Knowledge Building Pedagogy and Technology: Enacting Principle-Based Design in History Classroom

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Abstract: This study traced the pedagogical moves adopted by a teacher in taking a principle-based approach to designing knowledge building environment (pedagogy and technology) for history lessons. Students, in turns, engaged in mature historical analysis through collaborating and reflecting on their theories on historical inquiry suggesting that Knowledge Building pedagogy and technology are conducive to mature historical thinking. We measured the impact of this approach by the sophistication of students’ theories and explanations in terms of the level of historical thinking. Results showed encouraging trends but also pointed towards ways to enhance knowledge construction in history lessons.

Introduction
The essence of knowledge building (KB) classroom focuses on engaging a group of learners in discourse and advance collective knowledge while ensuring that this knowledge is accessible for future use (Lee, Chan, & van Aalst, 2006; Scardamalia & Bereiter, 2003). Such classroom depends largely on teacher’s ability to translate a set of Knowledge Building principles to design lessons and organise instruction (Chai & Tan, 2003) in a way that engages students in mature work in the discipline, enculturating them in a learning culture that values their initiation to contribute, add values to ideas, and advance collective knowledge through collaborative discourse (Bereiter, 2002). KB classroom includes integration of Knowledge Forum (KF), an online communal discourse platform that has scaffolds to support students in creating and linking notes (Scardamalia, 2004). In this study, we look at how a history teacher translates knowledge building principles into designing a history classroom to build students’ historical thinking.

Knowledge building in a history classroom
Existing literature on knowledge building pedagogy has predominantly focused on science as the subject matter. Bereiter and Scardamalia (2012) explained that generating ideas about scientific phenomena involves exploring scientific laws or principles, whereas generating ideas about social historical phenomena involves exploring theories of a specific case. This difference in the knowledge building practices of the two subjects illustrates that improving knowledge building pedagogical practices for history continues to be an important agenda (Tan, So & Yeo, 2014).

Schema, historical thinking and use of historical concepts
In the learning of history, it is important that students are given the opportunities to make sense of the world as they explore the seemingly distant and dense historical content. They must develop a robust schema, a mental model, to organize and interpret the vast amount of information in a history text. Research on novice versus expert performance (Voss & Wiley, 1998) has indicated that expertise in history requires a mental model that allows for reasoning and problem solving. This schema is an important dimension in developing historical literacy in students. Historical literacy provides a consistent framework upon which to develop historical thinking and students’ ability to construct historical concepts. Seixas and Peck (2004) argue that the role of history education is to work with students’ fragments of thinking and develop them, so students can learn to think historically and have a better basis for sense-making.

Teachers’ principle-design approach to designing the inquiry activities
The teacher has six years of teaching experience and three years of experience with KB practice. In this study, he worked with 39 fourteen-year-old students (19 boys and 20 girls) in an express class (middle-achievers) in a government-aided school. KB pedagogy and technology was adopted throughout the year but this series of lessons were recorded over two week in term three of the school year. He started this series of lesson by designing a set of cognitive scaffold based on the historical concepts defined in the national curriculum document. These cognitive scaffolds took the form of sentence starters to support students in writing notes on Knowledge Forum, a multimedia community knowledge space. The software provides knowledge building supports both in the
Relevance in terms of the increased understanding of present life

We learnt that relevant not necessary means that it must show blessings. By not showing a blessing is also relevant. It still talk about blessing or not blessings creation of notes and in the ways they are linked, it also allows for revisions, elaborations, and reorganizations over time. These scaffolds also serve to support students in navigating the source materials, reflecting their understanding of the information, and crafting explanations of the historical matter. The following segment is a narrative derived from teachers’ reflection on his lesson design when the sequence of lessons was completed.

**Sparking curiosity (inquiry phase)**
Teacher wanted to interest the students in the history topic by engaging students in their own initial questions and ideas about the topic of Japanese occupation. He got the students to post their initial thoughts online and explained to students that the sequence of lessons would be run according to their ideas and inputs in class (Democratizing Knowledge). He also ensured that students embraced the rules of engagement that all ideas are valuable and must be worked upon such that there is diversity of ideas. Example of the different initial questions surfaced by students were, “how was life tough during Japanese occupation?” “Blessings during Japanese occupation?”

**Gathering evidence by developing examples of group sources**
In a subsequent lesson, the teacher facilitated a classroom discussion around students’ theories posted online (students’ notes on KF was projected on the wall throughout the discussion). Students suggested that they need to find sources to verify and improve their explanation and theories. They then set off to search and upload relevant sources onto Knowledge Forum, they were encouraged to justify their choice. Students understood that they have to find their way to advance their theories (Epistemic Agency) and they were given opportunities to talk about their contribution in class in subsequent lessons.

**Exercising reasoning and reflective thinking**
Teacher then built on students’ posting that questioned the relevance of the source and got the rest of the students to derive pointers they learnt about relevance before commenting on the rest of the post (Epistemic Agency and Constructive use of sources). In so doing, students were broadening their concepts of ‘relevance’. For example, they have learnt that relevance is not about having the source agreeing with the statement. A contradicting source can also be relevant as long as the content relates to the given topic/issue. All through these lessons, the teacher focused on getting students to demonstrate historical thinking surrounding the concept of relevance, the concern of covering historical events and facts was secondary to the development of historical thinking.

![Figure 1. Three sets of students’ notes using scaffold “my theory”, “I need to understand”, and “rise-above”.

Rise above
At the final stage of inquiry, the class was tasked in groups to craft explanations that incorporated and synthesized
prior knowledge, new information and new understanding acquired throughout the process to respond to the overarching question, “Was it true that Japanese Occupation in Singapore only brought forth negative impacts to the people?”. This question was synthesized from students’ questions in first view. Upon studying students’ responses, teacher reflected that he saw a shift in students thinking. Students were able to adopt different sets of KB scaffolds to help them progress in the writing of their group response, they showed a more robust view of the topic by challenging some conventional thoughts and they were able constructed more diverse yet coherent explanations. Below is a snippet of students’ rise-above note which the teacher analysed as “(in the note) students has constructed a non-monolithic thinking, adopt both perspectives [non-conventional approach in the study of JO which usually focuses on negative].”

Japanese Occupation helps people to come together as one, regardless of races. This is very different from British time. This is something that is positive to the people in Singapore. But, we also agree that there are also sources showing Japanese Occupation also bring forth negative impacts. (snippet of students’ note taken from KF)

Analysis
To find out how the KB environment impacted students’ development of historical literacy skills, 586 students’ notes collated across three weeks and two different KF views on different aspects of Japanese occupation posted KF were analysed using the coding scheme in Table 1. (KF Views are ‘pages’ on KF that provide a visual organization for notes. A KF view allows one to see all related notes and it represents related ideas and discussion strands.) The notes that were analysed were mainly written with sentence starters such as “my theory”, “a better theory”, “pulling our knowledge together”, “new information that depicted students’ theories, explanation, and rise-above.

The coding scheme is built from existing literature that has identified six distinct but closely related historical concepts as a framework for assessing historical literacies skills. The six concepts are: Historical Significance; Evidence (Use of Historical Sources); Continuity and Change; Cause and Consequence; Historical Perspective; and Moral Judgement. In the present study, a gradation scheme was created to chart developments in students’ understanding of these six historical concepts across the three KF views. The gradation scheme is as follows (Table 1):

Table 1: Coding scheme on progression of students’ historical literacies skills based on level of sophistication of notes defined by the integration of historical concept

<table>
<thead>
<tr>
<th>Categories</th>
<th>Descriptions</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>No awareness of historical concepts</td>
<td>-</td>
</tr>
<tr>
<td>Level 2</td>
<td>Superficial understanding of historical concept as a way to “answer” to a question.</td>
<td>“Source 2 answered the question of how tough days were back then during the Japanese occupation.”</td>
</tr>
<tr>
<td>Level 3</td>
<td>Use of historical concept as part of the explanation.</td>
<td>“My theory -Source 3 is relevant because the source shows that how hard it is to get food for living.”</td>
</tr>
<tr>
<td>Level 4</td>
<td>Elaboration of historical concept in explanation (usually involves personal thoughts or theories)</td>
<td>“My theory -source 1 show(s) us how life under japanese occupation was tough, i agree as it shows us how Elizabeth choy got torture by japanese occupation and the method of making her husband feel useless. Back then women does not have any protection”</td>
</tr>
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</table>

Findings
It is generally evident from the results that students’ historical literacy skills improved significantly over the course of the KB lessons. The overall pattern is that, as the project progressed and lessons continued, students’ historical literacy skills were showing increasing level of sophistication. With such positive shift in students’ historical literacy, the teacher reflected and surfaced two points to be considered in his next cycle of lesson design, first, he felt that there could be higher level of autonomy given to students throughout the inquiry process and second, he felt that more effort could be used to unpack the rise-above principles to students so as to allow them to assess and own the new knowledge they created throughout the lessons.
Conclusion and implications
In summary, results reflect that a KB environment can benefit students’ learning of History, as it increases students’ development of interest in the subject, as well as their historical thinking. The key role of history teacher lies in their interaction with students. Such interactions includes a collective effort in posing guiding questions, having rich conversations, providing scaffolds to help students see patterns in history events and text and finally, facilitating students’ independence in knowledge construction process.

References