

Improving Reading Comprehension using the Cooperative Mind Mapping Summary Strategy

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Abstract: Becoming an effective reader requires cultivating habits of extensive reading and acquiring efficient reading strategies. This study investigated the reading comprehension performance of learners with three different reading summary strategies: "cooperative mind maps," "co-text," and "individual mind maps." Participants were 272 high school students. The result showed that the "cooperative mind map group" significantly outperformed the "individual mind map group," indicating that the group discussion process is essential to build deeper comprehensive understanding of the reading material, given the same condition of using the mind mapping tool to write summaries. Our major results showed that combining group discussion with a mind map as a visual summary writing tool is the most beneficial approach for improving students' reading performance. In addition, through the summary construction process using the mind mapping tool rather than a simple text tool, students could better identify important concepts, think about relationships and hierarchies between concepts, and thus developed a better ability to organize and understand the reading content.

Keywords: Reading strategy, reading comprehension, mind map, cooperative learning, individual learning.

1. Introduction

Reading is the basis of all kinds of learning. However, becoming an effective reader requires cultivating habits of extensive reading and acquiring efficient reading strategies. "Reading strategies" play a crucial role in understanding the essence of reading material, collocating attention, and monitoring the reading processes (Duke & Pearson, 2002). According to the Programme for International Student Assessment (PISA), summarization is an important reading strategy that could be used to improve students' reading performance (OECD, 2013). It can be used to organize information for a better understanding of the reading material and to precisely describe the essence of the text. However, this is an ability that most senior high school students in Taiwan lack, based on observation of their performance on the PISA test. Literature on reading summarization falls into two categories, textual (Jeong, 2011) and graphic (Chang, Sung, & Chen, 2002) summarization. Comparing the effect of the collaborative textual summarization strategy with direct instruction, Jeong (2011) found that summarization helped fourth graders better identify main ideas and write summaries. On the other hand, studies have also provided empirical results supporting the advantages of presenting summaries with graphical visualization. Chang, Sung, and Chen (2002) found that combining concept maps with textual summarization can enhance text summarization abilities and improve learning performance. Similarly, some studies adopted mind maps (Buzan, 1991), a special type of concept map, and obtained positive results in terms of improving reading comprehension performance (Brinkmann, 2003; Merchie & Van Keer, 2012).

In light of these studies, we intended to integrate textual and graphical summarization strategies into the reading process to compare their possible different effects on students' reading comprehension. We also aimed to identify whether incorporating the mind mapping tool in group or individual reading activities would be more beneficial for students.

2. Study

This study aimed to compare the effects of different types of summarization tools (textual vs. graphical summarization) and the forms of classroom-reading activities (individual reading vs. group reading) at the same time, to understand their impacts on students' reading performance. It is worth exploring whether the effect of graphical summarization strategy in the context of group-based discussion is the most efficient reading strategy for students.

2.1 Participants

A total of 272 vocational high school students (aged 16-18) in Taiwan participated in this study. The students were assigned to one of the three groups with different reading summary strategies: the "cooperative mind maps," "co-text," and "individual mind map" groups. As a result, cooperative mind map groups ($N = 107$), co-text groups ($N = 83$), and individual mind map groups ($N = 82$) were formed. For the two groups with a cooperative summary writing process (the cooperative mind maps group and the co-text group), students were further required to form smaller groups of 3 to 4 students for discussion purposes.

2.2 Procedure

The whole experiment was conducted for around 2 months with 45 minutes per week. In the first week, all participants were administered a pre-test on PISA and were then assigned to the Cooperative mind maps group, the Co-text group, or the Individual mind map group. In the following weeks, participants underwent the major reading and summary sessions. The Cooperative mind maps group and the Individual mind map group were trained to use the Xmind mind mapping tool. They then took part in a reading activity using mind maps to summarize the main ideas of the article on "Media Literacy and Right to Communicate." The Co-text group took part in the same activity without using mind maps. In addition, the Cooperative mind maps group and the Co-text group were instructed to engage in group discussion and to contrast their own perspectives during the process. In the last week, all participants were administered a post-test based on PISA.

3. Preliminary Results

To understand the possible different influences of the reading summary strategy on learners' reading comprehension ability, an ANCOVA was performed to examine the differences in the PISA post-test scores of the three groups, with the covariate variable being the PISA pre-test score. Before conducting ANCOVA statistical analyses, we needed to assess whether the correlation between the covariate and the dependent variable differed significantly among the groups. There was no significant interaction between the three groups and the PISA pre-test score ($F = 1.22, p = .30$), indicating that the assumption of homogeneity of the regression slopes was met. The ANCOVA result (Table 1) indicated that significant difference existed between the three groups on the PISA test ($F = 3.04, p = .05, \eta^2 = .02$). In particular, participants in the cooperative mind maps group ($M = 3.97, SD = .06$) scored significantly higher than those in the individual mind map group ($M = 3.73, SD = .07$).

Table 1: Mean, standard deviation, and adjusted means for the PISA scores.

| Measurement | Group | N | Pre-test | | Post-test | | |
|-------------|-------|-----|----------|-----|-----------|-----|--------|
| | | | M | SD | M | SD | Adj. M |
| PISA score | 1 | 107 | 3.66 | .56 | 4.01 | .63 | 3.97 |
| | 2 | 83 | 3.51 | .49 | 3.83 | .67 | 3.87 |
| | 3 | 82 | 3.55 | .52 | 3.71 | .72 | 3.73 |

Group 1: Cooperative mind maps group; 2: Co-text group; 3: Individual mind map group

4. Conclusion and Discussion

Our results showed that the Cooperative mind maps group outperformed the Individual mind map group in the PISA test, suggesting that the mind map alone could not produce satisfactory reading comprehension. Using a mind map to present a reading summary first helps students to identify the key concepts and clarify the relationships among major concepts. When it is further implemented in a cooperative setting, the effect could be optimized to enhance students' reading comprehension. Cooperative mind maps could help prompt students to focus on discussing the reading-related tasks rather than being distracted by aimless chatting during group discussion; they were prompted to collaboratively reflect on and examine the relationships between the concepts retrieved from the text.

Our preliminary results suggested that when teachers ask students to read, they should encourage them to adopt the mind mapping tool to turn their reading notes into graphic form, discuss with their classmates in a group-based setting, and then generate a final mind map to represent their final reading summary.

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