Support by Educators for Knowledge Building in an Organic Social Networking Environment

David James Woo, Faculty of Education, The University of Hong Kong, wootangnd@yahoo.com

Abstract: This paper analyzes educators supporting knowledge building in an organic, non-prescriptive computer-supported social network. Community activity in the social network is examined, as is the community's discourse to determine how members support knowledge building. The findings suggest that while there was prolific activity on the social network, it was confined to the early stages of the community's life, located in the discussion forum feature and largely generated by a core group of members. The discussion forum, the asynchronous communication channels and the informal nature of the community were considered affordances to knowledge building by educators on the social network. The informal nature of the community could be responsible for the community's centralization and a hindrance to supporting inactive members.

Introduction

This paper attempts to address a gap in the knowledge building literature by analyzing knowledge building (KB) by educators in an organic, informal computer-supported social network. In the present study, informal refers to the non-prescriptive, non-compulsory nature of membership and activity on the network. This study aims to address the research question, "How do educators in an organic, non-prescriptive computer-supported social network support KB?" In addition, this study is interested in obtaining insight into specific practices for the improving of computer supported collaborative learning (CSCL) design of a social networking platform for KB. An informal learning community's discourse in a social networking environment will be analyzed to determine who produced knowledge, where it was produced, when it was produced and which knowledge was advanced. The paper concludes with discussion on challenges and issues to effective KB within the context of informal professional development in a social networking environment.

Knowledge Building

KB can be seen as a social response which organizations can adopt to cope with a fundamental shift in society from knowledge learning to knowledge creation. Scardamalia (2002) has proposed 12 socio-cognitive and technological determinants of KB, and later, six themes of KB (Scardamalia & Bereiter, 2006), both of which, in sum, set apart KB from other pedagogical approaches such as constructivism, active learning and collaborative learning. Per the 12 determinants and six themes, KB can be understood as a means by which to improve knowledge collectively, moving beyond an authoritative, best practice paradigm, by advancing a diversity of *good* ideas put forth by empowered individuals who are accountable to themselves, to their communities, and to the greater society. In general, KB is not about hegemony -- who is right and who is wrong -- but about respect and equity in the generation of ideas, so as to foster a common understanding.

In the main, there is a lack of KB in schools, not least because there has not been a coherent effort to develop one in educational contexts. On the basis of those studies about KB in education which were reviewed for this current study, the extent to which KB has been developed in educational contexts can be seen. Students, young ones, high-achievers and low-achievers, have been studied to see how KB can improve their academic performance (Tse & Lee, 2006; Chan & Lee, 2007; So et al., 2010); and in a comparative cultural study, KB has been implemented in classrooms to determine its effects on Chinese students (Chan, 2010), as well as on Norwegian students (Rysjedal & Wasson, 2005). Teacher communities have been studied to understand how teachers interact in knowledge-building and non-KB tasks (Tan et al., 2008), how they work together to sustain KB (Hong, et al., 2009) and teachers' points of view on KB (Hong, et al., 2010). The development of learning communities by students and teachers' utilizing information and communication technology (ICT) have also been researched (Van Aalst & Chan, 2001; Yuen, 2003). Almost all research on KB in schools has tended to be contrived, and prescriptive, however: teachers and students involved in these studies (Van Aalst & Chan, 2001; Yuen, 2003; Rysjedal & Wasson, 2005; Tse & Lee, 2006; Chan & Lee, 2007; Tan, et al., 2008; Hong, et al. 2009; Chan, 2010; Hong, et al. 2010; So et al., 2010) were required to attempt KB as part of a formal curriculum. With respect to the type of CSCL environment employed for the KB exercise, if any, the Knowledge Forum (KF) is the preeminent CSCL platform mentioned in the literature (Van Aalst & Chan, 2001; Scardamalia, 2002; Yuen, 2003; Rysjedal & Wasson, 2005; Scardamalia & Bereiter, 2006; Tse & Lee, 2006; Chan & Lee, 2007; Tan, et al., 2008; Hong, et al., 2009; Chan, 2010; Hong, et al. 2010; So et al., 2010).

A gap in the KB literature exists at the informal level of professional development. This author has not found a study on what teachers and other school stakeholders do to build knowledge in their informal learning communities outside the confines of their formal, prescriptive duties, and opportunities, despite the likelihood

that this modality may benefit these educators by providing coaching, support and reflective practice, all of which they may lack in their institutions (So et al., 2010) and all of which are vital to establishing a collaborative culture through which KB can thrive (Chan & Lee, 2007). These informal educator communities can serve an important role in delivering KB skills to educators through self-practice because, "One way to help teachers to develop a deeper conceptual understanding of teaching as a process of knowledge-building may be to engage them in the actual 'knowledge-building' practice" (Hargreaves, 1999; Hong & Sullivan, 2009; as cited in Hong, et al., 2010, pp.1). Their potential to transform continuous professional development through KB requires greater attention in the literature.

Another gap in the literature is found at the choice of CSCL environment used for KB studies. The preponderance of KB studies which utilize the KF (Van Aalst & Chan, 2001; Scardamalia, 2002; Yuen, 2003; Scardamalia & Bereiter, 2006; Chan & Lee, 2007; Tan, et al., 2008; Hong, et al., 2009; Chan, 2010; Hong, et al. 2010; So et al., 2010) may suggest that, in addition to KF being an effective CSCL vessel in which to contain KB, the KF may be the only CSCL environment in which KB can be performed. Despite some literature on wikis (Harrer et al., 2008; Moskaliuk et al., 2008) as a viable KB support, the prevailing narrow scope of CSCL environments in KB limits understanding of how technological constraints endemic to KF affect KB and more generally, how different CSCL environments provide affordances and hindrances to more effective KB.

The Informal Educator Community

The community in the present study comprises 123 members representing 29 organizations from four countries, 26 of those organizations being schools. 23 subject areas were represented. Approximately 45% (n=55) of the community members identified themselves as primarily teachers, 24% (n=29) department heads or coordinators, 15% (n=18) administrators, 11% (n=13) support staff (e.g. librarians; programmers; technicians; therapists; advisers; consultants; and facilitators), and 7% (n=8) other (e.g. unidentified; students; and professors).

The community is founded on a common goal of preparing for a technological and pedagogical innovation. Community membership is voluntary, as is participation in the community. In addition, a high level of *epistemic agency* is given to community members. Each member can freely produce content such that the member exerts significant control over the components of the community's KB effort.

Knowledge Building in the Organic Social Networking Environment

This section describes how educators supported KB on the social network. It reports where knowledge was produced, when it was produced, who produced it, and which knowledge was advanced by analyzing social network activity between users, and between features and within features, and by examining the discourse produced by the activity.

Instances of new activity were calculated for the five main features of the social network (i.e. discussion; groups; events; videos and photos) and several patterns emerged from the data. In the main, text-based modalities were used most frequently by community members: the discussion forum had the most instances of activity (n=204), and while the photos feature was the recipient of the second-most number of instances of activity (n=53), that content was produced by only one community member on a single day. There was a significant difference in the number of activity instances between the most frequently used feature and the second-most frequently used feature (n=151), indicating that, by far, members preferred to communicate on the community discussion forum.

Another pattern to emerge from analyzing the social network activity by feature was the diminishing instances of activity by time. Overall, the activity level in the social network was the highest in the first few months of the community, and then began dropping sharply. Following the initial flurry of activity on the social network, there were relatively few spikes in activity for any feature.

The community's discussion forum was investigated in-depth because it was the focal point for members' participation. 38 threads were counted, with an average of 5 replies (n=4.66) per thread. The median number of replies per thread was 2, and the mode number of replies per thread was 0. 34% of threads (n=13) had received at least 5 replies. The average number of words per post was 117 (n=116.97).

The average number of unique posters per thread was approximately 3. 18% of threads (n=7) had at least 5 unique posters. 29% of community members (n=36) contributed at least one post to the discussion forum. When participation is presented by members' roles, 25% of teachers (n=14), 34% of department heads and coordinators (n=10), 39% of administrators (n=7), 31% of support staff (n=4) and 13% of other members (n=1) contributed.

yEd software was used to visualize discussion forum user activity (see Figure 1) in terms of user centrality. The most connected member of the network serving as the baseline (that is, the member who has been in contact with the most other members of the network by participating in the discussion forum), only one member achieved at least 50% of that baseline member's centrality, with 49% of active members (n=17) achieving at least 25% of that baseline member's centrality. Of all the central members, 50% (n=9) identified themselves primarily as teachers, 33% (n=6) as heads or coordinators, and 17% (n=3) as support staff.

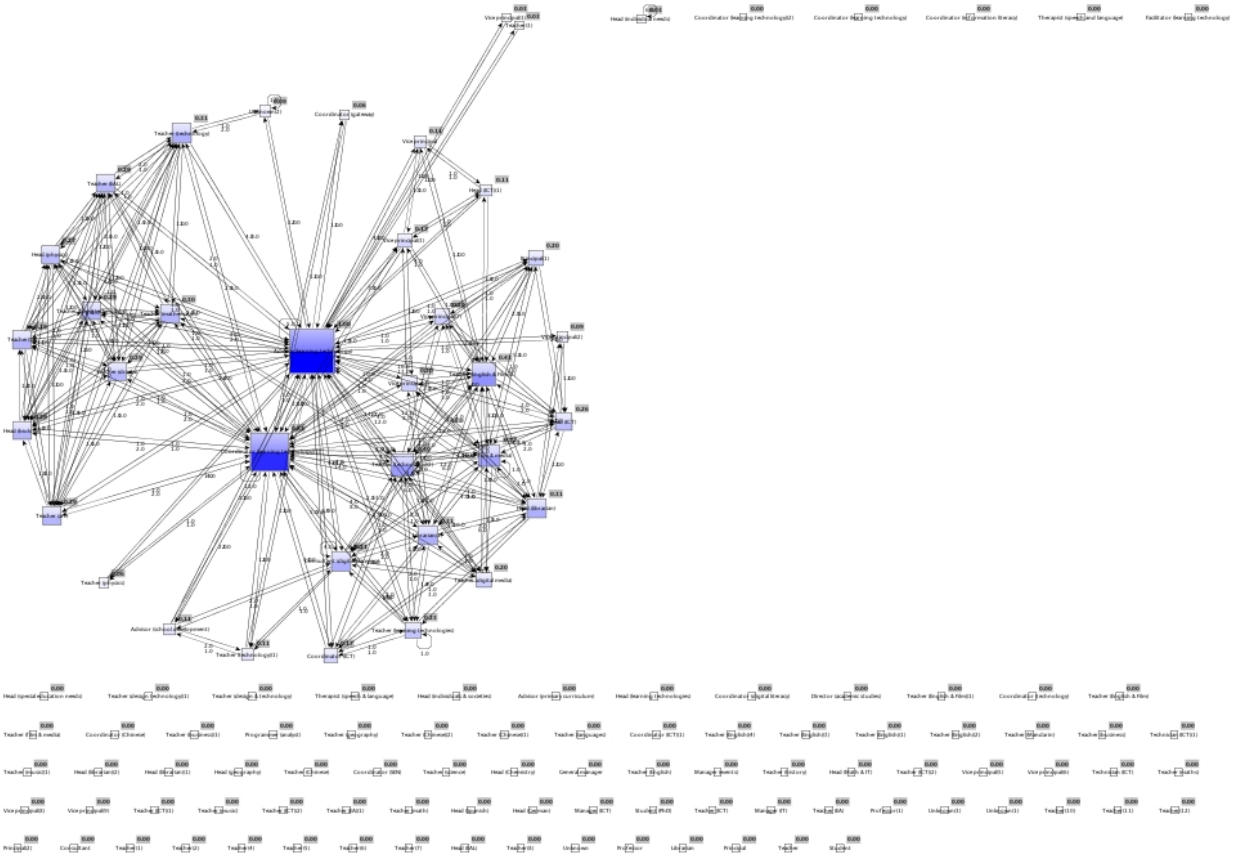

Figure 1. Visualization of Member Activity with Member Centrality Measures.

Table 1: Coding of posts according to knowledge building themes.

Discussion Topic (n=total number of posts) / Knowledge Building Themes	1 (n=31)	2 (n=8)	3 (n=6)	4 (n=8)	5 (n=14)	6 (n=7)	7 (n=20)	8 (n=17)	Total Instances of Theme
Knowledge advancement as a community rather than individual achievement	15	6	3	3	11	5	13	15	71
Knowledge advancement as idea improvement rather than progress toward true or warranted belief	13	7	3	2	11	5	13	14	68
Knowledge of in contrast to knowledge about	17	4	3	4	7	4	11	11	61
Discourse as collaborative problem solving rather than as argumentation	15	6	2	3	6	6	14	12	64
Constructive use of authoritative information	16	4	2	3	8	3	10	5	51
Understanding as emergent	17	7	3	2	11	6	16	13	75

The discussions which demonstrated longevity and prolificacy (n=8) were further analyzed for KB to shed light on the quality of the knowledge being built in the social network. Each post was coded according to the six KB themes that were enumerated by Scardamalia and Bereiter (2006) and that signify membership in a KB community. (See Table 1.) A post could be coded under more than one theme, or it could be unclassified according to the Scardamalia framework since the post was not an occurance of KB.

Several observations about KB could be made about the eight discussions. In the main, there was substantial KB for each topic as posts within those topics could be subsumed under the KB themes. Posters were less concerned about authority and individual accuracy and more concerned about furthering cooperation between members. For example, a lengthy discussion on Internet safety resulted in such a contribution as:

> Looks like we all seem to be moving in a similar sort of direction with this. I've said before on another forum that we are really addressing issues of digital citizenship and is the phrase that I think best describes this whole area of interaction. You rightly address the point that...I'd really be happy to work with you on this to be honest so that we can develop some materials together...Maybe we could do some inter school activity?

Discussion

This paper examined how educators support KB on a social network within the context of an informal professional development community. It determined that while there was significant activity on the network, it was confined to the early stages of the community's life, located in the discussion forum feature and largely generated by a core group of members assuming a wide range of roles in their schools. Nonetheless, KB was observed within the discourse. In sum, there was uneven support for KB in terms of member participation per feature and over time.

The findings help to explain the affordances of KB on this type of social network. That the discussion forum was the primary medium for KB supports Van Aalast and Chan's (2001) finding that online discussion was a catalyst for community building and may contradict Scardamalia and Bereiter's (2006) assertion that discussion boards overall were not as conducive towards KB as the KF was. In this case, the community members preferred the discussion board feature to the videos, photos, groups and events features on the social network in creating and sustaining KB activity. It may be crucial to provide text-based modalities for KB in computer-supported collaborative learning environments. More research is needed into the effects of ICT multiple modalities on KB.

That several discussions received posts over the course of years suggests that there is a particular KB affordance of a semi-permanent, asynchronous communication channel used in conjunction with the informal nature of the educator community. In essence, the KB task does not have to *end*. In fact, it appears that providing semi-permanent storage of information along with relatively free exit and entry into the community can perpetuate KB on a social network so long as members desire to cooperate in advancing knowledge. Therefore, given that the discourse in a thread can last years, an important consideration is to notify all members when new information is added to the network. Furthermore, the context of this study supports Scardamalia and Bereiter's (2006) argument that prescriptive rules and procedures may facilitate KB but they do not necessarily foster quality, whereas a more general set of principles allows flexibility in knowledge development and seems to improve knowledge quality. The discourse on the social network lacked explicit rules yet there was vibrancy in several of the discussions.

The informal nature of the community and the social network features created a centralized community. Although many people joined the community, only several of them contributed actively, if at all, to KB tasks. Per Van Aalast and Chan's (2001) finding, there was not a single community in the sense that all members on the social network contributed to the KB; many on the social network signed up and never generated any content on their own; but those that did tended to do so prolifically and enthusiastically, resembling in their coherent roles what Scardamalia (2002) deemed an *expert team* of competent workers who assume a wide range of roles in their schools and who not only know their individual roles well but also know those of their peers insofar as by their cooperation, the team can overcome myriad challenges and complications. Within an informal community on a social network, a product of successful KB could be the emergence of an expert team. Likewise, without the contributions of these core, centralized members, the social network would be in want of activity.

That the majority of community members did not contribute warrants further exploration. Van Aalast and Chan (2001), Scardamalia (2002) and Hong (2010) have put forth findings on cognitive barriers to successful KB, which include differing, if not obstructive expectations and understandings of KB discourse amongst members. The informality of the community may not have been conducive towards providing measured and appropriate assistance to members who wanted to contribute significantly to the discourse but did not know how. In the main, more investigation is needed to determine whether those explanations fit the circumstances of those educators in this study that did not contribute at all to the activity on the social network.

References

Chan, C. K. K., & Lee, E. Y. C. (2007). *Fostering knowledge building using concurrent, embedded and transformative assessment for high-and low-achieving students*. Paper presented at the Proceedings of the 8th international conference on Computer supported collaborative learning, New Brunswick, New Jersey, USA.

Chan, C. K. K. (2010). Classroom Innovation for the Chinese Learner: Transcending Dichotomies and Transforming Pedagogy. In C. K. K. Chan & N. Rao (Eds.), *Revisiting The Chinese Learner* (Vol. 25, pp. 169-210): Springer Netherlands.

Harrer, A., Moskaliuk, J., Kimmerle, J., & Cress, U. (2008). *Visualizing wiki-supported knowledge building: co-evolution of individual and collective knowledge*. Paper presented at the Proceedings of the 4th International Symposium on Wikis, Porto, Portugal.

Hong, H.-Y., Zhang, J., Teo, C., & Scardamalia, M. (2009). *Towards design-based knowledge-building practices in teaching*. Paper presented at the Proceedings of the 9th international conference on Computer supported collaborative learning - Volume 1, Rhodes, Greece.

Hong, H.-Y., Chen, F.-C., Chai, C. S., & Chan, W.-C. (2010). *Teacher-education students' views about knowledge building theory and practice*. Paper presented at the Proceedings of the 9th International Conference of the Learning Sciences - Volume 1, Chicago, Illinois.

Moskaliuk, J., Kimmerle, J., & Cress, U. (2008). *Learning and knowledge building with wikis: the impact of incongruity between people's knowledge and a wiki's information*. Paper presented at the Proceedings of the 8th international conference on International conference for the learning sciences - Volume 2, Utrecht, The Netherlands.

Rysjedal, K., & Wasson, B. (2005). *Local and distributed interaction in a collaborative knowledge building scenario*. Paper presented at the Proceedings of th 2005 conference on Computer support for collaborative learning: learning 2005: the next 10 years!, Taipei, Taiwan.

Scardamalia, M. (2002). Collective Cognitive Responsibility for the Advancement of Knowledge. In B. Smith & C. Bereiter (Eds.), *Liberal education in a knowledge society*. Chicago, Ill.: Open Court.

Scardamalia, M., & Bereiter, C. (2006). Knowledge Building: Theory, Pedagogy, and Technology. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (pp. 97-118). Cambridge ; New York: Cambridge University Press.

So, H.-J., Seah, L. H., & Toh-Heng, H. L. (2010). Designing collaborative knowledge building environments accessible to all learners: Impacts and design challenges. *Comput. Educ., 54*(2), 479-490. doi: http://dx.doi.org/10.1016/j.compedu.2009.08.031

Tan, J., Chai, C. S., & Hong, H.-Y. (2008). *The Analysis of Small Group Knowledge Building Effort amongTeachers Using an Interaction Analysis Model.* Paper presented at the 16th International Conference on Computers in Education, National Central University, Taipei, Taiwan.

Tse, W. C. A., Lee, F. L., & Ou, Y. (2006). *The Effectiveness of Knowledge Building through Computer Supported Collaborative Learning among Elementary Students: A Case Study*. Paper presented at the Proceeding of the 2006 conference on Learning by Effective Utilization of Technologies: Facilitating Intercultural Understanding.

Van Aalst, J., & Chan, C.K.K. (2001, March). *Beyond "sitting next to each other": A design experiment on knowledge building in teacher education.* In P. Dillenbourg, A Eurelings, and K. Hakkarainen (Eds.), *European perspectives on computer-supported collaborative learning: Proceedings of the first European conference on computer-supported collaborative learning* (pp. 20-28). Maastricht: University of Maastricht.

Yuen, A. (2003). Fostering Learning Communities in Classrooms: A Case Study of Hong Kong Schools. *Educational Media International, 40*(1), 153 - 162.