

Towards a Model for Rapid Collaborative Knowledge Improvement in Classroom Language Learning

Yun Wen, Chee-Kit Looi, Wenli Chen, Learning Sciences Lab, National Institute of Education,
Nanyang Technological University, 1 Nanyang Walk, Singapore 637616
Email: yun.wen@nie.edu.sg, cheekit.looi@nie.edu.sg, wenli.chen@nie.edu.sg

Abstract: The concept of Rapid Collaborative Knowledge Improvement (RCKI) refers to quick cycles of knowledge improvement in the short duration of a classroom lesson. We explore the role of RCKI in language learning in our school-based design research by working with teachers to co-design and enact lessons in classrooms. We design a model, called the *Funnel Model*, to provide a scaffolding structure to enable RCKI practices in the context of reading comprehension. Starting with a stage of individual brainstorming, the model leads to stages of intra-group and inter-group knowledge improvement. The design and implementation of three cycles of RCKI activities in GroupScribbles (GS) supported classroom environment are provided to illuminate the flexibility and diverse uses of the model.

Introduction

Rapid Collaborative Knowledge Improvement (RCKI) refers to the notion of democratizing participation and idea refinement in the context of live dynamic classroom settings, that is, face-to-face collaborative knowledge construction and improvement over the duration of a class session, and supported by certain technologies for lightweight instant interaction (Looi, Chen, & Patton, 2010). When enacted in the classroom, RCKI takes the form of alternative ways to promote classroom interactions that enable students to co-construct knowledge and learn content skills. It is designed to address the constraints faced by classroom teachers when they are designing and implementing knowledge construction and improvement practices within the short duration of a classroom lesson ranging from say half an hour to one and a half hours. The notion of “rapid” is understood from 3 main aspects of a learning activity: 1) it is done within a limited time of participation; 2) it uses a lightweight form of expression; 3) it must enable the participants to have quick cycles of interaction. RCKI focuses on democratic knowledge sharing as well as cycles of individual and group knowledge enhancement. Like the Knowledge Building (KB) process of Scardamalia and Bereiter (1996), it seeks to initiate students into a knowledge creating culture (Scardamalia & Bereiter, 2006). Yet having quick cycles of knowledge construction distinguishes it from KB which connotes the process of idea improvement over a protracted or extended period of time.

In our work, we have explored the use of RCKI in second language (L2) learning classrooms (specifically the Chinese language). The concept of RCKI seems suitable for guiding language learning, especially L2 learning. L2 teachers typically handle the low proficiency of students in the target language by focusing primarily on vocabulary and grammar, and hence approaches like ideas generation and expression are seldom brought to the fore (Scott, 1996; Stapa & Majid, 2009). When cognitive load is not just expended on language expression, the enthusiasm and capacity of L2 learners to engage in reading and writing in on-line based interaction could be enhanced (Wen, Chen, & Looi, 2010). Rather than being interpreted as internal mental process solely by the individuals, the process of L2 is viewed as a semiotic process attributable to participation in social activities (Block, 2003; Lantolf, 2000; Lantolf & Thorne, 2006). Interaction, which has long been considered important in language learning, is not just a device that facilitates learners’ movement along the reconstructing continuum, but a social event which helps learners participate in their own development, including shaping the path it follows (Ellis, 1999). The paradigm shift in language learning from traditional psycholinguistic perspective to sociocultural perspective is a prerequisite for success of RCKI in L2 learning.

Besides, in exploring L2 learning, we have to go beyond classic instructional design approaches in which the learning content is rather systematically determined and pre-structured, and the learner activity is predefined to follow specific, uniform sequences (Lakkala, 2007). It is argued that collaborative practices, or its related learning practices that are underpinned by the socio-cultural paradigm, cannot (should not) be fully designed in advance, as the processes and outcomes emerging in a collaborative learning setting are (and should be) strongly shaped by the joint activity and interaction of the participants themselves (Lakkala, 2007). However, this does not mean totally free, unguided or instructed collaboration can guarantee productive activity or learning (Kreijns, Kischner & Jochems, 2003). In these years, there is a growing amount of research on exploring some form of additional structuring to facilitate collaborative learning and interaction (Dillenbourg & Fisher, 2007). The best known is the notion of collaborative scripts that is proposed by Dillenbourg (2002, 2004) as a compromise between the constraints of classic instructional design and the flexibility needed in collaborative learning. Instead of providing scripting, we propose a collaboration model as a general visual

scaffold for RCKI. We hope it can provide an intuitive grasp of RCKI for teacher facilitators and student learners, especially for beginners. The model is called *Funnel Model* which makes tangible the stages of knowledge improvement. In this paper, the funnel model for realizing RCKI is discussed in the context of Chinese as L2 learning. Three cycles of activity design centred on the theme of reading comprehension were designed and implemented over three weeks. We hope that this practical example can illuminate the flexibility and diverse uses of the model for language teaching and learning in a classroom setting.

What Funnel Model Entails

Instead of collaboration scripts that generally provide a detailed set of guidelines, rules and structured tools for describing how the group members should interact, we attempt to make use of a concrete model constrain the interaction processes so that RCKI can happen. We coin it as “Funnel Model” from its structural conical shape (See Fig.1). Underlying the concept of RCKI, the funnel model provides a tangible structure for one operational collaborative activity design beginning with brainstorming and a structured process of consistent knowledge improvement. The design entails 3 stages: from the wide to the narrow: “*brainstorm*”, “*rise above*”, and “*advance*”. By respecting and encouraging cognitive diversity, the first stage encourages the creation of diverse ideas. The subsequent stages tap on this diversity to seek synergy of ideas, and a stage of convergence and consensus seeking leading to knowledge convergence (Fisher & Mandl, 2005) and advancement.

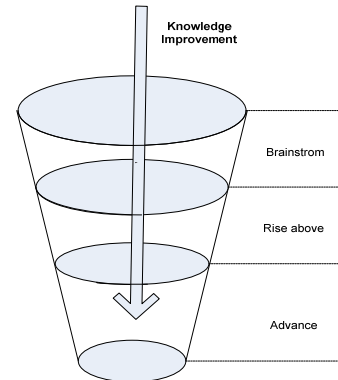


Figure 1. Funnel Model.

GroupScribbles as a Technology for RCKI

In the work reported here, we implemented the funnel model using a collaborative software called GroupScribbles (GS). GS is a software platform designed for supporting generalized coordination among students and the instructor, and it enhances the affordances of sticky paper notes by providing a digital version of it while avoiding some of their physical constraints (DiGiano, Tatar, & Kireyev, 2006). Its specific affordances could enable RCKI practices in a succinct way.



Figure 2. A screenshot of the public board (upper) and private board (bottom).

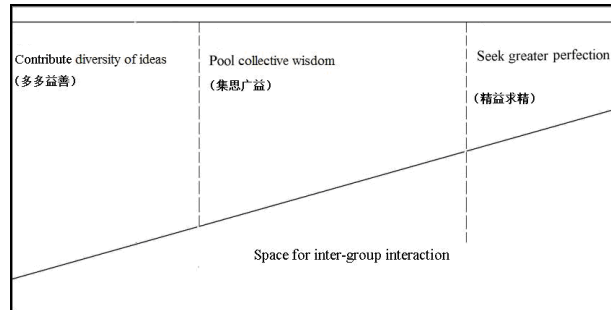


Figure 3. A funnel model template for supporting GS-based activity on reading comprehension.

Figure 2 displays the user interface of GS with a two-paned window. The lower pane is the user's personal work area, or "private board", with a virtual pad of fresh "scribble sheets" on which the user can draw or type. Scribble sheets are the digital equivalent of small sticky notes that enable a “lightweight” scribbling to be made on the note. Once a student completes a note and moves it into the group boards or “public board”, other students in the same public board can see the posting simultaneously. A student can select any group board by clicking the board number on the right-top, and browse all other groups’ postings on their individual public board. GS hence promotes and facilitates both intra-group and inter-group interactions.

Figure 3 shows a template representing the funnel model to facilitate GS-based reading comprehension. A group board of GS is divided into 4 major areas by the template, of which the main body is consisted by 3 parts. From the left to the right, “*Contribute diversity of ideas*”, “*Pool collective wisdom*”, “*Seek greater perfection*” are the stages as advocated by the funnel model. The bottom space is made available for inter-group interaction, where the students from other groups are encouraged to provide their feedback after visiting this group board.

Experience with the Funnel Model

The design of the funnel model lessons and their enactment is in the context of language classes in a secondary school in Singapore. The school provides a technology-rich environment for students. Each student is equipped

with a laptop (Apple Macbook). The teachers with whom we collaborated with in this school have some familiarity with the role of technologies in education. In the work reported here, we collaborated with a Chinese language teacher Ms H. who holds a strong belief that traditional didactical teaching approach of the Chinese language, that is dampening students’ enthusiasm and motivation, is in urgent need of reform.

We first provided training for the teacher to learn how to use GS. We conducted a series of professional development sessions with her in which we introduced the notion of RCKI and some of its design principles (Looi, Chen & Patton, 2010). In doing co-design of the lessons, we realized that the teacher requires strong scaffolding for guiding them to do concrete lesson design and enactment. We also realized that this scaffolding support will also help students to better understand the teacher’s lesson design objectives. As a consequence, the embryo of the funnel model template was conceived when we co-designed Chinese lessons with Ms H.

Figure 4 depicts the process of our research design. The funnel model as a collaboration model embodies some of the design principles of RCKI, and provides a guide to concrete activity design. Based on the model, we have had several cycles of activity design, implementation, evaluation and re-design. From July to September 2010, we completed these 3 cycles of activity design. During this process, a total of 5 GS Chinese lessons around the theme of reading comprehension (each lesson lasting 110 minutes) was conducted. The Chinese language in Singapore is taught as a L2, of which reading comprehension has always been a key focus. Adopting the design research process, lesson activities were re-designed in each new cycle by considering how to address the problems that emerged in the current design. In going through this process, the teacher facilitators and the students developed a better understanding of the abstract concept and principles in RCKI, helping the teacher to iteratively improve her pedagogical innovation.

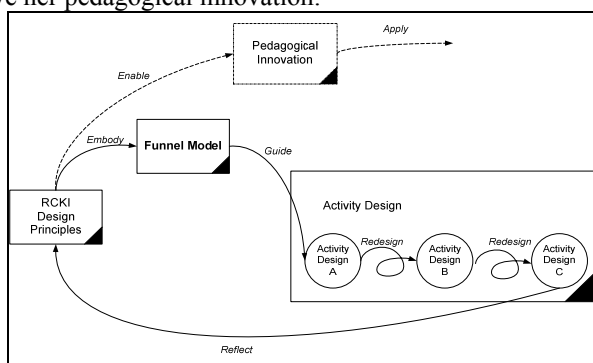


Figure 4. Framework of Our Research Process.

Table 1: Reading comprehension activities designed based on Funnel Model.

Sequences Cycles of activity design	Step 1: Seek diversity of ideas	Step 2: Pool collective wisdom	Step 3: Inter-group visiting	Step 4: Seek greater perfection	Step 5: Group presentation
Cycle 1: Activity A: co-answering questions (lesson 1 & 2)	Brainstorm answers for the guiding questions	Re-organize and synthesize answers via FTF group discussion	Borrow good ideas and provide suggestions for other groups to realize knowledge improvement	Generate own group answers based on comments from other groups	Present own group’s answers in front of the class.
Cycle 2: Activity B: questions generation (lesson 3)	Generate questions and ask themselves whether they can answer these questions	Discuss and select two of the most difficult and valuable questions for challenging another peer group to answer	Visit the peer group’s public board to answer the selected two questions as a group	Judge the peer groups’ answers to the questions, and give their own group’s “perfect” answers.	Explain whether the peer group offer good answers to the questions set by their own group, and give own group’s answers
Cycle 3: Activity C: question-answering (lesson 4 & 5)	Generate questions as many as possible after reading the text	Discuss all of the posted questions, provide the answers to these questions and identify the questions in which they could not reach an agreement within the group	Look through other groups’ questions and answers; help other groups to improve answers for those complex questions	Return to own group space to modify own group answers based on comments given by other groups	Explain what the most difficult questions the group students have posed and how they develop their answers finally.

Table 1 shows the activities that implement the funnel model in our each design cycle. For activity A, the lesson began with the teacher asking the students to read the comprehension essay for that lesson. She then

assigned different comprehension questions for each group of students to address and answer, and those questions were designed to assist students to get to the pith and marrow of the text. After reading the text, the students in each group brainstormed responses to their individual group question. Following the “lightweight” principle, the students were encouraged to contribute their rough ideas or share their prior knowledge in a few words within a short time (usually 5-6 minutes). All the postings in this part were not necessarily very mature, but each new idea was encouraged. Subsequently, the students conducted face-to-face discussions to organize, synthesize and further modify their existing individual postings or create new postings that build on the individual ideas. After that, they were required to visit other group boards, posting their suggestions or comments in the space for inter-group collaboration. When the students returned back to own group board, they were supposed to further refine their group answer based on the feedback given by other groups. After further verbal negotiation and combination, they were required to seek consensus and finalize their group idea, and posted it onto the final stage of the model.

Students in this class of 20 secondary 1 students, taught by Ms H, varied widely in Chinese language proficiency. In all the GS activities, the 20 students were divided into 5 groups. When we collecting data in classroom, two researchers observed each class and took down detailed field observation notes. Screen capturing software iShowU was installed on all students MacBook to capture the process of each student’s work on the PC and their verbal talks and facial expressions. These data can be used to analyze the moment-to-moment students’ interactions in each activity. After each lesson, students were asked to write their comments and feedback concerning the lesson on the class’s blog. When all 4 GS lessons were completed in the term, through interviews, the teacher and the students shared with us their experiences and new understandings of collaborative learning.

Discussion and Conclusion

During the first cycle of designing and implementing activity A, through classroom observations, we identified some problems with the students doing collaborative learning. Two problems emerged: 1) there were not sufficient FTF communication within groups; 2) there was no sufficient awareness of inter-group interaction. These informed out a second cycle and third cycle of activity design, in which activity design B and C were conceived and conducted respectively (Table 1). In the second cycle of design, we strengthened the requirement of inter-group interaction through asking peer groups to set and answer questions for each other. In the third cycle of design, the students were also required to set questions by themselves. Before posting their questions, students should be aware whether they could answer the questions by themselves. They were encouraged to do intra-group FTF communication to solve questions together within the group. As the students were motivated by answering their own queries, there were lots of negotiations among group members. Traditional teaching strategies on reading comprehension were integrated with the funnel model for designing more pedagogical sound activities. Reciprocal teaching, integrated in the design of activity B and activity C as an example, was adopted as a strategy for developing text comprehension. It provided opportunities for students to learn to monitor their own learning and thinking (Palincsar, & Brown, 1984), leading to a greater responsibility for the learning process.

Students’ post-class reflections provide us with some evidence that most of them have a basic understanding of the intention of the funnel model design. Student A wrote that “I like very much the first stage of the model, in which each student can post own ideas, and then we proceed to do analysis and synthesis. It enhances our thinking skills. [我最喜欢各个组员在第一个空格写上想法和构思，我们才会去分析和综合，整个提炼了我们的脑筋的发挥。]”. Student B posted “my favorite is the last part of the activity which requires students to do group discussion. We can learn and help one another through the group discussion. This can help those students who are weak in Chinese. [我最喜欢这活动里的最后部份。因为它需要同学们在小组里讨论。在小组里讨论，能互相学习，互相帮忙。这样能帮助在华文方面比较虚弱的同学。]” It seems that in following the funnel model, students, who have just started how to do collaborative learning, tend to contribute their understanding based on their individual language proficiency and then collaboratively seek an improved group understanding.

The core idea of the funnel model has been internalized by some students. Student A said in the post-interview after all 5 lessons: “*We’re already used to it (the funnel model). Perhaps we will not write it down. But our mind still works the same way. Because we’ve used it a lot of times, we are familiar with how we should think. How to give suggestions and turn them gradually into better answers. We might not use your method. But the idea behind remains the same. From everyone’s ideas to one combined answer.*” The model provides a kind of scaffolding for teachers to embark on collaborative learning activities in the classroom and to monitor the activities to lead towards fruitful collaboration. In our post-interview, Ms H said that she had become more confident of conducting the GS lessons after enacting the funnel model. She added that she had a better understanding of collaborative learning and RCKI: “*We put our ideas 1, 2, 3, 4 together, we must generate a new one. You must have something at the end.*”

The design and enactment of collaborative learning activities in a technologically-enriched classroom is a very complex process that has to take into account a multitude of factors. One way to start is to expose teachers to best practices, either written or as shown on videos. This entails having such best practices to start off with, which is not always the case for new classroom innovations. Adopting a best practice approach also may set up unrealistic expectations for teachers (Bielaczyc, 2006). An approach based on starting from principles is postulated to help teachers to internalize an innovative mindset (Zhang & Scardamalia, 2007). However it is always a challenge for teachers to comprehend such principles especially when they appear to be rather abstract or de-contextualized. A model may be a compromise between the abstract principles and an ideal enactment model that can fully reflect the core of the design may guide the novice participants to make the new concept and technology implementation successful. The funnel model proposed in this article provides one structured representation of the functions and processes to enable RCKI practices. The model is also meant to scaffold teachers to enact and orchestrate the collaborative learning activities in the classroom as well as to build capacity to be able to design such learning activities themselves eventually.

References

- Bielaczyc, K. (2006). Designing social infrastructure-critical issues in creating learning environments with technology. *The Journal of the Learning Sciences* 15 (3): 29.
- Block, D. (2003). *The social turn in second language acquisition*. Washington, DC: Georgetown University Press.
- DiGiano, C., Tatar, D., & Kireyev, K. (2006). Learning from the Post-It: Building collective intelligence through lightweight, flexible technology. In *Proceedings of conference on computer supported cooperative work companion*, Banff.
- Dillenbourg, P. (2002). Over-scripting CSCL: The risks of blending collaborative learning with instructional design. In P. A. Kirschner (Ed.), *Inaugural Address, Three Worlds of CSCL. Can We Support CSCL?* (pp. 61-91). Heerlen: Open Universiteit Nederland.
- Dillenbourg, P. (2004). "Split Where Interaction Should Happen", a model for designing CSCL scripts. In P. Gerjets, P. A. Kirschner, J. Elen & R. Joiner (Eds.), *Instructional design for effective and enjoyable computer-supported learning*. Tuebingen: Knowledge Media Research Center.
- Dillenbourg, P., & Fischer, F. (2007). Computer-supported collaborative learning: The basics. *Zeitschrift für Berufs- und wirtschaftspädagogik*. 21, 111-130.
- Ellis, R. (1999). Theoretical perspectives on interaction and language learning. In R. Ellis (Ed.) *Learning a second language through interaction* (pp. 3-33). USA, Philadelphia PA: John Benjamins B.V.
- Fischer, F., & Mandl, H. (2005). Knowledge convergence in computer-supported collaborative learning: *The role of external representation tools*. *The Journal of the Learning Sciences*, 14(3), 405-441.
- Kreijns, K., Kirschner, P.A. & Jochems, W. (2003). Identifying the pitfalls of social interaction in computer-supported collaborative learning environments: a review of the research. *Computers in Human Behavior*, 19 (3), 335-353.
- Lakkala, M. (2007). The pedagogical design of technology enhanced collaborative learning. A position paper for the framework for e-learning Contents Evaluation Project. Retrieved February 2010, from <http://www.elearningeuropa.info/files/media/media13028.pdf>
- Lantolf, J. (2000). Introducing sociocultural theory. In J. Lantolf (Ed.), *Sociocultural Theory and Second Language Acquisition*, Chapter 1 (pp. 1-26). Oxford: Oxford University
- Lantolf, J. P., & Thorne, S. L. (2006). *Sociocultural theory and the genesis of second language development*. Oxford: Oxford University Press.
- Looi, C.-K., Chen, W., & Patton, C. (2010). Principles and enactment of rapid collaborative knowledge building in classrooms. *Educational Technology Magazine*, September.
- Palincsar, A. S. & Brown, A. (1984). Reciprocal teaching of comprehension-fostering and comprehension monitoring activities. *Cognition and Instruction*, 1(2), 117-175.
- Scott, V.M. (1996). *Rethinking Foreign Language Writing*. Boston: Heinle & Heinle.
- Scardamalia, M., & Bereiter, C. (1996). Computer support for knowledge-building communities. In T. Koschmann (Ed.), *CSCL: Theory and practice of an emerging paradigm* (pp. 249-268). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Scardamalia, M., & Bereiter, C. (2006). Knowledge building: Theory, pedagogy, and technology. In K. Sawyer (Ed.), *Cambridge handbook of the learning science* (pp. 97-118): New York: Cambridge University press.
- Stapa, S. H., & Majid, A. H. A. (2009). The use of first language in developing ideas in second language writing. *European Journal of Social Sciences*, 7(4), 41-48.
- Wen, Y. Chen, W., & Looi C.K. (2010). "Ideas First" in Collaborative Second Language (L2) Writing: An Exploratory Study. In Gomez, K., Lyons, L., & Radinsky, J. (Eds.) *Learning in the Disciplines: Proceedings of the 9th International Conference in Learning Sciences (ICLS 2010)* (pp. 436-443). International Society of Learning Sciences: Chicago IL.
- Zhang, J., & Scardamalia, M. (2007). Sustaining principle-based knowledge building innovation. Paper presented at the American Educational Research Association (AERA) Conference, Chicago, IL.