A Wireless Handheld System for Supporting Individual and Cooperative Learning in Chinese Reading Comprehension

Yu-Ju Lan[a], Chien-Mei Chang[b], Yao-Ting Sung[c], Kuo-En Chang[d]

[a] *Department of Mathematics and Information Education, National Taipei University of Education,, Taiwan, R.O.C.*

[b, d] *Graduate Institute of Information and Computer Education, National Taiwan Normal University,Country, R.O.C.*

[c] *Department of Educational Psychology and Counseling, National Taiwan Normal University, National Taiwan Normal University, R.O.C.*

yujulan@gmail.com

Abstract: The purpose of this research was to develop a wireless handheld system for supporting individual and cooperative reading activities in Chinese reading comprehension. The findings showed that the integration of learning scenarios with the proposed wireless handheld system could improve students' Chinese reading comprehension proficiency.

Keywords: Cooperative learning, Chinese language learning, wireless handheld system

1. Introduction

Reading is the core of language teaching activities, and the reading proficiency that students possess plays a key role in their academic achievement. Studies show that students with a better reading ability have superior academic performances than students who don't have. According to the 2009 Reading Assessment from National Assessment of Educational Progress (NAEP) [1], reading is an active and complicated progress, and it contains various reading behaviors. Bryant, Ugel, Thompson, and Hamff [2] believe that readers would like to begin their reading progress by browsing articles first, and have different levels of interaction with the content of articles, which include explaining, judging, combining between previous and current reading experiences, and developing new understandings about articles. Gagné [3] argued that during the three reading phases (pre, during, and post reading processes), readers will be able to integrate the article content with his or her personal experiences to construct their own meaningful understanding about the reading materials. Therefore, reading comprehension is an essential element for reading activities and also a core of reading instruction. Studies show that applying reading strategies has a significant impact on students' reading comprehension proficiency.

Therefore, to cultivate students' reading comprehension proficiency is always the upmost educational purpose [4]. In Taiwan, at the secondary level, to cultivate students' reading comprehension proficiency and self-study abilities are the major purposes of the language teaching activities. Although the training about students' abilities to apply reading strategies is an important element to promote students' reading comprehension proficiency and self-learning abilities, reading strategy instruction is ignored due to two problems which

are urgent to be solved in the practical teaching settings. The first problem is the pressure of the national entrance exam. Chinese language teachers tend to focus on step-by-step explaining the meaning of sectional contents rather than explicit reading comprehension strategies instruction. Consequently, students are in lack of the learning and training of reading strategies [5]. Therefore, how to help teachers screen and understand each student's reading habit, and how to help students use reading comprehension strategies effectively are the first part of problems needed to be solved for the current Chinese reading instruction. Second, the current teaching model of Chinese reading is more like a teacher-center style, which means that there are few interactive discussions among students, and in which students tend to inertly memorize the content rather than to understand the real meaning. Students can not, accordingly, have a better understanding of articles that they have read, and the possibility to raise their interest in Chinese learning is slim. Therefore, how to change the lack of the interactive teaching model is the upmost task for the current Chinese language reading instruction.

Aiming at solving the problems mentioned above, mobile computer supported cooperative learning, MCSC, has a high potential to provide a solution model. MCSCL possesses the specific feature of computer assisted learning, which can offer individuals immediate feedback and learning assistance; furthermore, it is also equipped with features of personalization, portability, high interactivities among human, machines, and environments (such as mobile phones, Personal Digital Assistant, and Tablet PC), and therefore it is able to provide cooperative learning activities with work splitting, negotiation, discussion, and cooperative processes monitoring functions. Consequently, MCSCL has been leading a trend of studies on the cooperative learning [6]. However, most of the mobile technology is mainly used on English learning including speaking [7], vocabulary [8, 9], phrases [10], grammar [11], and early reading [12]. Only few studies focus on Chinese literature reading comprehension and reading strategy training.

Considering the limited number of MCSCL studies focusing on Chinese literature reading comprehension and reading strategy training, this study combines mobile technology to develop a reading supporting system, which was called wireless handheld system (WHS), to support both individual and cooperative learning processes in the reading activities of Chinese reading class. Furthermore, the system also aimed at offering automatic screening, reading strategy training, real-time learning assistant, and an interactive mobile reading learning environment for the Chinese reading class. The result shows that integrating WHS into Chinese reading class can help improve students' reading comprehension proficiency.

2. The Wireless Handheld System

The "Wireless Handheld System" (WHS) offers students to perform both individual reading and cooperative learning activities, and students will be required to log in first in order to launch the program. After students log in to their account and obtain reading material, the page of "setting reading objectives", which relates to the article that students are going to read will show up first; then based on titles, writers, and sources, the type and format of the article will be identified and followed by the reading activity. During the individual reading phase, students need to use the estimated reading method to explain words that are designated by teachers. Estimated reading method is the same as the word identification strategies, which were mentioned by Bryant and his fellows [2]. The strategies applied contextual analysis, phonetic analysis, and structural analysis skills to identify unfamiliar words. Since the Estimated reading skill is more difficult, it is necessary to apply different knowledge and clues; therefore, based on students' need, they can use hints from three levels, or apply note-taking, summarizing, and highlighting for supporting reading strategies. Then,

they will be able to send out a complete explanation of words. Figure 1 illustrates the operating procedures of individual reading activities.

While students continue doing the cooperative learning activities, the system does not only support the reading activity, but also focus on reading strategies application trainings. In this phase, students will discuss and share their individual reading results, which include possible words explanations and answers to reading comprehension questions and so on. Through this system's reading strategies about querying, explanations, and clarification, students will be able to answer or discuss difficult words, share the method of reasoning the meaning of articles, and apply reading strategies in order to have a deeper understating about reading material and gain the experience about employing reading strategies. The cooperative learning processes are shown in the Figure 2.

In addition, in order to avoid the disadvantages of traditional cooperative learning activities, which may lead to a failure, this system is designed to improve the previous flaws of the cooperative learning, and develop "sharing and work splitting" functions . The main purpose of the information "sharing function" is to integrate each group member's answers first and then make them sharable by all the group members. Through the sharing function, students can look at each member's answers while having cooperative learning discussions and then discuss. The premise of this "information sharing function" is that all of the group members should take their own responsibilities and agree with the mutual dependence concept [13]. At the beginning, each group member needs to complete their own individual tasks prior to the group discussion activity. If any of the group members does not complete his or her duty, the entire group will not be able to hold any cooperative discussion. In addition, in order to prevent inappropriate work slipping situation,   the "information sharing function" will distribute so called answering privilege to each member randomly, so any of group members who possess the right of answering questions needs to submit the discussion result; if the result is not sent by the certain person, the group can not continue their discuss for the next question. There is no exception.
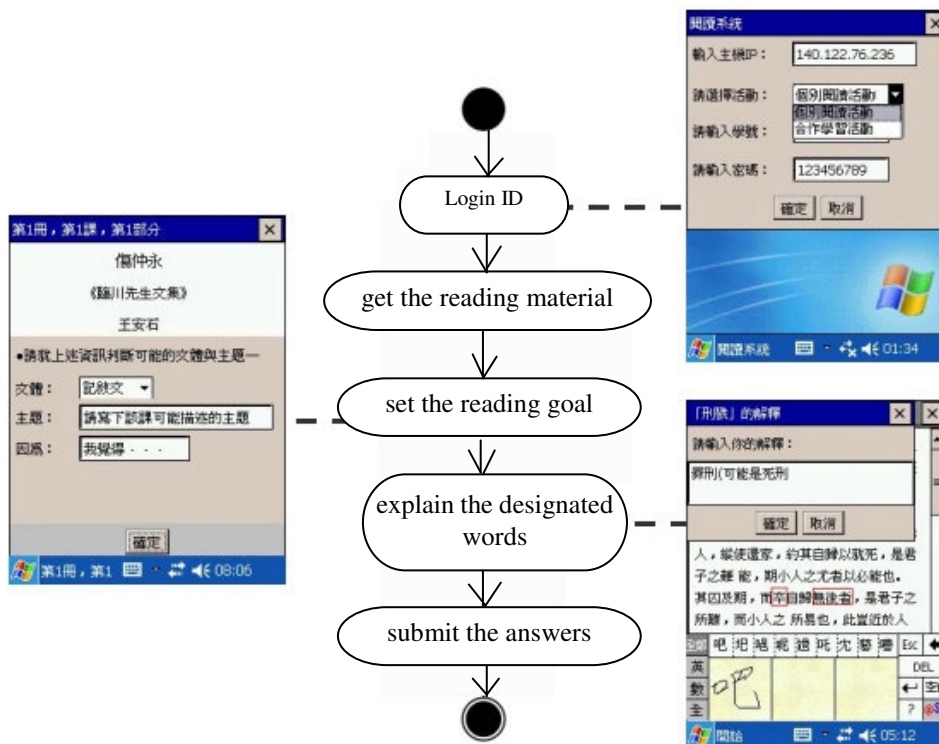

Figure 1. The procedure of individual reading activities

This system is designed to support teachers to have a quick and immediate understanding about students' individual reading and group cooperative leaning conditions.

The system will collect timely reading material of each student and produce a statistical table in order to provide teachers with each student's individual reading and question answering situation; therefore, teachers will be able to provide students with immediate feedback. In the individual reading aspect, teachers can focus on a certain student's "set the reading goal", his or her understanding about words, how many times that the student looks up the hint, and teachers will also be able to look up all of students answers about a certain word. Figure 3 below is to explain the situation. On the other hand, the data about cooperative learning activities will be reference for teachers, so they can understand the entire class's discussion situation; each group's answer about certain word is shown in Figure 4.
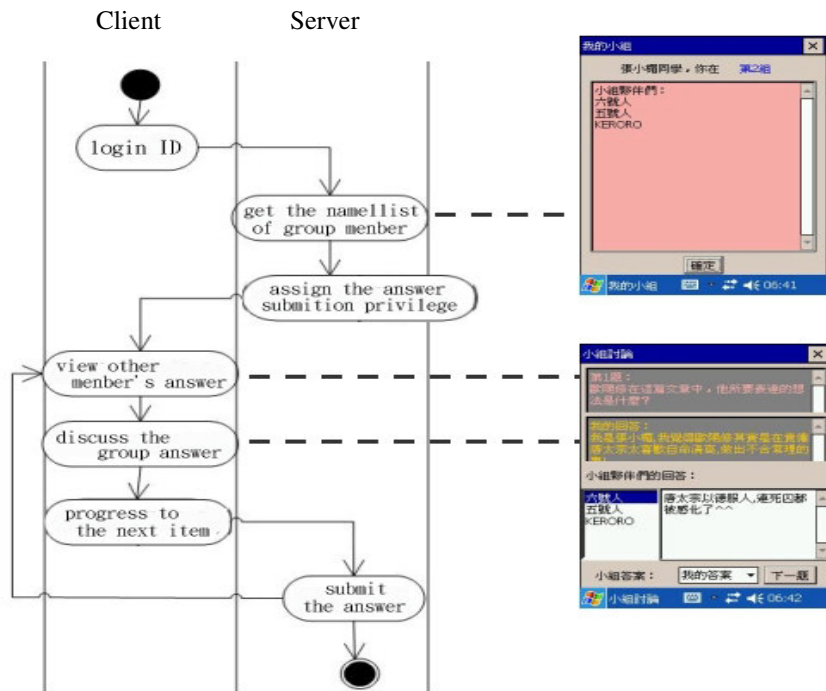

Figure 2. The procedure of "Cooperative Learning Activity" procedure.
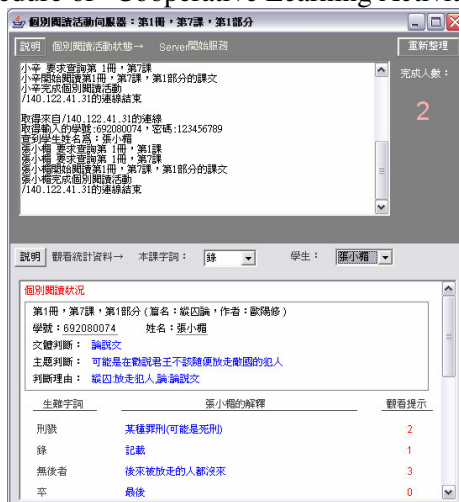

Figure 3. The Interface of Students' "Individual Reading Situation" from the Server Side
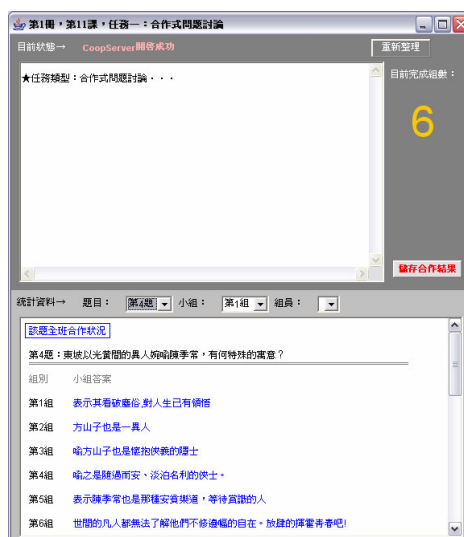
Figure 4. The Interface of Questions and Each Group Answering Situation from the Server Side

3. Methods

3.1 Subjects

The samples of this study are two classes of the 13 grade students from Taipei First Girls' High School. The average age of these samples was 16, and all of the participants obtained very high scores on the entrance exam; they were the best academic performing students in Taipei area at that year. These students were divided into different classes randomly, so we considered these two classes possess the same quality and level on the academic performances. Participants were divided into the experimental and control groups randomly, and each group contained 43 students.

3.2 Design

This study adopts the quasi-experiment design. The data analysis on the reading comprehension proficiency is based on two-way ANCOVA. The independent variables in the experiment are group (experimental or control) and test (pre- or post). The dependent variable is students' reading comprehension proficiency. The covariant is the Mid-term exam of Chinese language.

3.3 Procedure

This study lasted 8 weeks and had nine Chinese reading courses, and the procedure is explained below. Both experimental and control groups had the same reading materials, and the questions that teachers setting up for the answering activities were the same. However, pre and during the learning activity phases were different due to the usage of WHS. Before the Chinese reading class, the control group used a traditional method to conduct the reading preview activities, which meant to study at home and mark any questions while the students in the experimental group used PDA to access WHS for performing both individual reading activities and cooperative words discussions. Then in Chinese reading class, the control group used a traditional way to conduct reading activities as the following: the teachers asked students questions in order to understand the students' preview situation, asked the

same comprehension questions that were used in the experimental group's cooperative learning, let students express their opinions freely, and asked students to answer questions, which were provided by teachers during the class. By contrast, the experimental group employed WHS to conduct cooperative question discussions, and teachers checked each group's cooperative learning process while students were discussing and answering the questions of word and phrase identification. By doing so, teacher would be able to monitor student's reading process and also could provide students with necessary learning supports.

Before and soon after finishing all of the treatments, all the students were administered a reading comprehension test developed by the authors.

4. Results

Before and following the treatment, all students were administered individual tests of reading comprehension test. The test includes two subtests: the content meaning level and the interpretation level. Alpha was set at .05.

Regarding the scores of subtest of the content meaning level, Table 1 shows the means and standard deviations for the scores of the subtest of the content meaning level. The results from the two-way (group × test) analysis of covariance reveals that the interaction is insignificant ($F(1, 74) = .17, p > .05$), which means that there are no differences which vary according to levels. The test is significant ($F(1, 74) = 7.34, p < .05$), meaning that both the two groups made significant improvement between pre- and post-test. However, the group is insignificant ($F(1, 73) = 2.50, p > .05$), meaning that there is no difference between the two groups' scores.

Table 1. Means and standard deviations for the scores of the content meaning level

scores	Experimental group (n=36)		Control group (n=40)	
	M	SD		M
pre-test	17.48	.57	18.71	.54
posttest	18.94	.58	19.74	.55

Regarding the scores of the subtest of the interpretation level, Table 2 lists the means and standard deviations for the scores of subtest of the interpretation level. The results from the two-way (group × test) analysis of covariance reveals that the interaction is significant ($F(1, 74) = 6.55, p < .05$), which means that the magnitude of differences varies according to levels. The test is significant ($F(1, 74) = 20.05, p > .05$), meaning that the improvement made by the two groups is significantly different from each other. The group is insignificant ($F(1, 73) = 2.67, p > .05$), meaning that there is no difference in the scores of the two groups. The simple main effect analysis shows that the scores of the pre-test of the control there is significantly better than that of the experimental group ($F = 6.61, p < .05$), but the difference does not exit in the posttest ($F = .01, p > .05$) due to the significantly different improvement made by the two groups. Additionally, the experimental group made significant improvement ($F(1, 74) = 23.53, p < .05$), but the control group didn't ($F(1, 74) = 1.94, p > .05$).

Table 2. Means and standard deviations for the scores of the interpretation level

scores	Experimental group (n=36)	Control group (n=40)

	M	SD		M
pre-test	14.85	.63	17.09	.60
posttest	18.07	.54	18.00	.51

5. Conclusion

The purpose of this study was to design a "Wireless Handheld System" that can support the classroom learning activities of Chinese reading class. By employing WHS, teachers are able to monitor students' reading processes and students are able to practice reading strategy applications in their reading activities, both individual and cooperative.

Based on the result of the reading comprehension test, it shows that the students of the experimental group made significant improvements on both the content meaning level and the interpretation level, especially on the latter one. The situation might be caused by the strategy training activities provided by WHS, such as setting reading goal, self-explanation for reading materials, and making an abstract, … *etc*.

This study focuses on the effect of "Wireless Handheld System" on students' Chinese reading comprehension proficiency. Future study should focus on the evaluation of the effect of WHS on students' reading strategy application in Chinese reading activities.

Acknowledgements

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