Networks in Small-Group and Whole-class Structures in Large Knowledge Building Communities

Xueqi Feng, The University of Hong Kong, fengxueqi@hotmail.com
Jan van Aalst, The University of Hong Kong, vanaalst@hku.hk
Carol K.K. Chan, The University of Hong Kong, ckkchan@hku.hk
Yuqin Yang, Central China Normal University, yuqinyang0904@gmail.com

Abstract: This study compared small-group and whole-class structures in two large knowledge building communities. We analyzed students' online notes on Knowledge Forum by KBDex (Oshima, Oshima, & Matsuzawa, 2012). Results found that students in the small-group structure showed better community knowledge advancement. However, the unbalanced distribution of expertise in the small-group class was also observed.

Introduction

Knowledge building is a community-oriented approach emphasizing knowledge creation (Scardamalia, 2002). Research on collaborative knowledge building showed that small-group practices could contribute productive community-level interaction (Resendes, Scardamalia, Bereiter, Chen, & Halewood, 2015; Yang, van Aalst, Chan, & Tian, 2016). The small-group social configuration within a community is an attractive option for my research program, which aims to investigate knowledge building in large community with more than 50 students. To this end, we used KBDex to compare the advancement of community knowledge between the two social configurations, and to visualize different groups' contributions to the community knowledge.

Method

This study was carried out in two Grade Four classrooms from a primary school in Mainland China, with 54 students in Class A and 53 in Class B. The two classes investigated the topic of *Force & Motion* with the support of KF for about 9 weeks. In Class A, students discussed face-to-face in groups before the whole community online interaction. As a comparison, Class B conducted Knowledge Forum (KF) activities without such group discussions. 463 online notes from Class A and 356 from Class B were collected on KF.

Data analysis and findings

We first compared the advancement of collective knowledge between two classes through visual inspection of semantic relationships from KBDex. We selected three different phases (five notes created, 200 notes created and the final one created) of the word network to trace students' online activities in these two classes. Figure 1 shows that in the beginning of the discussion, words were less concentrated as three separate parts in Class A. However, due to constantly combination, all the words were combined in the end. Conversely, Class B shows a trend of decentration. Overall, students in Class A spontaneously formed cross-group interactions that facilitate community knowledge.

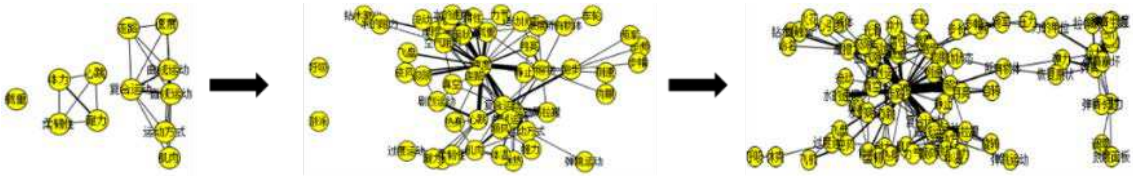

Figure 1. Snapshots of the network of word through time (Class A).

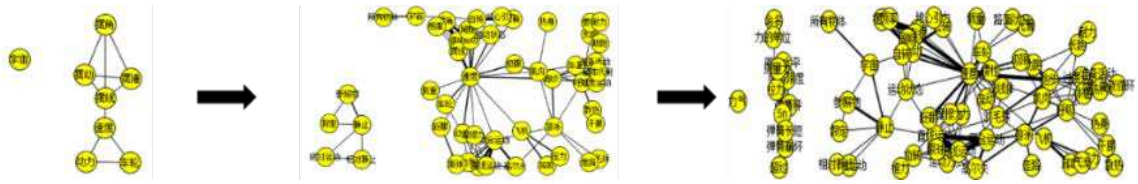

Figure 2. Snapshots of the network of word through time (Class B).

To explore different contributions within groups of the better knowledge advancement class (Class A), we compared groups' word networks through KBDex. We chose three groups according to the number of key words they used: low/ medium/ high active groups. Then we compared their word networks through KBDex. In Figure 3, all the balls represent key words of the whole community, while red ones indicate which words were used by the selected groups. Results illustrates unbalanced distribution of expertise: (1) different groups focused on different areas; (2) high active groups could focus on the center of the whole community, as well as marginalized areas; (3) even the low active group can also rise bridging words, such as stride and frequency of walking; (4) even the high active group could not cover all the key words of the community; (5) large learning gaps existed among all the three-level groups.

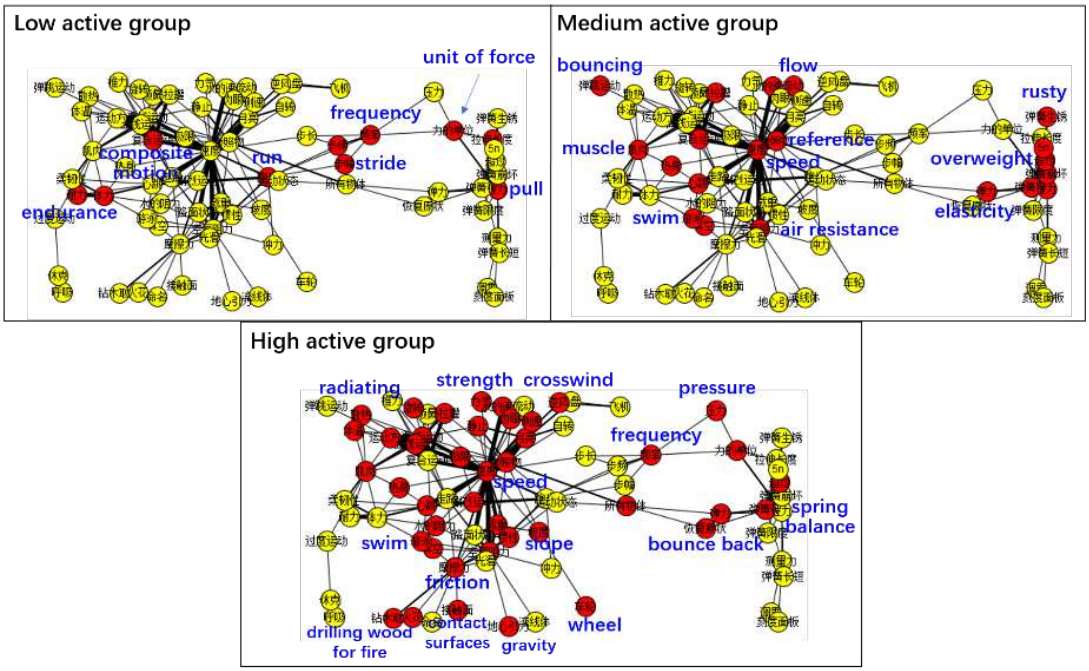

Figure 3. Social network of words in low/medium/high active groups.

Conclusions

By analyzing students' word networks of the two social configurations, we can see that the small-group class showed higher socio-dynamics of community knowledge advancement. However, groups in the small-group class showed different degree of contribution to the whole community. Substantial future work is needed to explore new tools to visualize the comparation of contributions among groups as well as the comparation of groups with the whole community. Furthermore, future instructional design should focus on deeper cross-group interactions to achieve the transformation from group knowledge to community knowledge.

References

Oshima, J., Oshima, R., & Matsuzawa, Y. (2012). Knowledge Building Discourse Explorer: a social network analysis application for knowledge building discourse. *Educational technology research and development, 60*(5), 903-921.

Resendes, M., Scardamalia, M., Bereiter, C., Chen, B., & Halewood, C. (2015). Group-level formative feedback and metadiscourse. *International Journal of Computer-Supported Collaborative Learning, 10*(3), 309-336.

Scardamalia, M. (2002). Collective cognitive responsibility for the advancement of knowledge. *Liberal education in a knowledge society, 97*, 67-98.

Yang, Y., van Aalst, J., Chan, C. K., & Tian, W. (2016). Reflective assessment in knowledge building by students with low academic achievement. *International Journal of Computer-Supported Collaborative Learning, 11*(3), 281-311.