

A Comparison of Adaptive Learning Within the SOI Model Using Paper and Computer Presentation

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Abstract. The main purpose of this paper is to analyse adaptive learning of elementary students' reading comprehension within multi-strategy using different tools. By applying the SOI model (Mayer 1996), three knowledge constructions of cognitive process, the reading comprehension for guiding three cognitive processes is developed in our design website tool named Multiple Online Reading Strategies System. The three multifunctional strategies in online reading strategies system, Selecting relevant information, Organizing incoming information, and Integrating incoming information with exist knowledge, could be applied to highlighting important information, concept mapping, and summarizing to determine topic sentences or important sentences in an article. Data are collected from elementary school in Taiwan and 245 questionnaires are collected in our study. These data are analyzed by the SPSS-for-windows software with statistical methods, descriptive statistics, t-test, one-way analysis of variance (ANOVA). The results of the empirical study suggest that adopting the highlighting method for students to understand articles and employing concept mapping and summarizing strategies to improve students' comparative analysis capabilities are conducive to establishing compact reading strategies for them whether students use online or on paper.

Keywords: SOI model · Multiple online reading strategies system · Reading comprehension · One-way analysis of variance (ANOVA)

1 Introduction

Based on the SOI model by Mayer (1996) as framework, this study designed a multiple online reading strategies system by simulating guided reading of printed expository texts. The multiple online reading strategies system was from knowledge construction by learning would follow three step of cognitive process. The three multifunctional strategies in online reading strategies system, Selecting relevant information, Organizing incoming information, and Integrating incoming information with exist knowledge, could be applied to highlighting important information, concept mapping, and summarizing to determine topic sentences or important sentences in an article. The three multifunctional strategies in online reading strategies system of highlighting important

information, concept mapping, and summarizing to determine topic sentences or important sentences in an article would be applied to comprehending facts explicitly stated in the text, comparing/analyzing the facts stated in the text, and deriving main idea from the text - between reading expository text in this study. The purpose of this study is to investigate whether differences exist in students' reading comprehension abilities - comprehending facts explicitly stated in the text, comparing/analyzing the facts stated in the text, and deriving main idea from the text - between reading expository text using the multiple-strategy reading comprehension system and using printed paper.

2 Literature Review

In the competitive 21st century, knowledge quality and creativity play a vital role to the country. It is also the era with rapid development of information technology. Reading is considered as basic learning and acquiring new knowledge skills. Mayer and Wittrock (1996) indicate three processes of cognitive include selecting relevant information from what is happened, organizing selected information into a coherent representation, and integrating submitted information with existing knowledge. The graphic organizer process is helpful for continuous processing of the concepts and the interrelations among them (Armbruster and Anderson 1984). The teaching of learning strategies has a growing consensus and legitimate place in the curriculum (Weinstein and Mayer 1986). Chang et al. (2002) test 126 fifth graders in primary school indicated that the map-correction method and the scaffold-fading method enhanced text comprehension, summarization abilities and summarization ability. Although scholars affirm the important of graphic organizers and knowledge maps when learning process, some important issues from previous studies have yet to be considered such as new technology applied in learning process.

3 Methodology

This study used unequal-group quasi-experimental design to conduct experimental teaching to investigate whether differences exist in students' reading comprehension ability between reading expository text using the multiple online reading strategies system and using printed paper. The convenience sampling method was used, and two classes from the fifth and two classes from sixth grades, respectively, were selected for the online test. Another two classes from the fifth and two classes from sixth grades, respectively, were selected for the printed test. In total, there are four experimental groups (two classes from the fifth and two classes from sixth grades respectively for the online test) and four control groups (two classes from the fifth and sixth grades respectively for the printed test). The experimental group used the multiple online reading strategies system, while the control group used traditional printed reading material and written test.

3.1 Participants

Participants of this study included fifth-grade and sixth-grade students from two public elementary schools in central Taiwan, who were distributed to classes using normal class grouping. Therefore, the prior knowledge and learning abilities of the students were in normal distribution. One class from the fifth and sixth grades in both schools, respectively, were randomly selected for the reading comprehension tests using online multi-strategy reading comprehension system and printed paper. One of the classes was randomly assigned the online reading and reading comprehension test, while the other class participated in reading and reading comprehension test using printed paper.

3.2 Samples

Two fifth-grade classes and two sixth-grade classes were assigned online reading and reading comprehension test; another two fifth-grade classes and two sixth-grade classes were assigned reading and reading comprehension test using printed material. The tests returned 245 valid questionnaires in total.

3.3 Reading Comprehension Tasks

Chinese Reading Comprehension Test preparation by Lin and Chi (2000) was used as the material for reading and testing. Articles number 7, 9, 10, and 12 were used for both online and printed tests, which consisted of comprehending facts explicitly stated in the text, comparing/analyzing the facts stated in the text, and deriving main idea from the text.

3.4 Multiple Online Reading Strategies System Design

The three multifunctional strategies in online reading strategies system, we designed highlighting important information, concept mapping, and summarizing to determine topic sentences or important sentences in an article to stand for selecting relevant information, organizing incoming information, and integrating incoming information with exist knowledge. The multiple online reading strategies system was designed by 3 parts as Fig. 1.

4 Results

Based on the multiple online reading strategies system (F value = 52.986; p value = 0.000 < 0.001), the means for comprehending facts explicitly stated in the text, comparing/analyzing the facts stated in the text, and deriving main idea from the text were 0.6034, 0.2102, and 0.2932, respectively. Table 1 shows the results of post hoc comparison. For the multiple online reading strategies system test, comprehending facts explicitly stated in the text scored higher than both comparing/analyzing the facts stated



Fig. 1. The multiple online reading strategies system

Table 1. The results of multiple online reading strategies system

Abilities in online reading	Mean	Standard deviation	F value	Post hoc tests
Comprehending facts explicitly stated in the text	0.6034	0.6482	52.986***	Comprehending facts explicitly stated in the text
Deriving main idea from the text	0.2102	0.2450		Deriving main idea from the text
Comparing/analyzing the facts stated in the text	0.2932	0.3398		Comparing/analyzing the facts stated in the text

***p < 0.001

in the text and deriving main idea from the text. From these results, we can infer that in multiple online reading strategies system, the selecting process (strategy of underlining key points) scored higher than the organizing (strategy of filling in concept maps) and integrating (strategy of deriving summaries) processes.

Based on multiple reading strategies system test using paper (F value = 54.365; p value = 0.000 < 0.001), the means for comprehending facts explicitly stated in the text, comparing/analyzing the facts stated in the text, and deriving main idea from the

text were 0.5333, 0.1667, and 0.2680, respectively. Table 2 shows the results of post hoc comparison. For the printed-material reading comprehension test, comprehending facts explicitly stated in the text scored higher than both comparing/analyzing the facts stated in the text and deriving main idea from the text. From these results, we can infer that in multi-strategy reading comprehension, the selecting process (strategy of underlining key points) scored higher than the organizing (strategy of filling in concept maps) and integrating (strategy of deriving summaries) processes.

Table 2. The results of multiple reading strategies system using paper

Abilities in printed reading	Mean	Standard deviation	F value	Post hoc tests
Comprehending facts explicitly stated in the text	0.5333	0.5891	54.365***	Comprehending facts explicitly stated in the text
Deriving main idea from the text	0.1667	0.2176		Comparing/analyzing the facts stated in the text
Comparing/analyzing the facts stated in the text	0.2680	0.3003		Deriving main idea from the text

***p < 0.001

5 Conclusion

From the study, it is indicated that the purpose of the multiple online reading strategies system was to investigate whether differences exist in students’ reading comprehension abilities - comprehending facts explicitly stated in the text, comparing/analyzing the facts stated in the text, and deriving main idea from the text - between reading expository text using the multiple online reading strategies system and using printed paper. The multiple online reading strategies system was used to measure students’ performance in comprehending facts explicitly stated in the text, comparing/analyzing the facts stated in the text, and deriving main idea from the text. The results showed that in both online and printed reading comprehension, the selecting process (strategy of underlining key points) scored higher than the organizing (strategy of filling in concept maps) and integrating (strategy of deriving summaries) processes.

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