26. Scaffolding at the Inter-group Level: An International Collaboration Experience between Hong Kong and Canada Students

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Abstract. The concept of scaffolding suggests that with appropriate assistance, a learner could attain a goal or engage in a practice otherwise out of reach (Davis & Miyake, 2004). Previous studies have explored scaffolding between or among individuals (e.g., Wood, et al., 1976; Palincsar & Brown, 1984). This paper examined scaffolding that could happen at an inter-group level. A group of 22 Hong Kong primary five students collaborated with a group of 22 Canada grade five students through an online discussion forum. Although they were of the same grade, it was the first year for Hong Kong students to engage in online discussion activities, while Canada students were much experienced in this type of learning activities. As Pea (2004) argued that "fading", which was the removal of supports to let learners act on their own, was as an essential component of scaffolding, this study incorporated a three-phase design so that fading could be studied in addition to the effect of scaffolding. In phase one, Hong Kong students discussed among themselves on the forum. In phase two, Canada students joined in the discussion with Hong Kong students. In phase three, Canada students were no longer present on the forum while Hong Kong students continued to discuss among themselves. To analyze the interaction patterns of the students, social network analysis was employed in the present study. It was found that in phase one, Hong Kong students tended to write isolated notes and work on their own topic; while in phase two, with the joining in of Canada students, the interaction pattern changed drastically, with the notes were linked with one another, even among those written by Hong Kong students. In phase three, although Canada students were no longer present on the discussion forum, the interaction pattern retained among Hong Kong students that their notes were linked with one another. The study suggested that with a more experienced group, the interaction pattern of a novice group in online discussion could be changed and the changed pattern could retain even the experienced group no longer present.

Keywords: scaffolding, international collaboration, knowledge building, CSCL

1. Introduction

Scaffolding is a concept that has already been overloaded to serve different purposes for different researchers and educators (see e.g., Stone, 1998; Pea, 2004), this paper intended to add one more on the list, the one that happened at the inter-group level, whether one group of students with more experience in online collaborative discussion could scaffold the performance of a less experienced group. Although scaffolding is often linked with Vygotsky's idea of zone of proximal development (ZPD), defined as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978), it was first introduced in the paper of Wood, Bruner, & Ross (1976) to describe the "process that enables a child or novice to solve a problem, carry out a task or achieve a goal which would be beyond his unassisted efforts". ZPD suggests that a learner has the potential to learn with appropriate guidance; scaffolding is the process of enhancing learning within the zone. The original version of scaffolding was about the interaction between or among individuals (e.g., Wood, et al., 1976; Palincsar & Brown, 1984). In recent years, its meaning has expanded to include artifacts such as books, diaries, videos, and computers that could support learners to learn. Faced with such hybrid meanings, Pea (2004) argued that "fading" should be regarded as an essential component of scaffolding. Fading is the gradual removal of supports to let learners act on their own (Collins, Brown, & Newman, 1989). If a scaffold could not fade, learners would not be able to finish the task without the scaffold; Pea (2004) argued this type of supports or behaviors should better be understood as a component of distributed cognition (Hutchins, 1995) or distributed intelligence (Pea, 1993). It's important to differentiate between scaffolding with fading and the more general distributed intelligence without fading (Pea, 2004). Pea (2004) also used the terms scaffolds-with-fading and scaffolds-for-performance to distinguish the two. Brush & Saye (2002) used the terms hard and soft scaffolds to distinguish the supports that could be planed in advance and were usually embedded in computer software, and those that were dynamic and provided by teacher or peer to help with the learning process respectively. Based on the notion of distributed scaffolding (Puntambekar & Hubscher, 1998) that scaffolds could be distributed across tools and contexts, Tabak (2004) put forward the idea of synergistic scaffolding to propose that different scaffolds, such as software and teacher supports, should match with one another so as to reach a synergistic state that provides more powerful scaffolding than the sum of the parts.

Computer-supported collaborative learning (CSCL) is a new pedagogical approach to create a powerful learning environment in combination with ideas of collaborative learning and networked technology (Jarvela, Hakkinen, Arvaja, & Leinonen, 2004). In such a shared

learning environment, students could learn from their interactions with other students, as depicted by Vygotsky (1978)'s idea of ZPD; they could also learn from the artifacts such as the notes created in the process of interaction, as depicted by the theory of distributed cognition (e.g., Hutchins, 1995); the structures provided by the CSCL environment could guide students to engage in some collaborative inquiry processes, as depicted by the idea of community of practice (Lave & Wenger, 1991). However, the actual implementation of CSCL is not always successful. For example, Guzdial (1997) found that students posted an average of less than one note per week in his study, and the average thread length was only 2.2 notes. This low level of interaction might not be enough to bring about the beneficial outcomes of CSCL. With respect to Tabak (2004)'s idea of synergistic scaffolding, although the CSCL environment provided a basis for interaction to take place, it might need the synergy of some other "scaffolds" to bring about its full potential. Nature of task could be one of these scaffolds, as Cohen (1994) suggested that open-ended tasks were more suitable for collaboration. On the human aspects, teacher was found to be an important factor in engaging students in productive learning in CSCL environment (e.g., Lipponen, 2000). In this paper, another human aspect of scaffolding was explored; it's between two groups of student situated at the east and west of the world, with one group having more experience in CSCL activities than the other. In order to include "fading" as one of the research focus, this study were divided into three phases: when the less experienced group acted on its own; when the two groups collaborated; and when the less experienced group acted on its own again.

2. Method

The participants were 22 Hong Kong primary (grade) five and 22 Canada grade five students. They used an online discussion platform, the Knowledge Forum (KF), developed by Marlene Scardamalia and Carl Bereiter at the University of Toronto to support asynchronous collaborative knowledge building activities (Scardamalia & Bereiter, 1992) to discuss on some inquiry topics. KF creates a shared network space for students to write new notes, read other's notes and respond by writing built-on notes. Notes related to the same topic could be arranged in the same view. KF also provides the function of scaffold, which is in the form of word cues such as "New information", "New idea", "I need to understand", to help students better organize the contents in their notes. All Canada students were from the same class in a laboratory school of the University of Toronto and had the experience of using KF since grade one, while it was the first year for Hong Kong (HK) students to have such experience. Before the two groups collaborated, in phase one, HK students worked on KF among themselves to discuss on topics of bacteria, computer, dress-up, electric boat, and electric light for two months; they were divided into five groups, each responsible for one topic, but students were encouraged to build on other's notes and

work on other's topics, too. In phase two, HK and Canada (CA) students interacted online to discuss on eight topics related to ancient civilization, including weapon, food, clothing, building, etc., for one and a half months; HK students were divided into eight groups according to the eight topics and were encouraged to join the discussions of other topics; while CA students were free to work on any of the eight topics they were interested. In phase three, HK students continued to work on the eight topics while CA students no longer appeared on the discussion forum. The analysis was mainly focused on the side of Hong Kong students, how their online participation and interaction patterns changed throughout the three phases. The Analytic Toolkit (ATK) for Knowledge Forum was employed to analyze those patterns. ATK is a program developed by the Knowledge Building Research Team (Burtis, 1998) to obtain statistical information such as the number of notes created, number of built-on notes created, number of reads, and what kinds of scaffold used, for each student within a certain period of time. In addition to the quantitative analysis, an interview was conducted with Hong Kong students after the three phases to see whether they noticed any differences between the notes written by them and by CA students.

3. Results

Students' participation patterns on KF throughout the three phases were as shown in table 1. Within the period of phase one, Hong Kong (HK) students discussed among themselves, it could be seen that each HK student created an average of 9.91 notes, but only 2.95 of them were build-on notes; and only 28% of their notes were linked with one another, while the remaining 72% were isolated notes. From phase one to phase two, although the average number of notes created by HK students dropped to 7.64, a high proportion of them (4.97) were build-on notes; it could also be found that a total of 57% of notes created by HK students were linked with other notes. The same high percentage of note linkage was found among CA students (43%) in that period, even though the average number of notes created by them was not very high (3.23). Paired t-test suggested the increase of percentage of notes linked of HK students from phase one to phase two was significant ($t(21)=3.48$, $p<.01$); no significant difference was found between HK and CA students on the percentage of notes linked in phase two. In phase three, CA students no longer appeared in the online discussion, while HK students continued to discuss among themselves, it could be seen from table 1 that the percentage of note linkage remained at a high level (48%), and no significant difference was found between this percentage and the percentage in phase two ($t(21)=.98$, $p=.338$).

Table 1. Online participation patterns of Hong Kong and
Canada students throughout the three phases

	Phase 1	Phase 2	Phase 3

	HK	HK	CA	HK
Notes created	9.91	7.64	3.23	17.86
Build-on notes created	2.95	4.91	1.45	6.25
% notes linked	28	57	43	48
Number of views worked	1.18	2.05	2.36	2.32
Number of reads	113.41	134.68	52.18	194.86
% notes read	27	28	17	18

In this study, different topics were arranged into different views, thus the "number of views worked" could reflect the number of topics each student has participated in discussion. It could be seen from table 1 that in phase one HK students were mainly confined to their own topic (number of view worked=1.18) even they were encouraged to work on other topics. But in phase two, with the joining in of CA students to the discussions, the number of views HK students worked increased to 2.05, which was comparable to the number of CA students (2.36), suggesting that HK students were no longer confined to the single topic they were responsible. Such increase in the number of views worked for HK students was significant ($t(21)=2.78$, $p<.05$). When CA students left the discussion in phase three, HK students did not drop back to work on only one topic, but the average number of views worked remained higher than two (2.32). For the number of reads and the percentage of notes read, it could be seen that HK students did not work especially harder when they interacted with CA students, as they read approximately the same percentage of notes in phase one (27%) and phase two (28%). In phase three, their percentage of notes read dropped to 18%.

Table 2. Kinds of scaffold used in Hong Kong and
Canada students' notes throughout the three phases

	Phase 1	Phase 2		Phase 3
	HK	HK	CA	HK
New information	49%	48%	49%	61%
New idea	27%	32%	13%	15%
I need to understand	13%	12%	27%	22%
Others	11%	8%	11%	2%

Table 2 summarized what kinds of scaffold students used in their notes throughout the three phases. It could be seen that the patterns of HK students were quite consistent in phases one and two: half of the scaffolds were "New information", about 30% were "New idea", and about 10% were "I need to understand". The pattern of CA students was a bit different; although half of the scaffolds they used were also "New information", they tended to use more "I need to understand" (27%) and less "New idea" (13%). After the

interaction with CA students, in phase three, HK students increased the usage of the scaffold "I need to understand" to 22% and decreased that of "New idea" to 15%. Their usage of "New information" also increased to 61%. In the interview after the three phases, HK students were asked whether they noticed any differences between the notes written by them and by CA students, besides answering that the English of CA students was more fluent and their notes were longer, HK students also noticed that CA students tended to ask more questions in their notes; it was consistent with the finding that CA students used more "I need to understand" in their notes, as it was a kind of question-asking scaffolds.

4. Discussion

Over a decade ago, Riel (1995) put forward the notion of learning circles to describe cross-classroom collaboration through computer-mediated-communication that could happen at a global level. However, this kind of global online collaboration among students is not necessarily successful (see e.g., Johri, 2005). This paper described an international collaboration between Hong Kong (HK) and Canada (CA) students in discussing on some inquiry topics through an online discussion forum. They were of the same grade, but CA students were more experienced in engaging in this kind of online inquiry and discussion activities. Before the international collaboration, HK students discussed among themselves, but they tended to produce isolated notes and only work on the single topic they were responsible. With this kind of isolated interaction pattern, it's difficult for students to engage in sustained discussion or the process of "progressive inquiry" (Hakkarainen, 2004). However, with CA students' joining in the discussion in phase two, the interaction pattern of HK students changed drastically; they no longer wrote isolated notes; their notes were linked with one another, and they crossed the boundary of their own topics to work on an average of 2.05 topics, which was a figure comparable to CA students. From the total number of notes created and the total number of reads, HK students did not appear to put in much more efforts during the discussion with CA students in phase two, what they've changed was the interaction pattern. The results in phase three showed that the changed pattern sustained among HK students even CA students were no longer present on the discussion forum, suggesting the evidence of "fading", which was considered to be an essential component of scaffolding (Pea, 2004). Using the metaphor of Brown, Metz, & Campione (1996) that a classroom could be considered as consisting of multiple zones of proximal development (ZPDs), in phase one HK students' ZPDs were isolated with one another, while in phases two and three, the ZPDs were overlapped, providing the basis for the beneficial effects of CSCL environment.

With the interaction of CA students, HK students also learned about asking questions in their notes, as evidenced in their increased usage of the scaffold "I need to understand" in

phase three. While unlike the interaction pattern that changed almost immediately with the joining in of CA students, the change in scaffold usage was somewhat delayed and appeared only in phase three, suggesting that different effects of a certain scaffold could appear in a sequence of times. In the original formulation of ZPD, Vygotsky (1978) described the mechanism that enabled learning within ZPD was the person's ability to imitate; and this imitation was not a mechanical one but with some understandings (see also Chaiklin, 2003). The result of the interview suggested that HK students noticed more questions were asked in CA students' notes; with this understanding, HK students tended to use more of the question-asking scaffold "I need to understand" in phase three. Although further analysis is needed to identify what questions they really asked and to compare them with those of CA students, the results seemed to suggest that HK students have learned from their interaction with CA students.

This paper described an international collaboration between Hong Kong and Canada students through an online discussion forum. It opened the possibility of inter-group scaffolding that could occur between two groups of same-grade students with one group having more experience in online discussion than the other. What's being scaffolded was not the content or domain knowledge but the interaction pattern that could sustain the discussion and inquiry process. The phase of "fading" was also examined in this study, as it incorporated a three-phase design. Future scaffolding research might need to think about .whether to include fading in the design.

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