The role of problematizing in online knowledge building

Ming Lai
The University of Hong Kong

This paper describes an international collaboration between two classes of grade five students through an online discussion platform with one group more experienced in online knowledge building activities than the other. Using the methods of problematizing move (Koschmann yet al., 2005) and level of social construction of knowledge (Gunawardena et al, 1997), the analyses suggest that the more experienced group is better at problematizing the discourse or discovering areas of disagreement in the discussion. With the joint-discussion with the more experienced group, the discourse of the students in the novice class changed from more information-centered towards advanced levels of knowledge building.

Keywords: collaborative learning, problematizing move, online discussion, online knowledge building

Introduction

Combined with the affordance of a computer-supported collaborative learning (CSCL) environment, Scardamalia (2002) proposed a knowledge building approach which focuses on the learners' collective cognitive responsibility for the advancement of knowledge. The focus in the knowledge building approach is not on the sharing of information but the continual improvement of ideas through interactions with one another. Scardamalia (2002) proposed a total of 12 knowledge building principles, including such as "idea diversity", "improvable ideas", and "epistemic agency" that distinguish a knowledge building classroom from even the best of traditional and modern classrooms. Based on these 12 knowledge building principles, Law (2005) developed a group-level rubric to measure the advancement of knowledge building of a CSCL group. By studying a number of CSCL groups, Law (2005) identified a developmental trajectory in knowledge building, which broadly paralleled Gunawardena, Lowe, and Anderson's (1997) five phases of knowledge construction: (1) sharing/comparing of information, (2) discovery and exploration of dissonance or disagreement, (3) negotiation of meaning or knowledge co-construction, (4) testing tentative constructions, and (5) application of newly constructed knowledge. In other words, for students to become more advanced in knowledge building, they need to move from sharing or comparing information to the discovery of disagreement, negotiation of meaning and beyond.

In their paper titled, "How do people learn", Koschmann, Zemel, Conlee-Stevens, Young, Robbs, & Barnhart's (2005) studied how learning could be accomplished in inter-actional contexts. They proposed the idea of "problematizing move", which is a form of social action calling something previously held as true into doubt. A problematizing move performs two functions: directing attention to some potentially problematic matters, and at the same time, projecting some forms of collective action with regard to those matters. Koschmann et al. (2005) analyzed two learning episodes, one face-to-face and the other online, suggesting that the problematizing move could be applied in both contexts. This paper attempts to use the method of problematizing to analyze the online discourse of two groups of grade five students with one group more experienced in online knowledge building activities than the other.

Method

The research context and the online platform

This study was based on the collaboration between two primary school teachers, one in Hong Kong and the other in Toronto, Canada. The Canadian teacher is teaching at a laboratory school of the University of Toronto and has more than four years of experience in facilitating students to engage in online knowledge building activities while the Hong Kong teacher and his students were new to this novel approach. The international collaboration was set up when the two teachers met at an international conference. The Hong Kong teacher was interested in trying out this new pedagogical approach and the Canadian teacher wanted to scaffold the Hong Kong collaborators, both the teacher and his students, through online collaborative knowledge building of the two classrooms. As a result,

the two teachers agreed that their students, 22 from Hong Kong and 22 from Toronto, all at grade five, would collaborate through the online platform Knowledge Forum® during the school year 2004-2005.

Knowledge Forum® (KF), the online discussion platform used in this study, was developed by Marlene Scardamalia and Carl Bereiter's team at the University of Toronto to support asynchronous collaborative knowledge building activities (Scardamalia & Bereiter, 1992). KF creates a shared network space for students to write new notes, read other's notes and respond by writing build-on notes. Notes related to the same topic could be arranged in the same view. KF has a number of specific features to support knowledge building activities. First of all, its graphical display helps users to visualize their interactions with one another as each build-on note is linked to the note it responds to. KF also provides the function of "scaffolds" in the form of word cues such as "New information", "New idea", "I need to understand", and "My theory" so that students could better organize their note contents.

Participants' backgrounds and the collaboration process

All the 22 Canadian students were from the same grade-five class in the laboratory school described above. These students had used KF as a learning environment fully integrated into their school learning experience since grade one. In fact, teachers in this school adopted not only the technology platform, but also the knowledge building approach in their pedagogical practices. While the Canadian students were experienced in knowledge building and the use of the technology platform KF, the 22 Hong Kong students were totally new to this online environment. Although they were familiar with face-to-face discussions in class, they have never engaged in online knowledge building activities approach which emphasizes the continual improvement of ideas through intentional interactions with one another. The major focus of this paper is on the differing in knowledge building experience of the two groups of students. However, it could not be ruled out that culture might play a role in this study as the two groups of students come from two different cultures; the possible effect of culture will be addressed in the discussion.

The current study began in the autumn term of 2004. As the Hong Kong (HK) students had no experience in online knowledge building activities, the two teachers agreed to start their collaboration only after the HK students had a chance to familiarize with working in KF. In Nov 2004, the 22 HK students formed five groups among themselves to work collaboratively on the online platform KF for two months to work on topics of bacteria, computer, dress-up, electric boat, and electricity. This two month period could be considered as stage one of this study in which HK students discussed among themselves on KF. At the same time, the Canadian (CA) students used KF to work on topics related to ancient civilizations which was one of their curriculum themes for the school year. No interaction of the two classes occurred during this stage.

In stage two, beginning at the end of January 2005, HK and CA students started their online collaboration. During the first week, an "Introduction" view was set up for the two classes of students to introduce themselves to each other and to articulate which topics they were interested in. Since the HK students and their teacher were also interested in ancient civilizations, the CA students extended their exploration by one and a half months to collaborate with their peers in HK on eight topics related to ancient civilizations that were found to be of interest to both classes of students. The topics included weapon, food, clothing, building, language, religion, life style, and Egypt.

The joint-collaboration ended when the CA school closed for their term-break. When school resumed in the spring term, the CA class moved on to other topics and no longer appeared on the online collaboration space with the HK students. On the other hand, the latter class of students did not have a term-break at the same time and they continued to work on the eight ancient civilization topics till June. Thus although it was not planned intentionally, the end of joint-collaboration signified the start of stage three, which could be regarded as a "fading" stage, as the more experienced group had withdrawn from the collaboration, leaving the novice group to continue the discussions by themselves.

Results

An episode of learning triggered by problematizing moves

To explore the role of problematizing in online knowledge building activities, the method of "problematizing move" proposed by Koschmann et al. (2005) was employed to analyze an episode within

a discussion thread. The selected episode was within stage two, in which both the two groups of students participated in the discussion. It was related to the topic of "food". Before the problematizing move, students were discussing when ancient people changed from hunting to trading for food. A CA student posed the first problematizing move, questioning whether all ancient civilizations hunted for food. The following excerpts were extracted from the online discourse triggered by this problematizing move. The text inside brackets at the beginning of each entry denotes the scaffold selected by the student in that note.

CA student #1:   [My theory]: Is that most civilizations hunted for food? It would be interesting if a civilization did not hunt.

HK student #1:   [I need to understand]: Unless you count the tribes in Africa or India, I'm not really sure that people nowadays hunt for food. But people long time ago either hunted or farmed or even fished. But I don't know whether the people hunted more or farmed or fished more.

CA student #2:   [Further explanation]: Most civilizations found that hunting was much harder to use to get food and most civilizations were agricultural societies (farmers) and hunted only a tiny bit.

HK student #2:   I think Chinese hunted for food .Then they fished for food. Lastly they planted.

HK student #1:   [New information]: The Chinese mainly farmed for food. They think that wheat is the most important food, that's why they had so many farms in a village. The season for them to plant is spring and they harvest the food in autumn, they do not work in winter. And when sometimes they can't grow any wheat, they hunt instead.

CA student #1:   [I need to understand]: How did they get their needed meat?

CA student #2:   [New idea]: The civilizations would probably only hunt when they needed the meat and be farmers for more of the time. Maybe they even just raised their own animals like chickens and cattle.

HK student #1:   Yes, that's a good suggestion, I think it's right. I once read a book and the people usually slaughtered their own animals, they rarely hunted. That's why some people have to take care of the animals and the other are doing the farming.

As shown in the above episode, the first problematizing move drew the attention of other students to explore it further. After some negotiations of meaning, the HK students articulated that farming was the major source of food from early Chinese history, suggesting that ancient civilizations could get food from farming instead of hunting. Then the CA student posed the second problematizing move by asking how ancient people could get meat if they did not hunt. After some more negotiations of meaning, they reached the conclusion that perhaps some ancient civilizations raised animals such as chickens and cattle for meat. The selected episode seemed to suggest that the CA students, who have more experience in knowledge building activities, were better at problematizing the discourse, and those problematizing moves could   trigger their HK peers to move towards negotiations of meaning and hence more advanced levels of knowledge building.

Depth of engagement in knowledge building

To look at the overall patterns changed throughout the three stages, the coding scheme of Gunawardena et al.'s (1997) five-phase model of knowledge construction was also employed to analyze all the note contents written by students. Law (2005) argued that Gunawardena et al.'s (1997) coding scheme could reflect student's advancement in knowledge building. Besides, the second phase in Gunawardena et al.'s (1997) model, namely the discovery of dissonance or disagreement, is closely related to the concept of "problematizing". Thus according to the content, each discussion note was classified as belonging to one of the five phases. Table 1 summarized the distribution of notes contributed by the students in each of the three stages in terms of the phase of knowledge construction coded on the basis of their content analysis. It could be seen that in stage one, when HK students discussed among themselves, the note contents were predominately related to sharing/comparing information (91%) and only 3% of the notes belonged to the category of negotiation of meaning and only 6% reflected the discovery of dissonance or disagreement.

In stage two, when the CA students joined in the discussions, the depth of the knowledge building discourse was noticeably changed. Results in table 1 indicate that a much higher proportion of the CA students' notes revealed discovery of dissonance (18%) and negotiation of meaning (22%), which were rarely found in the HK students' notes in stage one. In other words, compared to the discourse of HK students in stage one, CA students tended to express more disagreement or dissonance, and go deeper into the negotiation of meaning in their notes. In this joint-collaboration in stage two, HK students' notes also

exhibited more advanced levels of knowledge building, especially in the negotiation of meaning (21%), while the percentage of information sharing notes dropped to 67%. Although none of the notes in the entire discourse of both classes reached the highest levels of testing tentative construction and application of newly constructed knowledge, the HK students made a significant progress in knowledge building during this stage. It appears that the discourse of the CA students triggered their HK peers to advance in their level of knowledge building engagement.

Table 1: Classification of students' note contents in each of the three stages using Gunawardena et al.'s (1997) five-phase coding scheme

	Stage 1	Stage 2		Stage 3
	HK	**HK**	**CA**	**HK**
Phase 1: Sharing/comparing information	91%	67%	60%	81%
Phase 2: Discovery of dissonance	6%	13%	18%	5%
Phase 3: Negotiation of meaning	3%	21%	22%	14%
Phase 4: Testing tentative constructions	0%	0%	0%	0%
Phase 5: Application of newly constructed knowledge	0%	0%	0%	0%

In stage three, after the CA students withdrew from the online discussion, the distribution of the HK students' changed yet again. The percentage of notes devoted to the negotiation of meaning remained high (14%), although there was a drop from 21% in stage two. On the other hand, the percentage of notes reflecting discovery of dissonance dropped drastically to 5%, while the percentage of information sharing notes moved up to 81%, though this was still lower than the figure of 91% in stage one. It appears that without the disagreeing discourse contributed by the CA students, the level of dissonance became lower at this stage. Although the HK students could still engage in negotiation of meanings among themselves, the negotiation became gentler and the level of conflict was low. The HK students reverted back to more information seeking and sharing behavior at this stage.

Discussion

The findings seemed to suggest that with more experience in knowledge building activities, CA students are better at problematizing the discussion. However, another possible explanation is culture. The two groups of students were from two different cultures, one Eastern and one Western. There have been findings that people from Eastern cultures, which are more collectivist, tend to conform and agree more; while people from Western cultures, which are more individualistic, tend to deviate and disagree more (see e.g., Nisbett, 2003). The finding that Canadian students tended to express more disagreements in their discourse might reflect a cultural difference rather than a consequence of differential knowledge building experience between the students. Further studies are needed to separate the effects of culture from knowledge building experience. As the current study finds that discovering dissonance or disagreement is an important step toward advanced levels of knowledge building, it is useful to explore whether culture alone could trigger a high level of disagreement.

The findings of this study suggest that the discovery of disagreement is closely related to the concept of problematizing move (Koschmann et al., 2005). Further studies are needed to understand how these may be related. For example, can all types of disagreement serve the same problematizing function? Are there problematizing moves that do not involve disagreements? Could there be consonant and dissonant problematizing moves? Does the presence of scaffolds such as "I need to understand" provided in KF have any impact on the problematizing moves or the discovery of dissonance? Are the scaffolds useful in triggering problematizing moves? Pea (2004) summarized two major mechanisms of scaffolding: channeling/focusing and modeling. Channeling/focusing is closely related to "problematizing" as they both involve directing attention towards certain issues. The results of this study suggested that as a more experienced group in knowledge building, the Canadian students are better at problematizing the discourse, which in turns could scaffold a novice group towards more advanced levels of knowledge building.

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Author contact details

Ming Lai, Room 120, Runme Shaw Building, The University of Hong Kong, Hong Kong.
Email: minglai@hkucc.hku.hk.