Cultivating knowledge creation capacity for social studies among primary school students: A case narrative

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Abstract: In this paper, we report our subjective experiences in designing and implementing the knowledge building community among primary three students in one of the future school in Singapore. The knowledge building community is reportedly one of the most researched pedagogical models that aims to foster knowledge creation among students. While its pedagogical goals are laudable, its actual implementation is very challenging especially in the Asian school context. This study draws upon the personal experiences of the authors to explicate the challenges one may face in implementing this computer supported collaborative learning models and suggests several possible solutions for the identified contextual challenges.

Keywords: Teacher narrative, knowledge-building community, ICT

1. Introduction

Knowledge creation has been touted as one of the important goals, if not the most important goal, of education among many ministry of education all over the world [1]. To position learning for the purpose of knowledge creation should be in principle a sound pedagogical aim. This is especially true in today society where the creation of new products and services plays a vital role in contributing the economic progress of a nation. However, what forms of pedagogy would enable knowledge creation among learners, especially young learners in primary school, have been a much disputed topic both in the academic and practice arena. Windschitl [11] has pointed out that endeavors to bring forth constructivist oriented teaching and learning, which knowledge creation pedagogy is usually based on, face four dimensions of challenges: conceptual, pedagogical, cultural, and political. The teacher needs to understand what it means to construct knowledge (conceptual), how one can actualize that in the classroom (pedagogical), how would the general public and the parents react towards the new approach (cultural), and how to negotiate a fit between the new approach and existing ministry and school policies (political). In addition, it is almost unimaginable for knowledge creation works to be not supported by information and communication technology (ICT). As Jonassen [5] has pointed out, ICT in general, and the personal computer in particular, is to date the most powerful mindtool that greatly enhances the human cognitive performances. However, the introduction of computer in education is equally problematic. Leggett and Persichitte [6] have articulated five categories of barriers teachers may face when a new form of educational technology is introduced into the classrooms. These include Time, Expertise, Access, Resources, and Support, which together form the acronym TEARS.

With reference to the dimensions of challenges introduce by Windschitl [11] and the barriers articulated by Leggett and Persichitte [6], this study attempts to reflect the experiences we shared in designing and implementing the knowledge building community among two classes of primary three students in a Singaporean school. The explication of the challenges and barriers we face is likely to contribute to help interested educators to be more aware of the possible problem one might face in fostering knowledge creation among young learners. While much have been researched about the knowledge building pedagogy [2], the problems associated with the approach is seldom the focus of published studies except for some brief comments from limited studies associated with teachers' learning in Singapore [3][4]. As this study employs the knowledge building community to foster students' capacity in creating knowledge, the following review is directed toward it.

2. Literature Review

To foster students' capacity in knowledge creation, Bereiter and Scardamalia [2] argue that schools should focus on developing students' "ability to work collaboratively with conceptual artifacts in design mode" (p. 702). They have developed and refined a pedagogical model entitled the knowledge building community with numerous research reported [8-9]. Knowledge building is defined as "the production and continual improvement of ideas of value to a community" (p. 1370) [11]. This notion of knowledge building or knowledge creation is based on Karl Popper [7] proposed epistemic ontology of three worlds. Popper delineates World 1 as the world of physical objects; World 2 as the world inside the human mind; World 3 as consisting of immaterial objects that are products of human thinking. Examples of World 3 objects include theories, explanations and hypotheses created by scientists or art works of various media created by artists. These epistemic/conceptual/cognitive artifacts once created (i.e., articulated and recorded through a World 1 medium) acquire properties of World 1 objects which people can manipulate, study, improve and transform. Working on improving the World 3 epistemic artifact is what Bereiter and Scardamalia [2] refer to as working in design mode. In a knowledge creation environment within the classroom, knowing is treated as the dialectical process whereby the learners traverse between the three worlds to find an ever better fit between the three worlds. Such knowing is reflected by a better grasp of World 1 reflected through the change in World 2 objects (i.e., the conceptions that the learners hold about the phenomenon) and the World 3 objects (i.e., the conceptual artifacts created to represent what the learners understand). Bereiter [1] emphasizes that classroom work should be focused towards World 3 where the knowledge creation work is actually carried out rather than on students' World 2.

The knowledge building community is one of the leading Computer-supported collaborative learning (CSCL) model. It is supported by a CSCL platform, namely the Knowledge Forum™ (KF). The KF is an online multimedia database where students can log on and create posts through writing and drawing. Each post is treated as a World 3 object which contains the student's ideas about what they are studying. Once the post is created, it becomes an idea that is subjected to questioning and critiquing, which lead to idea improvement. Students in knowledge building classrooms create posts; review self and others' posts; compare and develop ideas and organize the ideas into ever more complex structures to address the problems they are studying [10]. These processes are supported by metacognitive and cognitive scaffolds. Generic scaffolds such as "My theory", "I need to understand", "A better theory" and "Putting our knowledge together" prompt the students to perform various cognitive activities so as to work on improving the ideas [9-10].

Past studies of the knowledge building pedagogy are mostly focused on science topics. While there are some attempts to use the approach on social studies topic, few studies have explicated how knowledge building affects students learning of social studies or how students build knowledge about social studies and the problems they encountered.

3. Method

There were 75 primary three students from two classes who participated in this study. Class A comprises high achievers while class B comprises average students. The classes were randomly chosen by the school. The implementation spans across one year. However, the lessons were conducted fortnightly for each class with one hour time span. By the end of the year, 17 lessons were conducted for each class.

The social studies topic the students work on was based on the syllabus requirement as articulated by the school. Specifically, the topic of study was country, in particular Singapore. The two themes that the students are working on were "What is a country?" and "Is Singapore a good country? Why?" These themes were formed based on students' questions. The students were asked to generate questions that they were interested to learn about the topic with some helps from the teacher to link their questions to the intended curriculum without forcing upon them. Subsequently, the students were engaged in inquiry-based learning where they search for information that will help them to answers the questions. The two teachers responded to the students' effort in performing their quest by asking deeper questions, teaching students basic Internet research skills, identifying relevant resources both through reliable Internet resources and books. As the students work on deepening their understanding, the teachers infused knowledge building principles (e.g., improving ideas and collective cognitive responsibilities) [2] at appropriate junctures to help students in reflecting on their learning.

The data collected for the entire study consists of the lesson plans created by the teacher, the video records of the lesson, the post lesson reflection, transcripts of post lessons discussion between researchers and the teacher, the notes posted in KF by the students, and the researchers' reflective notes. For the purpose of this study, the analysis uses mostly the teachers and the researchers' reflections. These data were analyzed qualitatively to surface the problems/barriers the project team encountered. Other forms of data and findings were drawn upon to triangulate the finding of this study when necessary.

4. Findings and Discussion

After the open coding stage, the project team found that Leggett and Persichitte [6] could provide suitable categories to organize the emerging themes. We therefore chose to report the findings using the TEARS as categories and discussed the various dimensions of challenges highlighted by Windchitl [11] within the categories.

As stated earlier, the total implementation *time* for the knowledge building of the primary three social studies lasted about 17 hours. In terms of the curriculum time available for the subject, it is a far cry from the research reports generated from studies based in Toronto Institute of Child Study. The original time table in the school stipulated 30 minutes lesson per week for social studies. To employ 30 minutes timeslot for computer-based learning were assessed as poor use of time by the teachers because the students have to travel to the computer classroom and settle in. It was decided that the teachers to exchange the periods with health education and conduct the lesson fortnightly. While this arrangement resolves the constraint imposed by the time table, it resulted in

long intervals between lessons, which caused difficulties for the students to make a connection between lessons. Reconsideration on curriculum time allocation for social studies has to be undertaken at the school management meeting, and it is a difficult task to ask for more time as department heads of the various subjects (English, Chinese, Mathematics and Science) are unlikely to give their class time. This project team is currently negotiating with the school to extend curriculum time through events such as field trips and after examination enrichment activities. In addition to the lack of curriculum time, the teachers also need time to understand emerging ideas and provide feedback for students to embark on the continuous process of refining ideas. For a class of close to 40 pupils, the teachers reflected that it took about 2-3 hours to make sense of students' emerging understanding and to craft appropriate responses.

In terms of the demand for *expertise*, the knowledge building approach is responsive pedagogy rather than prescriptive, and this inevitably leads to the demand of facilitating skills. For teachers who are new to the approach, responding to students' ideas and staying with the class in terms of their idea development is cognitively and metacognitively demanding. Based on the videos we collected, managing students who are working on different areas of expertise and ideas and resolving students' conflicts within and between groups demanded great flexibility in the teacher. The teachers' struggles reflected the social-cognitive foundations which undergird the knowledge building pedagogy. The epistemic ontology of working with ideas [7] is also something that the teachers were unfamiliar with. We have observed that the teachers are concerned about getting some learning artifacts or products created at the end of the lesson. This reflects the strong mindset among teachers in school of being product oriented rather than focusing on the learning processes. In addition, the teachers were uncomfortable with the diversity of ideas which may or may not be linked to the curriculum. For example, students asked questions about how people are born and why people die, and other questions that are pertaining to science rather than social studies. These questions have to be subtly directed back to the main theme of inquiry without dampening students' interest and therefore their epistemic agency.

For the next three barriers pertaining to *access, resources,* and *support*, the teachers experienced lesser difficulties. With regards to *access*, it is the least of a problem as the teachers were always able to book for the computer laboratory. Being a future school, all participating students were also issued with a smartphone. However, as KF is created for web browsers and uses pop-up technology, it is confusing to access KF through the smartphones. The teachers tried it and experience substantial difficulties. Perhaps because of this problem, the students seldom access the database beyond the class time. In other words, while there was no major access problem, easy access was still an issue in more subtle form.

The required *resources* for this project were not overwhelming. Mostly, the teachers needed more print-based materials to veer the students away from exclusively relying on Internet-based information. However, suitable print-based materials that are within the reach of students' reading ability were scarce. The students quickly comprehend their textbook content, but that was insufficient for their quest. The internet-based materials, mostly lifted from Wikipedia, were also beyond students' reading ability. This resulted in students lifting quite a fair bit of materials that they did not understand.

The most important *support* needed for this project is that of manpower. Currently, two teachers were present in a class supported by a technical assistant who helped in resolving technical issue that the teachers and students faced. At times, the teachers were still unable to attend to all the students' needs. Students frequently forgot their passwords and required the teachers or the technical assistant to reset their password. When they encountered problems either in the technical aspects or the cognitive aspects, the teachers

felt that they could not respond promptly. For the weaker class, this had usually resulted in students engaging in off task behaviors. The project team is acutely aware that, without the additional support provided as part of the research project, the support structure may not be available to assist the teachers. Possible solutions to the problems include preparing hard copies of navigational guide for students and improving the software by including auto-reset function to address the password issue.

5. Conclusion

This paper has documented the various challenges that the knowledge building approaches brought forth when it is employed in two grade three Singapore classes for social studies. While the barriers are not insurmountable, much pedagogical arrangements need to be created to actualize its potential. The researchers and the teachers are currently creating the pedagogical knowledge necessary to foster generative knowledge building community.

Acknowledgements

References

[1] Bereiter, C. (2002). *Education and mind in the knowledge age.* Mahwah, NJ: Lawrence Erlbaum.

[2] Bereiter, C. & Scardamalia, M. (2006). Education for the knowledge age: design-centered models of teaching and instruction. In P. A. Alexander & P. H. Winne (Eds.). *Handbook of Educational Psychology* (pp. 695-713). Mahwah, NJ: Lawrence Erlbaum Associates.

[3] Chai, C. S. & Merry, R. (2006). Teachers' perceptions of teaching and learning in a Knowledge Building Community: An exploratory case study. *Learning, Media & Technology, 31*(2), 133-148.

[4] Chai, C. S. & Tan, C. S. (2009). Professional development of teachers for computer-supported collaborative learning through knowledge-building. *Teacher College Records.* 111(5), 1296-1327.

[5] Jonassen, D. (2006). *Modeling with technology: Mindtools for conceptual change.* (3rd ed). Upper Saddle River, NJ: Prentice Hall.

[6] Leggett, W. P., & Persichitte, K.A. (1998). Blood, sweat, and tears: 50years of technology implementation obstacle. *Techtrends, 33* (Apr/May), 33-36.

[7] Popper, K. (1978, April 7). *Three worlds.* Retrieved from: http://www.tannerlectures.utah.edu/lectures/documents/popper80.pdf

[8] Scardamalia, M. (2002). Collective cognitive responsibility for the advancement of knowledge. In B. Smith (Ed.), *Liberal education in a knowledge society* (pp. 67-98). Chicago: Open Court.

[9] Scardamalia, M. & Bereiter, C. (2003). Knowledge Building. In *Encyclopedia of Education, Second Edition.* New York: Macmillan Reference, USA.

[10] Scardamalia, M., & Bereiter, C. (2006). Knowledge building: Theory, pedagogy, and technology. In K. Sawyer (Ed.), *The Cambridge Handbook of the Learning Sciences* (pp. 97-115). New York, NY: Cambridge University Press.

[11] Windschitl, M. (2002). Framing constructivism in practice as the negotiation of dilemmas: An analysis of the conceptual, pedagogical, cultural, and political challenges facing teachers. *Review of Educational Research, 72*(2), 131-175.