Available online at www.sciencedirect.com
ScienceDirect
Contemporary Educational Psychology 32 (2007) 389–399
Contemporary Educational Psychology
www.elsevier.com/locate/cedpsych

Enhancing comprehension in small reading groups using a manipulation strategy

Arthur M. Glenberg [a,*], Megan Brown [a], Joel R. Levin [b]

[a] *University of Wisconsin–Madison, USA*
[b] *University of Arizona, USA*

Available online 5 June 2006

Abstract

Having young readers manipulate objects to correspond to the characters and actions in a text greatly enhances comprehension as measured by both recall and inference tests. As a step toward classroom implementation, we applied this manipulation strategy in small (three-child) reading groups. For successive critical sentences, one child would read the sentence aloud and then manipulate the objects, then the next child would read and manipulate, and so on. Children in a reread control condition also alternated reading the text. For the reread condition, one child would read the critical sentence and then reread it, followed by the next child, and so on. Children who manipulated were substantially more accurate in answering questions about the texts. Thus, the manipulation strategy meets at least some of the criteria for being applicable in a classroom setting, namely it is effective when applied in small groups.

Keywords: Reading; Reading comprehension; Reading intervention; Small groups; Manipulation; First-grade; Reading groups

1. Introduction

Constraints on teacher time and materials are important considerations in judging the feasibility of an educational intervention. For example, a computer-based intervention is not of much use in a school that has few computers, and a one-on-one technique is not of

* Corresponding author. Fax: +1 608 262 402.
E-mail address: Glenberg@wisc.edu (A.M. Glenberg).

0361-476X/$ - see front matter © 2006 Elsevier Inc. All rights reserved.
doi:10.1016/j.cedpsych.2006.03.001

much use in a school with few teachers or aides. Recently, we demonstrated that a reading strategy that provides hands-on manipulation of story-relevant objects can boost young children's reading comprehension of short texts by close to two standard deviations (Glenberg, Gutierrez, Levin, Japuntich, & Kaschak, 2004). However, in that research, the manipulation strategy was taught on an individualized basis. In this article, we assess whether the strategy is also effective when used in small groups much like reading groups in classrooms. The remainder of this introduction briefly reviews the theory behind the manipulation strategy and previous research bearing on it. We then present an experiment in which a group-based version of the strategy is implemented. We end with a discussion of constraints on the manipulation strategy's application, along with speculations about when the strategy is likely to be successful and when not.

With the manipulation strategy, children read texts with critical sentences marked by a small drawing of a green traffic light. The green light signals the child to manipulate toy objects (e.g., for stories in a farm setting, a toy barn, horse, tractor, etc.) to correspond to the events described in the sentence. Thus, if the child read, "The farmer drove the tractor to the barn," the child would place the farmer in the tractor and move the tractor to the barn.

There are several reasons to believe that this type of manipulation should enhance text memory and comprehension. First, a good deal of research on memory (e.g., Koriat & Pearlman-Avnion, 2003) has shown that participants who mime phrases (e.g., "break the toothpick") remember much more than participants who simply try to memorize the phrases. This result is consistent with numerous others from both the motor-activity (e.g., Rubman & Waters, 2000), and self-performed task (e.g., Kormi-Nouri, Nyberg, & Nilsson, 1994) literatures—see, for example, Marley and Levin (2006).

Second, the effect is broadly consistent with a dual-coding approach (e.g., Paivio, 1986; Sadoski & Paivio, 2001). That is, the manipulation strategy introduces a visuomotor component in addition to the verbal code from the text. These "dual codes" are posited to be associated with separate but interdependent information-processing systems, which when combined will lead to more durable storage and retrieval than will either code separately. Whereas we have reason to believe that an important aspect of our intervention is the child manipulation activity per se (cf. the just-mentioned benefits of activity and self-performed tasks on memory), our findings are similarly consistent with predictions from dual-coding theory (see also Mayer, 2001).

Third, the effect is consistent with the notion of mental models in text comprehension (e.g., Johnson-Laird, 1983; Kintsch, 1988). That is, text comprehension may be described as the creation of mental models, or representations of what the text is about rather than representations of the text itself (Glenberg, Meyer, & Lindem, 1987). The manipulation technique makes the process of mental model creation transparent to children.

Finally, the effect is consistent with most embodied theories of cognition. In these theories, words and phrases get their meanings from the perceptual properties (e.g., Barsalou, 1999) and activities (e.g., Glenberg & Robertson, 1999, 2000) performed on corresponding objects. For example, Glenberg and Robertson's Indexical Hypothesis (IH) is based on three overlapping comprehension processes. First, words and phrases are indexed (mapped) to corresponding objects in the environment or perceptual symbols (Barsalou, 1999). Second, affordances (Gibson, 1979) are derived from the indexed objects. Affordances are relations between objects and actors that take into account biological constraints on action. Thus, a chair affords sitting, standing on, or hoisting into a defensive