Effect of Knowledge Building Pedagogy on Studentô Reading Comprehension

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Abstract: The purpose of this study was to investigate the effects of knowledge building pedagogy on grade4 students' reading comprehension. Data sources mainly came from experimental group and control group' average scores on PIRLS (Progress in International Reading Literacy Study). and data analysis was done by using an independent-samples t-test to compare average PIRLS' scores between the experimental group and the control group. The results are as follows: Experimental group and control group' PIRLS scores significantly increased in eighteen weeks and there was a statistically significant in that the experimental group outperformed the control group in terms of the pre-post increased PIRLS scores.

Keywords: Knowledge building, reading comprehension, PIRLS

1. Introduction

Knowledge building is a social process in which people work collaboratively to create and improve ideas of value to their community (Sun, Zhang & Scardamalia, 2010). The knowledge building pedagogy aims to help groups produces increasingly powerful explanations about the world and transform classrooms into knowledge building communities (Scardamalia and Bereiter, 1994).The purpose of this study was to investigate the effects of knowledge building pedagogy on grade 4 student' reading comprehension. To this end, knowledge forum (KF) technology was used to provide a computer-support learning environment; KF support students and record the process of idea generation, idea co-construction, and idea improvement.

This study adopted experimental research design. Participants in the experiment group were 25 grade 4 students, and in the control group were 28 grade 4 students. The experiment group was engaged in a class which used knowledge building pedagogy to enhance student' reading comprehension for eighteen weeks. The control group had their reading instruction using as teacher directed instruction.

3. Knowledge of and Knowledge About

Modern society does not emphasize to much on accumulation of knowledge, but instead highlight the importance of creating new knowledge. Students not only need to develop knowledge building competencies but they also need to see themselves and their work as part of the civilization-wide effort to advance knowledge frontiers (Scardamalia & Bereiter, 2006). Knowledge acquisition is the process of extracting, structuring and organizing knowledge from one source, usually textbooks or human experts. However, knowledge creation has to work with and use knowledge in various contexts, to explore and question, and to connect not only with other explicit ideas but also with implicit idea (Scardamalia and Bereiter, 2010). Knowledge acquisition highlights authoritative content itself, while knowledge creation is emphasize the importance of real-life experiences by learners.

Learning about various concept is the traditional way in accumulating knowledge. However, learning to create and work innovatively with ideas is the modern way in creating knowledge. Both concepts and ideas are originally from human beings, and are used for. Table 1 below show the differences and similarities between learning about concepts and learning to work with ideas. We can see that concepts are more organized and can be categorized. In contrast, ideas are usually emergent and not organized but can be more creative. Through idea-improvement, learning is a never ended process.

Table 1. Similarities and differences in terms of learning from concepts and ideas

	concepts	ideas
Similarity	Coming into forms from some human beings	
	Used for problem-solving	
	Basic of thinking process	
Difference	Can be organized and can be categorized	Difficult to organized due to their intuitive nature
	Concepts are usually proved facts based on some theoretical or empirical evidence	Ideas are usually not proved solutions for a problem
	Concepts can be easily structuralized	Ideas are more creative thoughts than some known concepts

4. Method

This study adopted quasi-experimental design. In the experiment group, the participants were 25 of grade 4 students, and in the control group, the participants were 28 grade 4 students. The experiment group engaged in class which knowledge building pedagogy was used to enhance reading comprehension among students for eighteen weeks. The control group had their reading class under

teacher-directed instruction. The control group's teacher stands in front of a classroom and presents information of text books, usually clearly outlined the academic content. PIRLS (Progress in International Reading Literacy Study) tests were used to assess children's reading comprehension. Students took PIRLS tests at the first week and the last week as their pre-test and post-test.

A research observed the experiment group in class for eighteen weeks with each class lasting for 40 minutes once a week. The researcher also observed how student worked creatively in Knowledge Forum (KF), in order to see if the experimental intervention improved students; reading comprehension. Knowledge Forum is a cross-sector, cross-age, cross-cultural problem-solving space where the focus is on the continual improvement of ideas. The heart of Knowledge Forum is a multimedia community knowledge space. In the form of notes, participants contributes ideas, and propose working models, make plans, search for evidence, identify reference materials, and so forth in this shared place (Scardamalia, 2004a). Participants in the experiment group can also use Knowledge Forum to make their thinking visible by using some graphical tools.

In Knowledge Forum, students post notes to show their views or ideas raise questions, others students can not only read their own notes but answer questions or refine ideas (Fifure1). Except for posting notes, scaffold in Knowledge Forum can be customarily designed to provide procedural facilitation for fostering expertise in writing (Scardamalia, 2004a). Students used scaffolds to improve their understanding. Scaffolds are metacognitive prompts that guide knowledge construction (Niu & van Aalst, 2009). Students will understand how to improve ideas when using scaffolds like " My theory" " I need to understand" "New information" "This theory cannot explain" "A better theory" "Putting our knowledge together". They can classified their ideas and try to find solutions when facing problem that they don't understand, like searching authoritative sources.

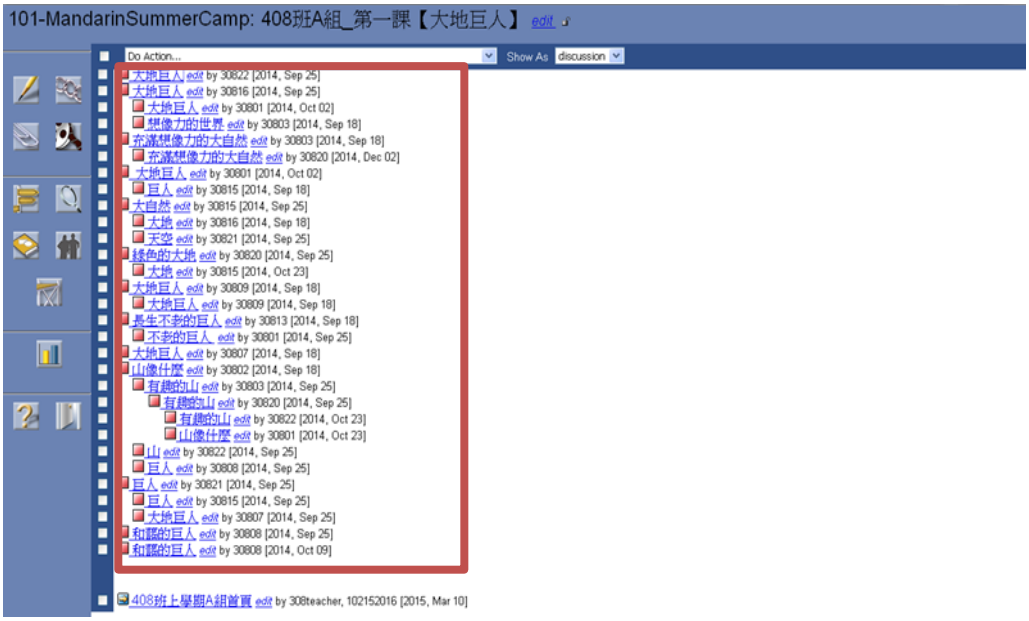

Figure 1. Student's notes in Knowledge Forum

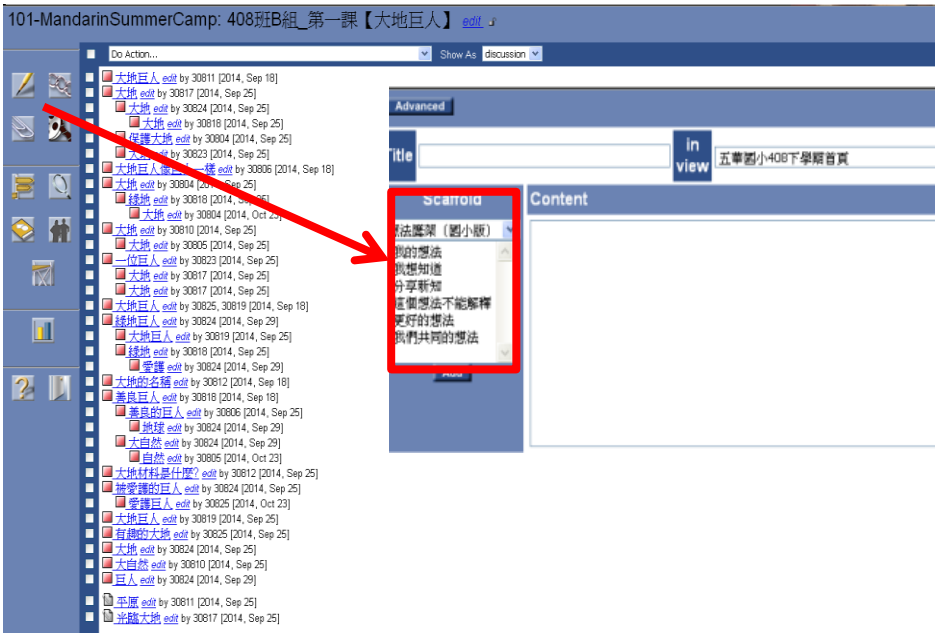

Figure 2. Scaffolds in Knowledge Forum

5. Conclusion

In this study, the experiment group was engaged in class which used knowledge building pedagogy to enhance student' reading comprehension for eighteen weeks. Figure 3 shows, the average PIRLS' scores between the experimental group and the control group. In the pre-test, the experiment group's mean score (M=23) was higher than the control group's mean score (M=22.68). And the experiment group's standard deviation (SD=5.63) was slightly higher than the control group's standard deviation (SD=4.27). It means that there was no significant differences between the experiment group and the control group'.

After eighteen weeks of different teaching methods between the two groups, The experiment group's mean score (M=26.28) in the post-test was significantly higher than the control group' s mean sore (M= M=23.07). It can be concluded that participants in the experiment group were able to improve their reading comprehension due to the experimental intervention.

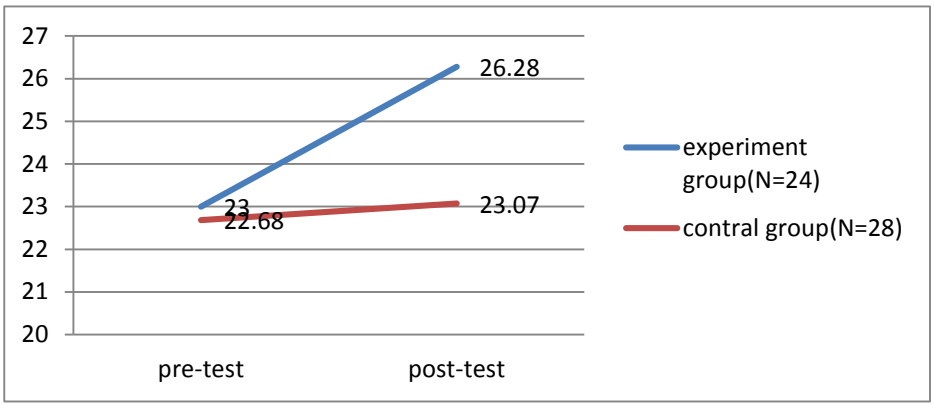

Figure 3. PIRLS reading achievement

Except for the change in PIRLS' average scores, an independent-sample t-test was conducted to compare average the PIRLS' scores in both the experimental group and the control group. A table 1below show, there was no statistical significant at the beginning of the experiment. Represent that there is no differences between the experimental group and the control group in reading comprehension level. After eighteen weeks using knowledge building pedagogy, as table 2 below show, there was a difference in the average score in terms of post- test score for the experimental group (M=26.28, SD=3.87) and control group (M=23.07, SD=3.13) conditions; t (50) = 3.33, p = 0.002.These results suggest that the experimental treatment really does have an effect on PIRLS' reading comprehension achievement.

Table 1. pre-test' t-test results comparing experimental group and control group

	experimental group		control group		t-test	95% CI	
Variable	M	SD	M	SD		LL	UL
Pre-test score	23	5.63	22.68	4.27	.82	-2.44	3.08

**p<0.05

Table 2. post-test' t-test results comparing experimental group and control group

	experimental group		control group		t-test	95% CI	
Variable	M	SD	M	SD		LL	UL
Post-test score	26.28	3.87	23.07	3.13	.002 **	1.28	5.14

**p<0.05

Additionally, qualitative data show positive effects of the knowledge building pedagogy. Analysis of Knowledge Forum posting revealed that students were able to improve their ideas by

posting and questing ideas in the online environment. Figure 4. presents the number of student's posting in each lesson tend to increase. Regarding the increasing trend, present students in the experimental group were motivated by knowledge-building activities. Students was engaged in collaborative learning and creating new ideas.

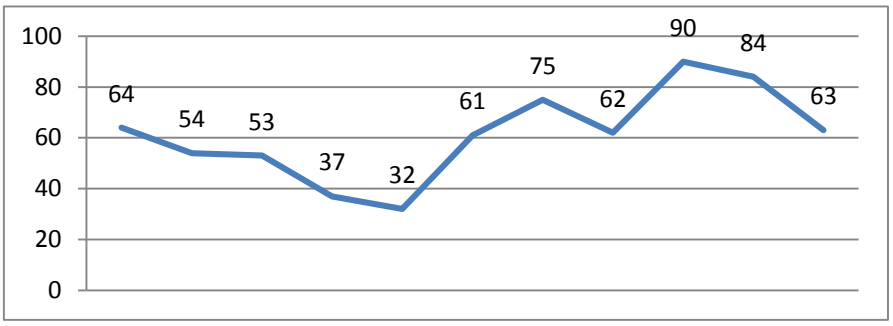

Figure 4. The number of student's posting in each lesson

6. Reference

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