Factors influencing online collaborative learning: Why some groups take off better than others?

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Abstract: In this work we carried out a case study to understand how some groups "take off" better than others with regards to engaging in the collaborative knowledge construction process in a virtual learning setting. We found that student facilitation was an important contributor to the process. Instead, the contribution of "lower" quality initial postings can jeopardize the process.

Introduction

Consistent with a sociocultural perspective on learning, collaborative learning (CL) is particularly popular in online, asynchronous courses. Typically supported by asynchronous threaded discussion tools, online learners engage in social exchange, discussion and collaboration in an effort to advance their knowledge. Computer supported collaborative learning (CSCL) research has focused on a number of factors influencing the success of CL in virtual settings. Group composition (in terms of gender, status, culture and expertise), size of group, nature of the task and task structuring, participants' individual characteristics, the role of the instructor and the role of tools/interfaces supporting the learning task, have all been identified as variables influencing collaborative knowledge construction in CSCL settings (e.g., Resta & Laferrière, 2007).

In this study we attempt to advance the research in online CL by focusing on two factors: *student facilitation* and *quality of initial postings*. Prior works suggest that the presence of a student facilitator in asynchronous online courses drives the quality of the learning process and the meaningful construction of knowledge within the online community (Aviv, Erlich, Ravid & Geva, 2003; Garrison & Cleveland-Innes, 2005). Yet there are still concerns that low critical thinking and irrelevant contributions take place when the discussion is guided by peers (Rourke & Anderson, 2002). In terms of quality of contributions, a few studies have focused on structuring online discussions and evaluation rubrics to ensure meaningful discourse and knowledge construction (Gilbert & Dabbagh, 2005). Yet, there seems to be lack of work examining how "good" and especially "bad" postings influence the progression of online discussions and the construction of knowledge. The present study provides quantitative and qualitative types of evidence on how *student facilitation* and *quality of initial postings* influence collaborative knowledge construction in online discussions. With reference to these factors, the study provides a perspective on why some groups "take off" better than others with regards to collaborative knowledge construction in online discussion forums.

Method

The participants were 34 graduate students in two sections of an online "Learning Theories" course, taught over 16 weeks at a public University in Northeast USA. The sample included 79% women (21% men), between 22 and 54 years old (M=37, SD=10.8). Students were randomly assigned in nine groups; seven groups of four students and two groups of three students.

Students were tasked to work collaboratively in their groups on a case vignette. Student collaboration was carried out virtually, using the threaded discussion forum of WebCT. The activity lasted two weeks. To ensure quality, the case vignette was adopted from a book specialized on the case study method by Dottin and Weiner (2001). The case presented an ambiguous classroom problem concerning a 12-year old boy, Joe. The discussion of the case vignette was not intended to promote knowledge acquisition; rather students were to apply concepts learned in the course and argue for plausible solutions based on their knowledge and professional experience. Ultimately, students were asked to produce a consensus plan for Joe's teacher, suggesting a solution to the problem. In order to guide their activity, students were provided with guidelines on how to approach the analysis of the case vignette (also adapted from Dottin and Weiner (2001)). The discussion was led by the students themselves. The instructor of the sessions monitored the group discussions, but her intervention was purposely restrained to structural feedback only (e.g., "You need to base your arguments on instances from the case and to support those with theory"). During group work, the entire corpus of collaborative discourse of each group was automatically captured in WebCT's discussion forum.

Data analysis

The analysis was conducted in two levels from (a) coding and counting the group's discourse in order to understand the general content structure of the discussion, to (b) exploring the collaborators' contributions as

they occurred chronologically and re-examining the discourse in depth to constitute evidence for the role of *student facilitation* and *quality of initial postings* in the collaborative knowledge construction process.

Coding and Counting

After reviewing a number of coding schemes of previous investigations of the process of collaborative knowledge construction (e.g., Aviv et al., 2003; Puntambekar, 2006), we decided to shape our coding scheme on the basis of the "Interaction Analysis Model" proposed by Gunawardena, Lowe & Anderson (1997), which conceptualizes the processes of collaborative knowledge construction in virtual environments as a series of successive phases. The coding scheme was fine-tuned on the basis of the discourse data of the present investigation (approximately 15%). Two coders worked closely together to modify and refine the coding scheme in context and to explicitly decide what aspect of the content constitutes evidence for each coding category: (1) Sharing/ Adding, (2) Negotiating meaning, (3) Elaborating, (4) Evaluating/testing of proposed synthesis, and (5) Consensus/Applying co-constructed knowledge (detailed table can be provided upon request).

The entire corpus of the collaborative discourse of each group was analyzed using the coding scheme. The post was taken as the unit of analysis and was categorized with one of the categories for the phases of collaborative knowledge construction. When in doubt about the phase that should be applied, the contribution was coded in the lower phase, and in clear cases of two or more applicable phases (usually evident in lengthier postings), the contribution was coded in the higher phase. Approximately 50% of the discourse was coded by the two coders simultaneously. The remaining 50% was coded by each coder independently and percentage agreement was computed to be 89%; disagreements were resolved by discussion between the coders.

We then calculated frequencies of the coded phases per group as in Table 1. The distribution of codes in each phase helped us understand the general content structure of the discussion in terms of phases of collaborative knowledge construction. Table 1 presents the number of codes across phases and groups.

Table 1: Number of codes across phases and groups.

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	*Total*
group1	3	3	2	6	1	*15*
group2	10	2	5	2	1	*20*
group3	7	2	2	3	1	*15*
group4	4	4	3	2	1	*14*
group5	13	7	6	6	1	*33*
group6	20	5	19	4	2	*50*
group7	7	10	13	8	4	*42*
group8	9	4	7	11	2	*33*
group9	7	14	3	5	1	*30*
Total (%)	80 (32%)	51 (20%)	60 (24%)	47 (19%)	14 (6%)	*252 (100)%*

Chronological Visuals and In-depth Examination of Discourse

Using chronological visuals, we further explored the collaborators' contributions as they occurred chronologically while re-examining the discourse in depth (beyond aggregate counts of posts) to constitute evidence for role of two factors -- student facilitation and quality of initial postings – in the knowledge construction process. This analysis was inspired by Hmelo-Silver, Chernobilsky & Nagarajan's (2009) CORDTRA visualization technique.

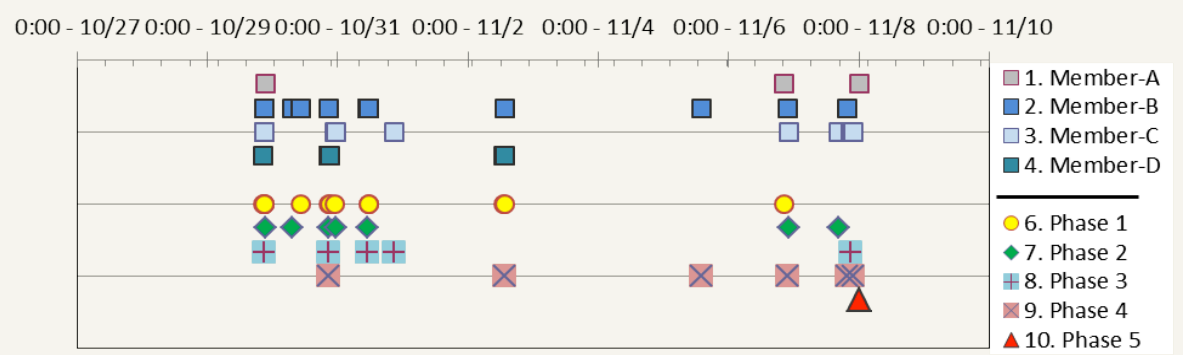

Figure 1. The chronological visual of Group 5.

For each group, we generated an Excel scatter-plot using the groups' coded discourse. See for example Figure 1 for Group 5 (all other visuals can be provided upon request). The time of the contribution runs at the top of the visual in chronological order (e.g., 2-weeks duration of the activity). Collaborators and discourse categories are listed on the right of the visual, while each time-point on the visual represents a collaborator and his/her contribution in the knowledge construction process. The analysis begins by inspecting all visuals for patterns. Then, the knowledge construction process is examined in more depth by "zoom in" on the areas of each diagram where patterns exist and by going back and forth between the visual and the group's discourse.

Results

Considering Table 1 and the visuals of all groups, our attention was drawn to particular groups which appeared more or less successful. These groups were examined in depth (beyond aggregate counts of posts) in relation to the factors of interest in this study: student facilitation and quality of initial postings.

Student facilitation

The detailed examination of the groups' discourse, by going back and forth between the visuals and the discourse, showed that groups with an emerging student facilitator appeared more successful in their collaboration compared to other groups. Using an empirical, bottom-up approach we identified that student facilitators possessed core presence in guiding and structuring the discussion toward the final product, participated frequently often undertaking the summarization of the points and ideas articulated (by themselves and others), and their contribution was acknowledged by their colleagues. A student facilitator was evident in two out of the nine groups of the study: Group 5 and Group 8.

In particular, considering the visuals of Groups 5 and 8 in relation to the visuals of all other groups and the counts of Table 1, these two groups appear successful in engaging in the collaborative knowledge construction process for several reasons: 1) there were contributions along all phases of knowledge construction, 2) all group members participated in the discussion, 3) there were not too many contributions (e.g., >40), which could be suggesting difficulty in coming to a consensus, and 4) there were not too few contributions (e.g., <20), which could be suggesting limited engagement with the task. The groups' discourse allowed us to understand the specific activities undertaken by the emerging leader over time, as well as the quality of the contributions in these groups.

In both of these groups the student leader (female in both) emerged in the early stages of the discussion. In Group 5, the leader (Member B) took the initiative to describe the situation and define the problem making sure she set out common grounds of discussion with the rest of the participants. Upon interaction with the other group members, she next tried to identify secondary issues and revise the problem definition. She often (from the beginning until the end) summarized the other students' postings evaluating and extracting the central ideas that would construct the final argument. Managing time in view of the assignment deadline was another initiative on her behalf. Overall, her postings were lengthy but not authoritative as her tone and style was not discouraging to other group members. She clearly expressed her opinion but at the same time invited others to add to or modify her points. Also, she frequently encouraged and motivated her colleagues to contribute, for example, "Those are some of the thoughts I had today. Some of Joe's issues might be taken care of by a change in the classroom learning environment, starting with classroom management. […] I think [Name] hit on this too! Great job [Name]". At the end, she indicated her satisfaction from their collaboration and appreciated the outcome as a successful one. Her role as a leader was reflected in one of the other participants' posting who, when finalising the group's consensus, said to her: "…Will you take a final look at this and then post it to the group consensus discussion? I can do this, but I don't want to post without your final 'once over'".

The student who emerged as a leader in the Group 8 (Member B) demonstrated similar facilitation patterns. She took the initiative to start and direct the discussion, and although this group had a rather late start in the activity, they worked intensively during week 2, engaged in all phases of the collaborative construction process and managed to complete the task on time. Her postings, albeit not lengthy, inspired the contribution of the rest of the participants, for example, "You did a lot of work for all of us on "Readers Workshop" and "Responsive Classroom". Thanks [Name]!" She frequently integrated the several contributions into one summary document while leading the discussion under a critical evaluation angle. Also, she often reviewed and monitored the group's progress. Her colleagues recognized her significant contribution, as shown in comments such as: "Your hard work really helped me out a lot." She contributed the most up until the end of the discussion, occasionally giving the impression that she did so trying to meet her colleagues' expectations: "Ladies, we are almost at the end!!! I am not sure who wrote the closing paragraph, but it pulled things together well. I added to it and I am posting here again for final comments/edits/revisions."

In both groups, the emerging student leader often drew from theories in the course textbooks and readings to initiate discussion in some direction, for example, "Are Joe's nonacademic needs being met? According to Ormrod (p.486), students are more likely to focus on their schoolwork when their nonacademic needs have been met." (Group 8 leader). In other cases, the student leader, drew from their experience and, with

examples from their teaching practice, they indicated how they would respond to the problem described in their case study activity. In this way, they encouraged the rest of the participants to construct and elaborate on those examples. For example,

> "Based on my experience, the teachers would benefit from finding out what Joy's interests are. While he seems to be ok in math, the teachers of other subjects would do well to find out what other areas of knowledge he is confident about. They could use his interests to help spur work in language arts, reading, science, social studies etc..." (Group 5 leader).

Last but not least, in Groups 5 and 8 where a leader emerged providing facilitation, there was less confusion while the discussion naturally progressed through, and reached, all phases of collaborative knowledge construction. In contrast, Groups 1-4 demonstrated limited engagement in all phases of knowledge construction; in fact, these groups shared the workload to get the task completed (i.e., cooperation) while collaboration was limited. On the other hand, Groups 6,7,and 9, although engaged in the process, they experienced difficulty summarizing their views in cohesive arguments – a task undertaken but the emerging student facilitator in Groups 5 and 8. This finding further constituted empirical evidence of successful collaboration in Groups 5 and 8 enabled by the facilitating role of the emerging leaders.

Initial postings of low quality

Our detailed examination of the groups' discourse suggested that the contribution of "lower quality" postings in early stages of the discussion can jeopardize the collaborative knowledge construction process. This kind of behavior was evident in two groups (out of 9) of the study, particularly Group 2 and Group 3. In both of these groups a participant started their initial ideas (Phase 1 statements) in bulleted form. Then, this formatting was adopted and continued by other participants and for the vast majority of the contributions. In general, the postings in bulleted form were undeveloped statements which did not seem to encourage further discussion, thus we can fairly characterize those as "lower quality" postings. Overall, Groups 2 and 3 were less engaged in the collaborative knowledge construction processes compared to all other groups, as evident both in the counts of Table 1 and the visuals. This constitutes evidence that postings of low quality contributed in the early stages of the discussion can jeopardize the progress of collaborative knowledge construction. Unlike Groups 2 and 3, all other groups presented initial postings of better quality in the sense that these postings were well-developed and communicated ideas in a narrative and meaningful way.

Conclusion

The study provides a perspective on why some groups "take off" better than others with regards to collaborative knowledge construction in online discussion forums. In this work, we found that student facilitation was an important contributor to the process. Instead, the contribution of "lower" quality initial postings can jeopardize the process. A discussion of these findings in relation to previous research as well as directions for future research are included in an extended version of this manuscript (please contact the authors for a copy of the long manuscript). Our findings, although tentative and demanding replication, can inform both the instruction and design of online discussions and group activities aiming to promote collaborative knowledge construction.

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