

Exploring Students' Ideas about Discourse and Chinese Text Reading in a Knowledge-Building Environment

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Abstract: This study examined the role of knowledge building in promoting junior high students' text understanding and conceptions of discourse in Chinese reading and examined how students engaged in productive discourse. Participants included 16 students reading Chinese texts on a selected theme and working collectively for idea improvement mediated by Knowledge Forum. Quantitative analysis indicated that both students' text understanding and conceptions of discourse became more sophisticated after the program; students who participated more on Knowledge Forum tended to have views more aligned with collaborative knowledge building and higher text understanding scores at post-test. Qualitative analysis shows students deepened their understanding of collaboration and discourse through engaging in knowledge building discourse. Implications of examining students' views of collaboration for productive online participation and roles of collaborative knowledge building in Chinese literacy are discussed.

Keywords: Knowledge building, text processing, literacy, conceptions of collaboration, discourse

Introduction

In the knowledge-based era, education needs to go beyond the acquisition of knowledge, and support students in improving their ideas, foster students to master new thinking habits, and develop collective knowledge (Scardamalia & Bereiter, 2006). Knowledge building meets the need of schooling in 21st century. Knowledge building highlights the collective advancement of ideas and knowledge; through progressive computer-supported collaborative inquiry, members of knowledge-building community are encouraged to identify gaps in communal knowledge and to advance their knowledge frontiers (Scardamalia & Bereiter, 2014). In other words, in knowledge building classes, students go beyond completing school tasks; they co-construct, create and improve ideas (Zhang et al., 2009). Learners make collective improvements as a community while teachers act as co-investigators working with students enriching the community ideas.

In the last two decades, knowledge building as a prominent model of Computer-Supported Collaborative Learning (CSCL) has been examined in various learning contexts (Scardamalia & Bereiter, 2014; Zhang et al., 2009). Nevertheless, most of studies have been conducted in science and other subjects; research on the role of knowledge building in text reading is rather limited. There has been some research on literacy and knowledge building but focus is placed on vocabulary growth (Sun, Zhang & Scardamalia, 2010) but less research has been conducted to examine how students read and process text together to build knowledge. How can question asking, explanation, deepening inquiry and idea improvement in knowledge building work when students are reading Chinese texts for knowledge advance? A key goal of this study is to examine students' knowledge advances when reading Chinese texts supported by Knowledge Forum.

Another theme of this study pertains to students' understanding of discourse, an important element of knowledge building. Research on CSCL indicates that student's conceptions of collaboration and learning can influence their online participation in computer-supported learning environments (Tsai, 2009). Regarding the development of CSCL, an increasing number of studies have begun to examine students' conceptions of web-based learning (e.g., Peng, Tsai, & Wu, 2006; Tsai, Lin, & Tsai, 2001; Yang & Tsai, 2008). Some research suggests that the students' views of collaboration influence their online participations in Knowledge Forum and mediated the effects of deep approaches in knowledge Forum participation (Chan & Chan, 2011). Substantial research has examined the socio-cognitive dynamics of knowledge-building discourse (e.g., Chen et al. 2015; Zhang et al., 2007, 2009), but fewer have investigated what students understand as productive discourse, or have examined the relations among students' beliefs about collaborative discourse and their knowledge forum engagement and text understanding.

This study is a case study of a knowledge-building program, which has been implemented in a Hong Kong secondary school. Specifically, this study examined knowledge

building through text reading and examined students' ideas about collaboration and discourse. The researcher designed and implemented the knowledge-building program: Students read different texts and inquired into the readings as they collaborated with each other to build knowledge on Knowledge Forum. The purpose of this study was (1) to investigate the effectiveness of knowledge building approach on fostering students' text understanding, (2) to examine and characterize students' ideas about collaboration and discourse and investigate the relations among students' views about discourse, KF engagement and literacy, and (3) to examine how students engage in discourse and how they work together to make knowledge advances in the Chinese reading and literacy.

Methods

Participants

This case study was conducted in a class of Secondary 2 (grade 10, aged 13-14) students in a Hong Kong school. This is not an elite school and students from this school have high to average ability; they have not been exposed to knowledge building before. The class consists of 16 students studying Chinese both in class and after class using Knowledge Forum.

Designing the Knowledge Building Environment

The program lasted from April 2015 to May 2015 with the goal of helping students engage in knowledge building and making collective inquiry when reading Chinese texts mediated by Knowledge Forum. Due to the school's intensive schedule, the students engaged in knowledge building for five class sessions, spanning over several weeks, and in between classes, students wrote on Knowledge Forum. The knowledge-building classes were taught by the researcher, and the pedagogical design was similar to one adopted in many knowledge building classrooms in Hong Kong (Chan, 2011; Lee, Chan & van Aalst, 2006). The design included different components and knowledge-building principles were embedded in the different classroom activities. The selected theme is 'thinking and doing' that includes epistemic elements and provides scope for inquiry. Students read different text passages related to this theme, and they generated ideas and questions and posted them on Knowledge Forum for idea improvement. The classroom design was summarized as follows:

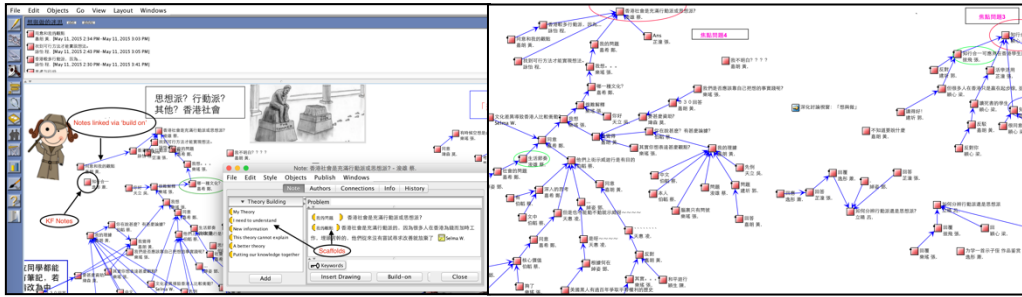
Table 1 Designing Knowledge Building for Text Reading in Chinese

Time	Principles	Classroom Discourse	Inquiry on Knowledge Forum
Week 1	Activating prior knowledge on	Brainstorming and	Introduction of

Focus: Developing a collaborative knowledge building culture	the topic—Thinking and Doing: Putting forth ideas and making ideas visible: epistemic agency	group discussion Reading and Questioning: Text-“Thinking and Doing”	knowledge forum
Week 2 Focus: Engaging students’ knowledge building using Knowledge Forum	Identify what they need to know and working together: Epistemic agency; Improvable ideas	Consider good ideas from Week 1; students follow up on important ideas Further text readings: New questions and information and reading at home	Inquiry in KF Students post new ideas and questions using scaffolds and build on others’ ideas
Week 3 Focus: Deepen knowledge building discourse and inquiry	Reading from Text and Contribution Epistemic Agency; Improvable idea ; Constructive Use of Information	Reciprocal teaching and jigsaw on text reading (Three different texts)	Continuing contribution on Knowledge Forum Students wrote ideas and questions on KF making reference to the text and trying to make meaning from the text
Week 4 Focus: Deepen knowledge building discussion and inquiry and Rise above	Deepening and Rise Above: What is going on in community and how can we improve? Epistemic Agency; Improvable idea; Constructive Use of information; Community knowledge	Students working in groups examining different clusters of notes. Different groups review productive threads to integrate new insights and information to create new ideas.	Working on threads of notes on Knowledge Forum Deepening students’ understanding of KB discourse: What is good question; What is good discussion; What are the good discussion in Knowledge Forum and why
Week 5 Focus: Assessing and inquiring into what is productive discourse.	What is going on in community and how can we improve? How can we synthesize? Reflective Assessment ; Epistemic Agency; Improvable idea ; Constructive use of information; Community knowledge; Transformative Assessment	Relating to principles of knowledge building and discourse, reflective and assess clusters of notes.	Use of KF applets and analytics to help students review their knowledge building work; focus on collective threads not just individual notes and how they can be improved

- ***Introducing students in collaborative KB Climate.*** Week 1 focused on developing a collaborative knowledge-building culture. Students formed small groups and they started reading the text “thinking and doing” that highlighted different issues; the text was provided to activate students’ prior knowledge and stimulate their thinking on the topic, and to help them start building knowledge. . Students put forth ideas and raised questions based on their reading and discussion making idea visible.
- ***Engaging students in KB inquiry on KF.*** Week 2 aimed to engage students in collaborative knowledge building on KF. Students were introduced to Knowledge Forum scaffolds when they contributed questions and ideas; Different classroom activities were developed including reciprocal reading so as to integrate reading with knowledge building work. Students were scaffold to contribute ideas and they were also encouraged to comment on good notes.
- ***Deepen Knowledge-building inquiry.*** Weeks 3 and 4 were designed to deepen knowledge building discussion and inquiry. Students were introduced to knowledge-building principles including constructive use of authoritative sources, improvable ideas and community knowledge to illustrate how inquiry and collaboration could take place. Students used text information to help them deepen their inquiry. Good questions and clusters of notes that required further discussion were selected as examples to help students reflect on their knowledge building. Students were encouraged to add new information to other threads to enrich the discourse.
- ***Collective and Reflective Assessment.*** Week 5 focused on helping students to reflect on their own discourse and assessing their own knowledge-building advance. Primarily students reflected collectively what they were doing on Knowledge Forum; what they were discussing, and how their discourse could be advanced.

Figure 1 The view of Knowledge Forum



Data Sources

Students' literacy and text understanding

A pre-and post-test of Chinese text understanding test was given to assess students' improvements of literacy and text understanding. It was especially designed to examine students' understanding of key concepts in Chinese that were related to the topic: thinking and doing. The domain test contained two questions: 1) what do you think of "thinking and doing"? 2) Explain the meaning of an old Chinese proverb from Confucius – "Learning without thought is labor lost; thought without learning is perilous". Rating rubrics were developed by the researcher and another peer researcher coded both the pre- and post-test papers. A four-point scale was developed for the two questions. The researcher scored all the answers of the domain test, and a second rater independently scored 30% of the answer of the domain test. The inter-rater reliabilities for the two questions were .82 and .87, respectively, based on Pearson correlation.

Students' understanding of collaboration and discourse

Open-ended questions on discourse. Four questions were designed to assess students' views of discourse: 1) What is a good discussion? 2) What are the benefits of discussion? (3) What is it important to pay attention to when discussing with others? and 4) Which one do you prefer, individual work or collaboration? Why? These questions were designed to examine students' views of collaboration and discourse in relation to elements related to knowledge-building. The researcher developed a scheme with three levels of responses and examples are provided as follows:

Level 1: Behavioral aspects: A rating of 1 was given to responses that were superficial generally relating to behavioral aspects irrelevant to knowledge building. Students perceived politeness and language proficiency as the key factors that affect the quality of a discussion. For example,

"Listen to others, respect for others." (Student# 4)

"Pay attention to each other when discussing" (Student #9)

Level 2: Elaboration of ideas: A rating of 2 was assigned to responses that are more elaborate and relating to some cognitive and social aspects. For example, one student wrote,

“Learn more from other’s different ideas, thinking from diverse aspects.” (Student# 6)

Level 3: Improvable ideas and going beyond: A rating of 3 was given to responses reflective of some elements of knowledge building involving diversity and improvable ideas. Two examples are included:

“Discussion helps us see diversity of ideas; it helps us rise higher when considering others’ ideas; we can know more about the world around us. (Student #14)

“ Discussion with others can generate more good questions, you cannot ...discuss alone, but with others... We inquire together, and sometimes the idea will change (Student #11)

The researcher scored all the answers of the open-ended questions on conceptions of discussion, and a second rater independently scored 30% of the answers of the open questions on conceptions of discussion. The inter-rater reliability of the open questions on conceptions of discussion was .90, based on Pearson Correlation. Cronbach’s alpha of open questions on conceptions of discussion (collaboration) for the 4 items was .77, indicating good scale reliability.

Questionnaire on collaboration. A questionnaire consisting of twelve items was administered at pre and posttests to assess students’ understanding of collaboration (Chan & Chan, 2011). Participants used a 5-point Likert scale to rate the questionnaire items; these items do not capture the full complexity of knowledge building but attempt to go beyond general views of cooperation and collaboration, for example, “Ideas from different members are synthesized into new knowledge”. Students rated these questionnaire items in relation to their understanding and experience of knowledge building inquiry. Cronbach’s alpha of collaborative knowledge building for the 12 items is .86, indicating good scale reliability.

Student interview. Interviews with students in a focus group were conducted to examine student experience that might have influenced their conceptions of discussion and collaborative knowledge building. Six students were invited to semi-structured interviews at the end of the program. Each interview lasted about 30 minutes designed to examine students’ experiences of knowledge building.

Students Participation on Knowledge Forum

Quantitative indices. Students’ participation on Knowledge Forum using server log data was employed. The quantitative indices used in the study were generated by statistical software called Analytic Tool Kit (ATK) (Burtis, 1996) and Applets accompanying KF4. Different kinds of ATK measures – including notes created, notes read, notes linked and

scaffolds used reflecting different aspects of community contribution and community awareness are included.

Inquiry threads. Students' Knowledge Forum discourse (connected notes) provided the crucial contextual data for the research questions as it provided a window to see how students went about knowledge building. This paper utilizes the content of knowledge-building discourse to explore how students engaged in productive knowledge building discourse.

Results and Analysis

Overall Participation on Knowledge Forum

The overall degrees of students' activity in participating in Knowledge Forum are examined. The result indicates that students' participation in Knowledge Forum was at a reasonable level: There is a total of 220 notes in the whole period, with each student on average creating 12.9 (8.93) notes, reading 44.2% (28.6); the percentage of notes linked was 73% (24.3) and number of scaffolds used is 10.8 (8.6). [Note: SD in parenthesis] The note-creating density is 87.6% and note-reading density is 36.7%, and these indices are generally comparable to other knowledge building databases.

The sizes of the build-on trees in the Knowledge Forum database during the entire period were also examined. A possible way to examine students' engagement in interaction and collaborative discussion is to analyze the threads they produced in Knowledge Forum. The ATK results have indices that represent the number of notes in a thread and are categorized into four types: small (2-5 notes), medium (6-20 notes), large (21-40 notes), and very large >40 notes. The result indicates that there were 31 small clusters, 5 medium clusters, 1 large but no very large cluster.

Effects of Knowledge Building on Text Understanding and Conceptions of Collaboration and Discourse

Changes in Text Understanding

Table 2 shows mean and SD scores of text understanding obtained at pre and posttests. Analysis using paired t-tests shows a significant difference between pre-test scores ($M=1.97$) and post-test scores ($M=2.72$), $t(15) = -5.20$ $p < .001$. The results, although drawn from a single group with no comparison group, provide some preliminary indications that knowledge building experience and Knowledge Forum had a positive effect on fostering text understanding in Chinese reading, which aligns with previous studies that knowledge building had positive effects on students' conceptual understanding (e.g., Lee, Chan & van Aalst, 2006).

Changes in Conceptions of Collaboration and Discourse

Table 2 also shows students' conceptions of collaboration at pretest and posttests. Analysis using pair t-tests showed significant differences on open-ended responses $t(15) = -4.18, p = .001$. and collaborative knowledge building questionnaire $t(15) = -2.07, p < .056$.

Table 2 Mean and SD scores for literacy and conceptions of collaboration

	Pre-test Mean (SD)	Posttest Mean (SD)	T score	P value
Text Understanding	1.97	2.72	-5.2	.001
Collaborative knowledge building questionnaire	3.66 (.57)	3.92 (.37)	-2.07	.056
Open-ended questions on conceptions of discussion	.63 (.27)	1.20 (.63)	-4.18	.001

Relations among Knowledge Building Participation, Views about Collaboration and Discourse and Text Understanding

Correlation analyses were conducted to examine relationships among Knowledge Forum participation, students' views of collaboration and discourse, and their literacy scores. There were significant correlations between post-test text understanding scores and posttest on conceptions of discourse ($r = .65, p = .007$); and scaffold use on Knowledge Forum ($r = .73$). Significant correlations were also obtained between scaffolds and post-collaboration questionnaire ($r = .55, p = .029$); post-open-ended questions on conceptions of discourse ($r = .54, p = .031$) (See Table 3). Primarily, the results suggest that students' posttest text understanding scores were related to use of Knowledge Forum scaffolds and students' more sophisticated views of discourse.

Table 3 Correlations among Knowledge Forum participation, views about collaboration and discourse and text understanding (posttests)

	Conception of discourse	Notes- Created	Notes-Read	Notes- Linked	Use of Scaffolds	Text Understanding
Conceptions of Collaboration (quantitative)	.701**	.449	.108	.026	.546*	.431
Conception of Discourse (open- ended)		.196	-.088	-.057	.540*	.649**
Notes Created			.573*	.566*	.694**	.407

Notes Read	.548*	.377	.010
Notes Linked		.407	.088
Scaffold			.723**

The quantitative data show that students' participation in Knowledge Forum and their beliefs about collaboration and discourse aligned with knowledge building are correlated with their text understanding and idea about discourse scores. Qualitative analysis are undertaken to examine how students understood, experienced and engaged in productive collaborative discourse as they worked together to make knowledge advance in relation to knowledge building principles.

Students' Changing Understanding of Discourse through Knowledge Building

Example One: Constructive Use of Information and Improvable Ideas

Excerpt one is included here to show students' changes in conception of collaboration relating to her experience with knowledge building relating to the use of information:

*“It used to be like that: someone said something, others just say that I agree or I object, no justification, rather vague. Knowledge Forum supports us on making our own evidence, build on by **using information and questioning**” (Student 11)*

Student No.11 first compared the discussion they had before in regular classes with the computer-supported online discussion that they experienced in the program. She firstly differentiated these two forms of collaboration by acknowledging the crucial role of authoritative sources in the collaborative knowledge building process, she found that unlike face-to-face discussion, KB provides them with the opportunity to read the text, to discuss in depth in Knowledge Forum, when one person expresses his/her own ideas, evidence should be added to a his/her theory, to elaborate and support the point, with these evidence, peers could critically evaluate the theory or build on to enrich it, the use of authoritative sources is constructive, which is highly related to the idea of *Constructive Uses Of Authoritative Sources*. Student No.11 learned that through the contrast of these different collaboration experiences she had, she also highlighted the higher quality of the discussion in KF differentiate itself with the regular relatively empty discussion she had before.

Student #2 added his ideas on this point to further explain their discussion in KF.

“Through discussion, some new sparks and new ideas emerged, which led to the further discussion. At the very beginning what we said is more inclined to be on one-sided, without in-depth exploration of the issues or causes, but in this learning process, we explored as archaeologist. One person arguments could put forward another person presents a higher level of in-depth questions that worth pondering, we reflected on what we discussed, after a more in-depth discussion, we can develop a new [theory] (Student 2)

Student No.2 pointed out that in regular class, their ideas are easily to become biased, and the chance that an idea moves up the discussion to a higher level is quite low. The interest and difference in KF discussion (KB) is that new views and ideas can emerge at any time and can be improved in the process of KB; moreover, this student made a meaningful connection between text reading in knowledge building with scientific studies, acknowledging that the way they work in Knowledge Forum is similar to the scientific exploration. Understanding could become sophisticated as long as students collaborate and work together collectively . The student also pointed out that deepening of the inquiry is significant in a discussion; reflection could lead to a deeper conversation among peers.

Example 2: Authentic problem, agency and Community knowledge

Excerpt 2 is included to show how students’ understanding in relation to ideas of agency and community knowledge.

“There are more spaces to discuss when we ask questions by ourselves. But if the teacher asks the question, you would not think too much, only because the teacher posed it and you have to answer. Moreover, in such case, we know that there is a standard answer. We just give the ideal answer to the teacher and that is it. However, if it is our own questions, the answer is infinite. In addition to that, I think the questions we would ask are different from the teacher’s. We raise this kind of issues that most of the teachers would not care. For example, CJX once posted a question in KF, which is: are there more thinker or doer in Hong Kong? But the teacher would never mention these issues, they think it is a waste of time, cannot enhance our learning. The teacher may rely more on the textbook-type of questions. But when we discussed on Knowledge Forum, we think of problems we did not concern before, we think of the problem that might occur more in line with the community's attention. ” (Student 15)

When talking about the problems they generated in KF, student No.15 compared the characteristics and nature of the questions that they would ask on KF on their own with the type of questions that the teacher would ask in regular classes. This student was more intend to ask authentic questions, which are highly relevant to real life, rather than textbook-based questions that have standard answer, which are normally asked by teachers. She thought that authentic questions contain infinite possible answers; knowledge building gave them the opportunity to think of this kind of question rather than be constrained by the textbook. This is more meaningful and valuable to learners. The student had a sophisticated understanding of authentic problems through the comparison between non-KB class and KB class experiences. This point aligns with one of the knowledge principles—*Real Ideas, Authentic Problems*

“At first we do not accept the views of others, we only cared about our own ideas and questions, but slowly through further discussion we learned a lot. We started to care about others’ ideas, we accepted to talk to others, and collaboratively move to a deeper level of discussion. Some students also recorded the problems that we encountered, we can learn a lot in the process.” (Student 10)

Student No.10 emphasized the progress the class made as a community, explaining how knowledge advances had been made as a community. He described the original situation in their KF discussion, which was non-collaborative when students had no concept of “community”. They only cared about their own ideas, opinions and improvements; it was difficult and strange for them to accept others’ opinions with respect and humbleness. However, the discussion in each session gradually changed; students started to pay attention to peers’ ideas, open to the difference and diverse among them, and deepened their discussion as a whole. Through the comparison and over time, the student emphasized the concept of “community”, which is vital to Knowledge Building. One of the differences between Knowledge Building and other learning approaches is that Knowledge Building highly focuses on the collective advancement in a community rather than just emphasizing personal learning. This focus is reflected by a key principle of knowledge building--*Community Knowledge, Collective Responsibility*.

Overall, students reflected their understanding of the collaborative knowledge building experiences by referring to what happened during their discourse. Primarily these interview excerpts suggest that students had a deeper understanding of collaboration and discourse with engagement in knowledge building; they developed more sophisticated views about improvable ideas, use of information, their agency in raising authentic problems and the importance of community ideas.

Students’ Engagement in Knowledge Building Discourse

The previous section illustrates students' changing understanding of what productive discourse is about; this section includes discourse examples to illustrate how students engage in productive discourse. Two excerpts were included one classified as an explanatory pattern showing how students engaged in idea improvement and made use of text information; the second showing how inquiry failed to reach a deeper level; and was classified as information-sharing type of discourse. The goal of this analysis was to understand how knowledge advances is occurring or blocked, and thus considering the conditions necessary for starting and sustaining such a process.

Example One: Explanatory discourse and constructive use of information

Excerpt one is included here to show how students posed authentic problems and engaged in deep inquiry making reference to the text that helped them to develop a deeper understanding of the topic. The episode was taken from an inquiry thread on the problem of “thinking,” which included ten notes and showed how students asked meaningful questions and constructed explanations. The students were talking about the necessity of discussing the topic—“thinking and doing”. The discourse began with a student asking the meaning of discussing this topic.

#My question# From a scientific point of view, no matter what we humans do must go through the thinking in our brain. So will this issue we are discussing now be a bit redundant? (Student #13)

#My theory# I agree with you. #My evidence# People will think first and do after thinking, if you make one mistake, correct it, it is not necessary to learn. (Student #1)

#My question# How do you know that everyone will think before take actions? (Student #2)

#My theory# I think it is not the matter of thinking or not, it is more on how much do you need to think before doing. (Student #4)

#My theory# In addition to how much should we think, we also discuss about the attitude, good and bad ...#My evidence# In class, we learned about what is 'good' discussion, 'good' question, thinking is the same, and we should know what is 'good' thinking to help us think.... Thus, we could truly - understand new knowledge. (Student #11)

#My question# What is good discussion and what is bad discussion? (Student #5)

#New information# According to reading material, "How Genius Think," we can know that we need to actively question others, should feel excited and appreciative to learn new knowledge, with ...our heart,..and expression we would be able to deepen the knowledge. But more importantly, we need to ponder from many angles, do not just attend to our own subjective way of thinking. (Student #11)

#My theory# I agree, but we could not force ourselves to like learning. (Student #15)

#My theory# But learning is vital in the society. Therefore, we need to cultivate our interests of learning (Student #10).

#My theory# I think that we should hold a serious attitude... try our best to work toward the direction of thinking in a better and productive way. #New information# According to the text "Eat that frog", we need to think and be determined...to plan based on what we want to reach, and then take action. (Student #3)

The first note was a critical question that emerged after students had discussed the topic "thinking and doing" for one lesson. Student No.13 (Note 1) doubted the necessity of spending time to discuss this topic by referred to his prior knowledge. Student No.1 (Note 2) agreed with Note 1 and provided with a similar reason. Note 3 came in as a start of the argumentation, which held a different view: "*how do you know that people would think before doing?*" This was an explanation-seeking question, which could lead to a deeper inquiry if there were more responses. Student No.4 (Note 4) stated another view, which could be seen as a disagreement to Note 1. Student No.11 responded to Note 4, she first acknowledged the point in Note 4, and then suggested another important aspect that they should consider during discussion: *the attitude toward thinking*. She shared the experience of learning what is a good discussion in class and related it to "*good thinking*" to explain her point. That is an acknowledgment, and the information introduced in the note aimed to deepen the collective understanding of this topic. Student No.5 (Note 6) asked a fact-seeking problem afterward. She wanted to confirm the definition of "*good discussion*". Although this question distracted the entire thread to some extent, the new question created an opportunity for student No.11 (Note 7) to construct an explanation to deepen their joint understanding. The student responded to that question by constructively using the information from the reading text to elaborate her points. The next student No.15 shared agreement of the point in Note 7 but also expressed his concern. The original question had been turned into another relevant question, but it was not considered as unintentional deviation from the inquiry topic this was because the two questions were conceptually related to each other and the change was intentional. The discussion was still focusing on exploring the full-image of this topic.

Student No.10 replied to Note 8 and expressed her personal opinion. Student No.3 (Note 10) came in to deepen the class's collective understanding, and said that *thinking is necessary; in addition to that, we also need to make plans and take actions accordingly*. Note 5, 7, 10 could be considered as the turning point of this inquiry thread; they enhanced the level of the discourse; and they all included the constructive use of authority resource and use of information from the text reading. It could be concluded that this thread was beyond information exchanging; there was a trend toward the explanatory discourse in this thread if a longer time could be provided.

Example Two: Stuck at information sharing and what was absent?

Excerpt two is shown here to present how students' discourse could start off in valuable way but how it failed because of the lack of awareness of the necessity of using text information in constructive ways and paying attention to community ideas. The episode was taken from an inquiry thread on the problem of "learning and thinking", which consisted of seven notes and showed how students asked meaningful questions at the very beginning but failed to deepen their inquiry in the end. The discourse began with a student asking what if we learn without understanding and thinking.

#My question# What would happen if learning without understanding and practice? #My theory# Learning without thinking and understanding is "mechanical learning", YS put it very well: "Reading without thinking and learning without applying in life will cultivate a learner whose life and beliefs are constrained from learning. " (Student no 3)

#my theory# I do not think that Hong Kong people are learning without practice or reading without thinking. #My evidence# We could apply the knowledge that we learned at school in our daily life. For example, we learned the principle of gravity in the science classroom; and then we know that if we want to let the aircraft successfully fly to the sky, there should have a certain momentum, which means a greater force than gravity. In addition to that, we learned about Modern China's general situation from the history class, we know that there are lessons that we could learn from the history. (student #2)

#My question# Is this a problem of student's, the teacher's, the principal, or the education system?) (Student #15)

#My theory# I think that is because of the students. Because there are students who learn without understanding and practice in our class! (Student #6)

#My question# Why do you think it is only because of the student? #My theory# I think it is not because that they like to do so, reading and learning without thinking and practice, it has something to do with the educational environment in Hong Kong. (Student #3)

#My opinion# We need to learn without thinking and practice sometimes. For instance, we will never use an equation to calculate the price and buy food in the market. (Student #5)

#My opinion# Your example is inappropriate. Mathematics focuses on training our critical thinking. (Student #2)

The first note was a valuable question. Student No.3 (Note 1) answered the question with a conjecture after the class read one text related to the topic “thinking and doing”. The question started with “what if” and was supported by referring to some authoritative resources; it was a general question without any specific contexts. Student No.2 responded to Note 1 by linking it to the Hong Kong context and suggested that *people in Hong Kong are applying their knowledge in life*. He shared his learning experiences at school as evidence to support his point. This note turned the general question in Note 1 into a detailed question, but it remained at this stage without any responses afterward. Student No.15 (Note 3) replied to Note 1 with a follow up question on the causes of this case. This note provoked the following discussion. Student No.6 (Note 4) insisted that the only reason was from the student and claimed there were examples in the class. Student No.3 (Note 5) disagreed with Note 4 by pointing out it was a biased explanation. His view moved the discussion to a higher-level by considering *the educational context*. However, student No.5 (Note 6) replied without deepening the discussion, instead posting a misconception of learning and using a mathematical learning example to support her opinion. This opinion was superficial, and student No.2 (Note 7) disagreed with her example because the nature of math is inappropriate to support the claim. He was scaffolding student No.5 to construct a more coherent explanation, which represented students’ agency in this inquiry episode.

Although the original question was highly relevant to the topic and the proverb students learned in the first session, the discussion still had not reached a higher-level in the end. There was a chance to deepen this inquiry after Student No. 1 came back to reply and stated that this issue was not only related to students but also the educational environment in Hong Kong. However, without authoritative resources to help him/her articulate his/her point,

this thread became a cluster of notes that only revealed students' fragmented personal viewpoints. Their ideas replaced each other, rather than developing and improving.

The analysis of the first episode provides some glimpses into how students worked together in building knowledge; it suggests the importance of students building on each other's ideas and deepening explanation, and how the use of text information is important in advancing the discourse. For the second episode, though the students started with fruitful ideas and questions, there was few reference to the text they were reading; the inquiry was not sustained; as the main problem was not addressed or distracted, the inquiry got stuck and did not move forward. The two examples were presented together to suggest possible conditions relating to explanation and the use of text information for knowledge building advance.

Discussion and Conclusion

The goal of this study was to investigate the role of knowledge building in fostering students' literacy in Chinese text reading and conceptions of discourse, and to examine how students made knowledge advance. The key features of this program were a knowledge building design that encouraged students to read the text passages, using information constructively and formulating questions and explanation, embedding knowledge building principles. Students were also encouraged to ponder what is good discourse and they reflected on what they were doing on Knowledge Forum and how they could develop more productive discourse.

Results indicated that students' literacy in terms of text understanding has been improved through this program; their conceptions of discourse became sophisticated after their experience with knowledge building. There were also significant correlations between knowledge forum participation, conceptions of collaboration and discourse, and text understanding. The pedagogical design of this study made efforts on developing students' conceptions of discourse through principles and activities. It is possible that the design has brought about more sophisticated views of collaboration and discourse, enabling students to dig deeper into the text, and that has subsequently brought about higher level of text understanding. Primarily the design emphasized students reflecting on their collective discourse examining what they were doing and how discourse could be advanced; it involves students working in jigsaw groups analyzing collective discourse. Such design would also have helped students to engage more actively on Knowledge Forum and develop more sophisticated views of discourse.

Whereas quantitative analysis provided some evidence in supporting the notion that knowledge building has a positive impact on students' conceptions of discussion, the students' interview and discourse analysis suggest the important roles of knowledge building in promoting not only text understanding but also general understanding of collaborative discourse. Primarily student interviews suggest students' changing understanding of discourse is aligned with knowledge building principles; the discourse analyses also suggest how students worked collectively formulating questions and explanation and using text information constructively to deeper understanding.

Several implications can be drawn from this study. First, this study suggested that knowledge building mediated by Knowledge Forum would promote students' literacy in Chinese reading and more sophisticated understanding of conceptions and discourse. These findings are consistent with research on how students' understanding of collaboration is related to their understanding (Ellis, Goodyear, Prosser, & Calvo, 2008; Reid, Wood, Smith, & Petocz, 2005). This study enriched the research on the role of knowledge building in different domains: Most of the studies of knowledge building have been done in sciences and other subjects (e.g., Zhang et al., 2007, 2009); few studies have been done in Chinese literacy and this study provided additional data sources to illuminate role of knowledge building. The design and results of the study suggest that students' conceptions of collaboration and discourse in CSCL model of knowledge building are important for effective design of knowledge building. More attention needs to be given to student beliefs and to building the culture for collective advances in designing knowledge-building environments. In particular, knowledge building in Chinese text understanding requires more attention to combine knowledge building with other reading strategies and scaffolds to advance both individual and collective understanding. Further investigations are needed to examine knowledge building and literacy and how students can be scaffold to build knowledge through collaborative reading and inquiry in classroom communities of knowledge builders.

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