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Training Self-Explanation Strategies:
Effects of Prior Domain Knowledge and Reading Skill

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Introduction

Numerous studies have demonstrated the benefits of self-explaining while reading text (e.g., Chi, de Leeuw, Chiu, & LaVancher, 1994). Chi and her colleagues have found that readers who explain the text either spontaneously or when prompted to do so understand more from the text and construct better mental models of the content. These studies and others provide promising evidence for the benefits of having students self-explain while reading text. The present study examined the benefits of providing self-explanation training to middle-school children to improve learning from science texts.

Prior domain knowledge has also been found to enhance text comprehension. However, little effect of prior knowledge on the effectiveness of self-explanation has been found. One purpose of this study was to further examine whether the effectiveness of self-explanation training depended on the prior knowledge of the reader. If the inferences encouraged during self-explanation are unsuccessful due to the lack of sufficient knowledge, self-explanation should be less beneficial for low-knowledge readers (e.g., McNamara & Kintsch, 1996).

The second purpose was to determine whether the benefits of training depended on prior reading skill. If skilled readers already engage in the active processing encouraged during the self-explanation process, then these readers should benefit less from self-explanation. Only less-skilled readers who do not naturally engage in these processes should benefit from training.

Method

The subjects were 29 middle-school children, including 13 control subjects and 16 self-explanation training subjects. Subjects prior domain knowledge, reading skill, and working memory capacity were measured before training began.

During training, subjects read four science texts. The training group first received a brief instruction in self explanation and comprehension monitoring strategies. The instruction focused on the benefits of paraphrasing, using logic, predicting what the text would say, making bridging inferences, and monitoring comprehension. The training subjects then read and self-explained aloud four science texts. After answering questions about the text, they watched a video of another student self-explaining the text. The subject identified which strategies the student in the video was using. The control subjects read the same four texts aloud and answered questions about the text, but did not self-explain the texts and did not watch the video.

After training, all of the subjects self-explained a text about heart disease. The control subjects were told how to self explain but were not provided with strategy instruction. The subjects were told to self-explain while reading the text, but were not prompted to do so. The entire experiment required five sessions.

Results

Training results allow the comparison of self-explanation (i.e., training) and reading aloud (i.e., control). The effect of self-explanation was not reliable. This lack of an effect is due to the contributing effects of both prior knowledge and reading skill. As shown below, high-knowledge readers understood more from the texts than low-knowledge readers regardless of condition. Moreover, skilled readers comprehended the text well regardless of condition, whereas less-skilled readers benefited from self-explaining while reading the texts. This indicates that the skilled readers actively processed the texts regardless of condition.
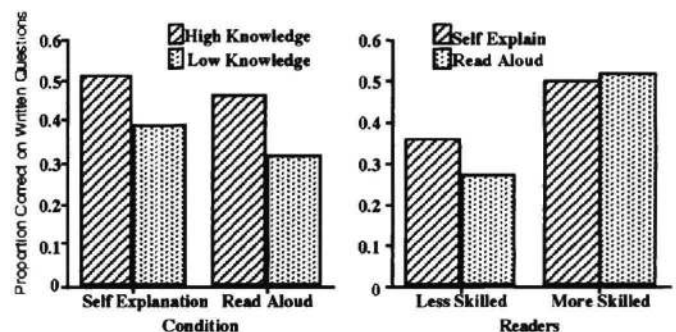

Fig. 1: Comprehension performance during training.

All subjects self-explained a fifth text after training to determine the benefits of self-explanation training. There were no benefits. There were also no effects of reading skill, nor of working memory capacity. The only contributing factor to comprehension was the reader's prior knowledge. High prior knowledge readers performed better on the comprehension questions (M=0.46) than low knowledge readers (M=0.26). This advantage also did not depend on the quality or quantity of the self-explanations while reading the text. In contrast to previous findings, this study clearly demonstrates that prior knowledge plays a critical role in determining the effectiveness of self-explanation.

Chi, M. T. H., de Leeuw, N., Chiu, M., & LaVancher, C. (1994). Eliciting self-explanations improves understanding. *Cognitive Science, 18*, 439-477.

McNamara, D. S., & Kintsch, W. (1996). Learning from texts: Effects of prior knowledge and text coherence. *Discourse Processes, 22*, 247-288.