Collaborative online learning: A heterogeneous phenomenon

Dr. Birgitta Kopp & Prof. Dr. Heinz Mandl

Ludwig-Maximilians-University
Munich
Germany

Abstract

This paper investigates the virtual seminar "Education and Socialization in Early Childhood" at the Ludwig-Maximilians-University, Munich. In this seminar, we focused on the group collaboration, which was evaluated by the students three times over the period of one semester, and on whether this evaluation changed over time. It was assumed that evaluation scores decrease over time as online collaboration is very demanding. Group collaboration was measured with the FAT questionnaire (Kauffeld, 2001) with the four dimensions "goal-orientation", "task-completion", "cohesion", and "taking responsibility". Results show that overall group collaboration is very high, but also very heterogeneous evaluated. While groups 2 and 4 evaluated all dimensions almost on a similar high level, evaluation scores decreased in groups 1 and 3 over time. This is due to the fact that in group 1, one group member left the course without further explication at the third point of time and group 3 showed an inadequate task solving strategy. Furthermore, group size is an essential indicator for group functioning.

Keywords: Heterogeneous collaboration, online learning, task solving strategy, group size

1 Introduction

Collaboration in online learning is an increasingly used learning method. It is assumed that during collaboration, learners have to elaborate on their knowledge in more detail (Webb, & Palincsar, 1996), solve socio-cognitive conflicts, which arise when learners have conflicting knowledge (Piaget, 1977), and exchange arguments about the best group solution (Andriessen, Baker, & Suthers, 2003). But this is only the case, if the group is socially functioning, what means that no dysfunctional group phenomena occur (Salomon & Globerson, 1989). There are especially four crucial criteria for efficient group collaboration: goal-orientation, task completion, cohesion and taking responsibility (Kauffeld, 2001). As online collaboration is more demanding for groups, it is possible that these four criteria will decrease over time.

2 Theoretical background

Online collaboration is more demanding for learners as they mostly have almost no experience with this new way of learning. Especially the norming and storming processes are virtually much more costly than in face-to-face collaboration, because in presence the collaborative work can be more easily modified. To see, whether virtual collaboration shows difficulties over time, there are mainly four different criteria that are relevant for collaboration: goal-orientation and task-completion on the task-level and cohesion and taking responsibility on a social-level.

Goal-orientation is based on the goal-setting theory (Locke & Latham, 1990). In this theory the goal serves as a motivator, because the goal causes people to compare their present capacity to perform with that required to succeed at the goal. When people succeed in meeting a goal, they will feel competent and successful (Mento, Locke, & Klein, 1992). Having a goal

enhances performance because the goal makes clear exactly what type and level of performance is expected. But goal-orientation also implies that people are committed to this specific goal. In collaboration, goal-orientation means that group members know their goals, that they are committed to these goals, and that they assign specific tasks to achieve these goals.

Task-completion is the main reason why groups are built as it is assumed that they carry out the task more effectively. Therefore, understanding the content of the task and considering adequate task solving strategies are important for a successful collaboration (West, 1994). In this context, reflecting on the strategies for task-completion in respect to achieve high effectiveness and changing them if not is also part of it.

Cohesion describes the dynamic process reflected in the tendency for a group to stick together and remain united in the pursuit of instrumental objectives and/or the satisfaction of member affective needs (Carron, Brawley, & Widmeyer, 1987). Group cohesion is very important as it is a main predictor for group performance.

Taking responsibility is central for the whole collaboration as there is no group success without responsibility for the task solving process (Kauffeld, 2001). Since taking responsibility guarantees that all group members contribute to the group solution, it avoids phenomena like social loafing or free riding (Salomon & Globerson, 1989).

3 Research Question

How do groups evaluate their group collaboration over time? As collaborative online learning is more complex and demanding for learners, it is assumed that this also influences the evaluation of collaboration. In the beginning, all learners are usually motivated and engaged, but when groups realize that the task solving process is more time-consuming or the group is not as effective as supposed to be, the evaluation may decrease. This is especially the case when all group members do not contribute the same way, group members do not stick to the group rules or groups have no effective task solving strategies. In such cases, groups have to reflect on their task solving process and change it accordingly.

4 Method

In this case study the interaction and collaboration among the students in a virtual course were measured. Therefore a definite questionnaire was used to measure group collaboration.

4.1 Course description

The study was carried out at the Ludwig Maximilians-University in Germany at the faculty of Psychology and Pedagogy in the seminar “Education and Socialization in Early Childhood”. The virtual seminar took place in the winter semester 2007/2008 from mid October to mid February. The main objective of this course is how socialization and education processes are organized and what influences and effects they have on the development of children in early childhood.

4.2 Sample/Target group

The participants were especially undergraduate students who studied pedagogy as main subject. Altogether there were 15 participants in the course, consisting of 14 female and one male. The participants were divided spontaneously and voluntarily into four groups. Groups 1 and 2 had three members, group 3 consisted of five members, and four participants were in group 4. All students had one tutor. In group 1, one group member left the seminar in the end of the semester, so that only two group members remained in this group.

4.3 *Duration*

The duration of the course was 14 weeks, two hours per week throughout the semester lasting from mid October to mid February. Students were supposed to interact in their virtual groups, and complete written assignments once a week.

4.4 *Study resources*

The learning materials of the seminar were twofold: First of all, every week, the participants received a deeply elaborated PowerPoint version of the main content of the respective topic. Second, there was further literature illustrating and deepening the excerpt. All materials were web-based, so that the participants were able to download them after logging-in.

4.5 *Design of the study*

The evaluation of the seminar was a longitudinal survey with three points of measurement. The analysis was conducted during winter semester 2007/2008 at the Ludwig-Maximilians-University. The first data collection was conducted from the 22nd until 29th of November, 2007, five weeks after the beginning of the virtual seminar. The subsequent data was collected two more times every four weeks using an online questionnaire. The second point of measurement was from 21st until 28th of December, 2007. The last point of measurement was from 31st of January until 7th of February, 2008. The students received an online questionnaire per e-mail. In the same way they were supposed to return the filled in questionnaires (see figure 1).

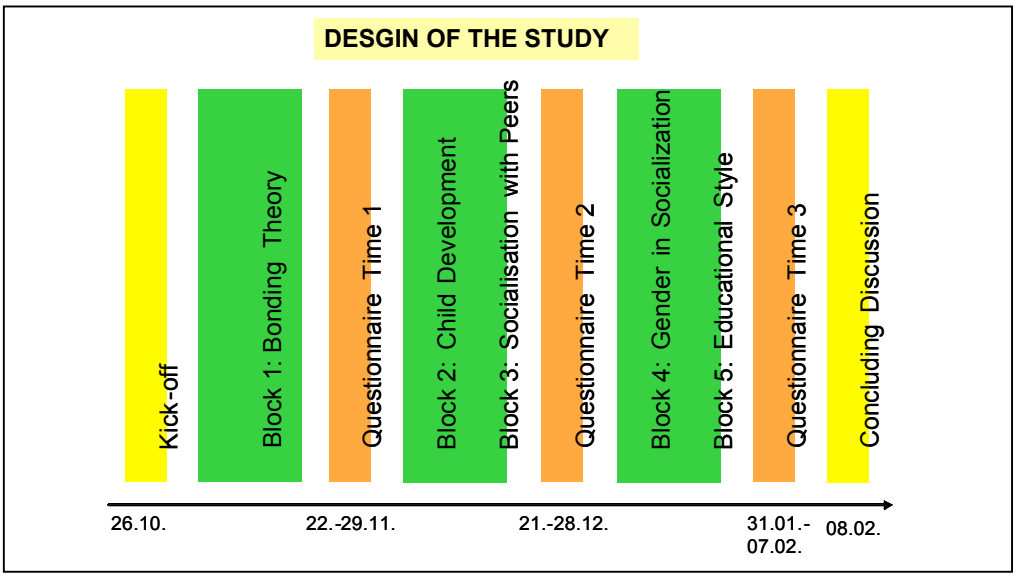

Figure 1: Design of the study

The participation in this study was part of the seminar. 14 of 15 course members took part in this investigation. The data collected during the study was handled anonymously, so the personal information of the students was protected.

4.6 *Technical design*

The virtual learning environment was technically based on an integrated Campus Solution by e/t/s. All members who were participating in the course "Education and Socialization in Early Childhood" received access to the virtual learning platform. The students could work from any computer that had Internet connection at their own convenience. The learning platform was equipped with different functions. First of all, there was a content section for delivering the main content on "Education and Socialization in Early Childhood". All the documents

were uploaded in digital format, so the students could download the learning material and print it out themselves. There were two components how the material was presented to students. The first component comprised the most important content of every topic in the form of a PowerPoint presentation. The second component included additional literature for the respective topics.

Second, there was the possibility of communication in every group with help of group forums or group chat function. The forum was the main communication and collaboration tool for the groups. The tutor also had access to the group forums and could answer questions or intervene in necessary cases. Furthermore, the group members could use private e-mail outside the virtual learning platform for communication.

Third, there was a forum of the seminar all groups and the tutor had access to. This seminar forum included sub-forums for task solutions (of every group), for feedback on the group solutions, for questions, for information and feedback on the seminar. The e-tutor and the participants could post important dates and write announcements. This forum was used for the communication between the groups and the tutor, but also between the different groups. Communication via e-mail was still possible and commonly used.

4.7 Didactical design

The content was didactically presented in a problem-based manner. Almost every topic was introduced with a case. This case was designed as authentic problem, which had to be solved by every group. Every working group had approximately one week to elaborate their ideas. Every member was supposed to present his or her ideas and post his solution on the learning platform to guarantee different perspectives on the group solution. Every group appointed a moderator who was in charge of collecting all the offered solutions and producing a common group solution that he later on was supposed to upload to the virtual learning platform. The social context was realized through the group work and the instructional context was given through the power-point presentation as well as through additional literature and specific help of the tutor if necessary.

4.8 Support arrangements for learners

The support for the learners included three methods: The definition of group rules, which were obligatory to every group member, the definition of a student moderator who rotated every week, and the feedback on group solutions, which were given by the tutor every week.

4.9 Data Sources

To collect data, the students evaluated the online collaboration via the standardized FAT questionnaire (*F*ragebogen zur *A*rbeit im *T*eam), authorized by Simone Kauffeld. The questionnaire comprises four scales with 22 items. The first scale, which asks for "group cohesion", comprises 8 items with reliabilities between .89 and .94 (Cohen's Kappa), e. g. "We communicated openly and freely." The 2nd scale asks for "taking responsibility", which had 4 items (e. g. "We permanently tried to improve the joint group solution") with reliabilities between .79 and .91 (Cohen's Kappa). The 3rd scale measures "goal orientation" with 6 items, e. g. "I identified myself with the group goal". The reliability was between .64 and .84 (Cohen's Kappa). The last dimension measures "task completion" with four items and a reliability between .90 and .93 (Cohen's Kappa). An example item is "The priority was the task solving".

All written contributions in the forum of the seminar as well as in the group forums were used to get a deeper insight into the interaction process. These observations were used to explain the evaluation of the collaboration.

5 Results

The evaluation of group collaboration included goal-orientation, task completion, cohesion, and taking responsibility. Looking at the overall mean of the four groups, all dimensions are evaluated on a very high level, even though they decreased from time 1 to time 2 and from time 2 to time 3. This means that in the beginning, group members rated their collaboration better than in the end. Looking at the dimensions individually, goal-orientation decreased from a mean of *4.73* (SD=*.76*) to *M=4.57* (SD=*.83*) and *M=4.48* (*SD=.94*), task completion from a mean of *5.68* (*SD=.62*) to *M=5.07* (*SD=1.03*) and *M=4.84* (*SD=1.09*), cohesion from a mean of *5.12* (SD=*.95*) to *M=4.95* (SD=*.97*) and *M=4.62* (*SD=1.19*), and taking responsibility from a mean of *M=4.73* (*SD=1.28*) to *M=4.13* (*SD=1.49*) and *M=3.86* (*SD=1.65*).

5.1 Goal-orientation

All groups showed almost the same high evaluation rates in goal-orientation. All groups were very interested in achieving the group goals, which was the solving of diverse tasks to get a certain degree. Only in group 1, the evaluation decreased in the third point of time, because one student skipped the course so that there were only 2 members remaining (see figure 2). Post hoc contrasts between the groups according to Bonferroni showed no significant effects.

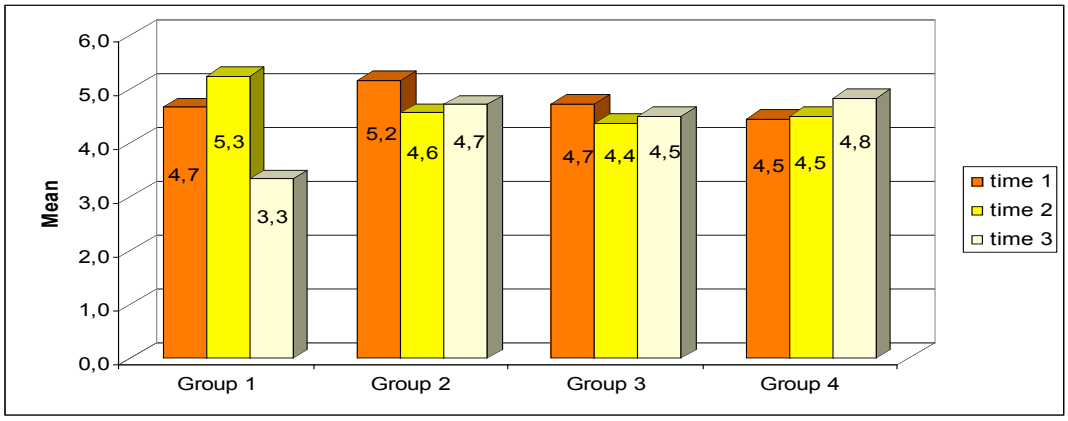

Figure 2: Mean of goal-orientation per group and point of time.

5.2 Task-completion

Regarding task-completion, groups 1, 2 and 4 evaluated this dimension on a very high level, while group 3 was definitely lower. Again group 1 showed a decrease in the third evaluation, because at this time, one group member left the group (see figure 3). Post hoc contrasts according to Bonferroni showed no significant effects.

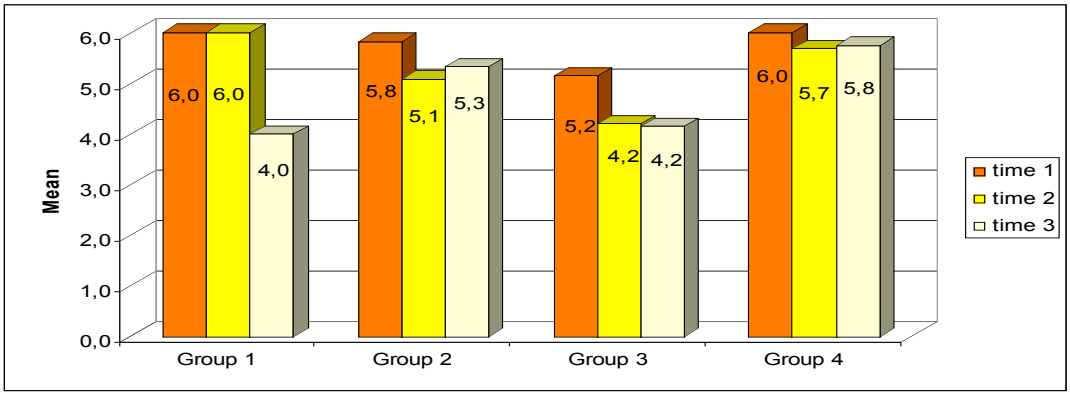

Figure 3: Mean of task-completion per group and point of time.

5.3 *Cohesion*

Regarding cohesion, groups 1 and 3 showed a decrease, while groups 2 and 4 stayed almost stable in their high evaluation. Groups 2 and 4 evaluated their group cohesion on a high level, group 1 in the beginning very high and in the third point of time considerably lower, while group 3 showed lowest rates in all three points of time (see figure 4). Post hoc contrasts according to Bonferroni showed no significant effects.

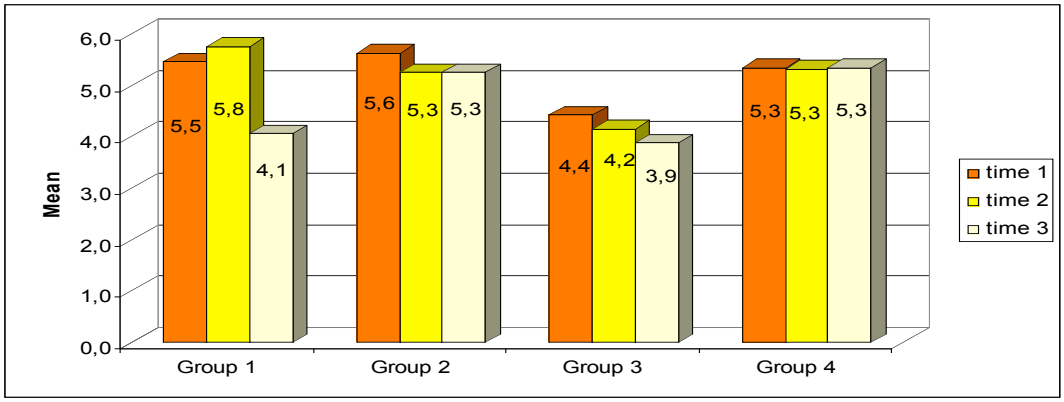

Figure 4: Mean of group cohesion per group and point of time.

5.4 *Taking responsibility*

Looking at the groups taking responsibility for their task, two main phenomena could be recognized: First of all, again groups 2 and 4 show a relatively stable and high evaluation even though, both evaluations decreased at the second point of time and again increased at the third point of time. Second, groups 1 and 3 both show a decrease at the third point of time, even though, the overall evaluation rates are much higher in group 1 than in group 3. Group 3 shows again the lowest rates (see figure 5). Post hoc contrasts according to Bonferroni showed significant effects between group 3 and 4 at time 3 ($p=.02$).

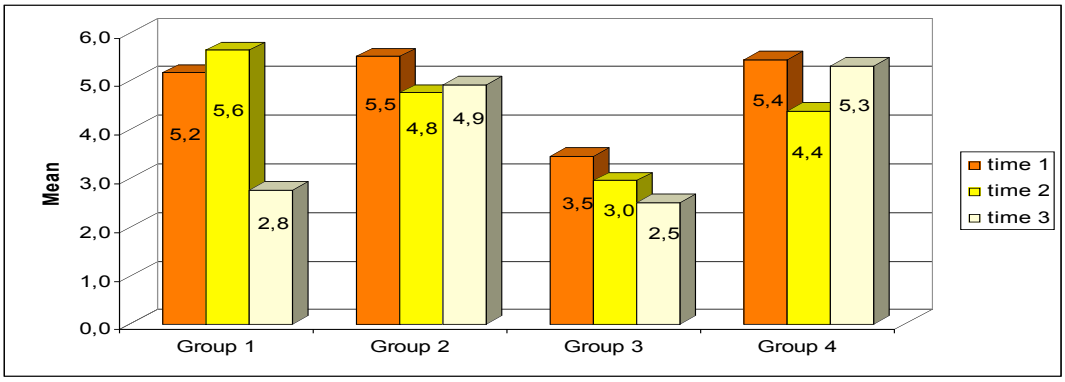

Figure 5: Mean of taking responsibility per group and point of time.

6 Discussion

Overall, the hypotheses could be confirmed: The evaluation of the four indices on collaboration decreased over time, but this overall decrease was on a very high level and was due to the decreasing evaluation of groups 1 and 3. These groups show some difficulties and problems in their online collaboration.

Group 1 shows a very steep decrease at the third point of time. The reason for this is due to the fact that one of the group members suddenly left the group without any further explanation. According to the data, the two group members remaining in the group were not able to compensate the contribution of the third group member, because group dynamic changed radically. Eventually, then the group size was too small. Therefore, all four dimensions enormously decreased about 1.5 to 2.8 points.

Group 3 shows that collaboration was not very satisfying. Even though all group members wanted to achieve the goal of the seminar (goal-orientation stayed almost the same), task-completion, cohesion and taking responsibility decreased much more. Especially taking responsibility was on a very low level. This could be explained with the task solving process of the group, in which one group member had to start with the solution, and all other group members added their opinion and perspectives with a different colour. As there were always the same persons starting with the solution, the impression occurred that some group members were free riding (Salomon & Globerson, 1989), because in the end of the task solving process, there was almost nothing to add or change. Therefore, the group members starting with the solution had much more work than those reading the solution in the end and just comparing it with their information. That means not all group members equally participated in the group collaboration, and not all took the same responsibility for their work. This effect was supported by the group size of five persons – a number that eventually is too big for all group members taking their responsibility.

Groups 2 and 4 also showed a little decrease, but on a very high level – probably because when working over a longer period of time, a more realistic picture of the work load and of the collaboration partners occur. But overall, these groups showed an effective and efficient way of collaboration. These groups sub-divided the task in sub-tasks when possible so that all group members had the same work load and all knew their goal to achieve. This also may be due to the fact that the groups had a group size of three, respectively four persons, which seems to be an optimal number for online collaboration.

To conclude: Online collaboration is a heterogeneous phenomenon – dependent on the way group members organize their task solving process and on the group size. Furthermore, a group member leaving the group frustrates the remaining group members – an occasion that happens much easier in online than in face-to-face learning. These results are relevant for the tutor in two ways: First, building groups of 3 or 4 members seems to be most efficient, and second, stressing the organization of the task solving process is very important as it is directly connected to the efficiency of the group work.

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