, the participants' required effort to communicate effectively is higher (Clark & Brennan, 1991). One of the requirements for effective group collaboration is the participants' active engagement in explorative and discursive meaning making processes (Herrmann & Kienle, 2008). Research in CSCL shows that intensive support of these processes is necessary to ensure successful learning. This support is often given in the form of scripts (Weinberger, Stegmann & Fischer, 2010). In addition to such scripts, the instructor's support (Kearsley, 2000) or sophisticated computer-generated adaptive support (Rosé et al. 2015) is also important for effective small group collaboration. Most of the research on small group collaboration in online courses concerns courses with only a very small number of participants, allowing for intensive support by the instructor. In research on online courses with a high number of participants the group work is mostly project-oriented and on a voluntary basis (e.g. Rosé et al., 2015), which means students are likely to be highly intrinsically motivated.

Given the characteristics of previous research, the following question comes to mind: do the positive effects of small group collaboration also occur when the number of participants does not allow for intensive support of the collaborative process or when students do not participate on a voluntary basis? As active participation can be seen as a prerequisite for small group collaboration to be effective, our studies had two aims. The first aim was to investigate whether students actively participate in mandatory small group collaboration in large online courses. The second aim was to identify challenges associated with active

participation, and to investigate how these challenges can be overcome to successfully implement small group collaboration into these courses without continuous adaptive support (from instructors or computer generated). Our approach is of interest for distance education as well as for universities that run online courses on-campus, and for large online course formats such as Massive Open Online Courses (MOOCs).

Methods

To achieve our goals, we ran two consecutive large online courses at university level, for which students could receive credits. In both courses, participants collaborated in small groups of three or four students in several iterations. We analyzed the data of Course 1 to identify possible challenges of small group collaboration, and tested the effectiveness of a re-design to address these challenges in Course 2.

Course 1

Course- and group work design

The subject of the course was "psychological principles of computer mediated communication". It included topics like "Transactive Memory" and "Scripting in CSCL". Moodle, which was used to run the course, is a commonly used learning platform in higher education. Participants had the possibility to engage in different learning activities and interact with various materials: an introductory video, relevant literature, quizzes and individual as well as collaborative assignments. Completing the assignments and the quizzes was mandatory for receiving the course credits. The study was conducted as part of an online university-level course. The course was open for students of different study programs at Ruhr-Universität Bochum and the University of Duisburg-Essen. Of 324 course participants, 270 participants gave their consent to include their data in our research. The course ran for a total of 14 weeks.

As already mentioned above, the course consisted of several types of course activities, including six small group collaboration phases in the second half of the course (phase 1: $n = 72$ [18 groups]; phase 2: $n = 63$ [16 groups]; phase 3: $n = 62$ [16 groups]; phase 4: $n = 123$ [31 groups]; Phase 5: $n = 122$ [31 groups]). The group collaboration of one phase could not be included in the data analysis due to technical difficulties. The different numbers of participants in the different phases are due to the dropout rate as well as the structure of the course, as in phases 1, 2 and 3 half of the participants did not work collaboratively but individually. In each of the four phases, participants were randomly assigned to small groups of three to four group members each. To avoid repeated inclusion of non-active participants, participants were dismissed from the course if they missed two or more assignments or quizzes. In each phase, students wrote a text to answer an open-ended question about the contents of that particular week. To allow students flexibility in time, we chose a written format which did not require students to work synchronously on the task. Students were supposed to discuss and coordinate in a group forum and collaboratively produce a written text in a real-time text editor. To solve the tasks, it was not enough to reproduce knowledge from the provided learning activities and materials (such as video and literature). Instead, conceptual knowledge construction (e.g. through explorative learning activities and self explanation) was needed for a correct solution. This type of task was supposed to ensure that participants felt the need to interact with each other in order to correctly solve the task (see Dommel & Garcia-Luna-Aceves, 2000). In addition, the tasks were slightly scripted (e.g. through the allocation of roles). The available time for completing each collaborative task was four days.

We assessed students' motivation (at the beginning and at the end of the course) and course satisfaction as well as usability of the system as perceived by students (at the end of the course) via surveys. Course-related intrinsic motivation was measured with the IMI (Intrinsic Motivation Inventory) consisting of 24 items on a seven-point likert scale. Satisfaction with the online course was measured with a single item on a seven-point likert scale ("I liked the online course"). We measured students' perceived system usability with the System Usability Scale (Brooke, 1997) consisting of ten items on a five-point likert scale.

Data analysis and results

We analyzed the following variables: dropout rate, participation in group work (relative number of groups with one or more inactive members) as well as motivation, system usability, and course satisfaction.

Of 270 participants at the beginning of the course, 122 were still active at the end of the course. This leads to an overall dropout rate of 55%. In all four phases, the relative number of groups with one or more inactive group members was 33-48%. Motivation at the beginning of the course ($M = 3.31$; $SD = .81$; $n = 106$; min =1; max=7) was higher than motivation at the end of the course ($M = 2.81$; $SD = .10$; $n = 27$; min: 1 max: 7).

The distributions of the results in system usability ($M = 2.91$; $SD = .29$; $n = 64$, min: 1 max: 5) and course satisfaction ($M = 2.98$; $SD = 1.30$; $n = 43$; min: 1 max: 5) were slightly skewed to the left.

Discussion

Typical problems for online courses were encountered, namely low participation and a high dropout rate. These phenomena are very well known for large online courses but they are of special relevance in the context of small group collaboration, since they lead to groups with an insufficient number of active group members. Low participation, in turn, may lead to frustration and reluctance to participate for the remaining group members, in the active group members and thus further decrease active participation. This hinders collaborative learning to take place. Frustration and reluctance may be reflected in the declining course-related intrinsic motivation throughout the course. Even though participants were dismissed from the course when they did not participate in the assignments for two or more times and the dropout rate decreased throughout the progression of the course, the rate of groups with one or more inactive group members did not fall below 33%.

As organizational factors are extremely important for successfully running a large online course, shortcomings on the organizational level may explain why low participation and high dropout rates occurred in the first place. Most participants had no experience with online-courses. Hence, some of them did not check for announcements in their email, and did not see the announcements on a news forum because they did not log in to the platform regularly. This led to confusion with respect to current activities and upcoming deadlines.

Course 2

Course- and group work design

Our aim was to increase active participation by improving the course structure and by taking measures to promote more effective communication in the course. We aimed to achieve these improvements by: 1) increasing the clarity of the platform by changes in structure and layout; 2) more distinct communication about activities and deadlines through more than one communication channel. Upcoming deadlines were now posted in a sidebar that was always visible to the students and additionally in a document that provided an overview of the activities for the whole course. In addition, if something important needed to be communicated, an email was sent to all participants; 3) extending the group work phases to a period of seven days. This gave participants more time to get organized and increased their possibilities to interact with each other; 4) asking participants to confirm their participation in the next upcoming course unit. Participants were only included in the upcoming group work if they confirmed their participation. Participants were allowed to be absent from group collaboration two times throughout the course. This was supposed to help reduce the amount of inactive group members and to raise students' flexibility as well as increase commitment and individual accountability. To promote social presence and community building, we implemented an icebreaker session where everyone was asked to briefly introduce him- or herself and post his or her favorite find on the internet (e.g. a video or picture). Apart from the aforementioned changes, the course design was the same as in Course 1. The course was again open for students of different study programs at Ruhr-University Bochum and the University of Duisburg-Essen. Of 149 participants, 111 gave their consent to include their data in our research. The course ran for a total of 13 weeks.

The design and procedure of small group collaboration was the same as in Course 1 except for the available time for completing each collaborative task (seven days instead of four days). Course 2 included four iterations of small group work in weeks 6, 8, 10 and 12 of the course: phase 1: $n = 76$ (20 groups); phase 2: $n = 37$ (10 groups); phase 3: $n = 34$ (9 groups); phase 4: $n = 63$ (16 groups).

Data analysis and results

The same analyses were performed as in Course 1. Of 111 participants at the beginning of the course, 57 were still active at the end of the course. Thus the dropout rate was 49%. In the four phases of collaboration, the relative number of groups with one or more inactive group members was 33-53%. System usability ($M = 3.84$; $SD = .70$; $n = 18$; min: 1 max: 5) and course satisfaction ($M = 4.00$; $SD = .88$; $n = 19$, min: 1 max: 5) were relatively high. The motivation questionnaire could not be used for analysis due to technical difficulties, unfortunately.

Comparing Course 1 and Course 2

No improvement was found concerning the dropout rate (Course 1: 55%; Course 2: 49%), nor concerning the relative number of groups with inactive group members (Course 1: 33-48%; Course 2: 33-53%). Concerning the

self report measures, t-tests revealed significant differences between the courses for system usability (Course 1: $M = 2.91; SD = .29; n = 64$ vs. Course 2: $M = 3.84; SD = .70; n = 18$): $t(80) = -8.402; p = .001., d = 2.253$ and course satisfaction (Course 1: $M = 2.98; SD = 1.30; n = 43$ vs. Course 2: $M = 4.00; SD = .88; n = 19$): $t(60) = -3.121; p = .003, d = 0.933$.

Overall discussion and outlook

In two iterations of a large online course, we were able to identify low participation and high dropout rate as substantial problems in small group collaboration. These typical issues do gain special significance in the context of small group collaboration, as they lead to an insufficient number of active group members. Hence, in groups with low participation, (effective) small group collaboration cannot take place.

In order to counteract these problems, we identified possible shortcomings in communication and clarity of the platform and implemented improvements in Course 2. Perceived system usability and course satisfaction did increase significantly. However, the active participation into group work did not increase, nor did the dropout rate decrease.

Thus, the results imply that the changes that mostly concerned the organizational level of the course, were perceived useful. However, the fact that the changes were not effective regarding the reduction of inactivity and dropout rate raises one major question: How can small group collaboration have positive effects on active participation, motivation and learning outcomes when there is not enough activity and motivation for small group collaboration to occur in the first place? Without active student engagement in group work, the positive effects of group work cannot occur. We hypothesize that without intensive supervision from instructors, active student participation is hard to achieve.

As the focus of our studies lay on improvements on the organizational level, we suggest that future research investigates whether active participation in group work in large online courses can be increased by changes on the social level (e.g. creating more positive interdependence among the group members; see Johnson & Johnson, 2014). Our own future plans for research includes investigating whether participants' contribution to group work correlate with their other activities in the online platform. The goal would be to identify behavioral patterns to characterize participants with low collaborative activity (and possible dropout) as well as students with high collaborative activity.

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