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The role of observation in the recall of informational text

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ABSTRACT

This study, which reports on previously unpublished data gathered in connection with a summer literacy-science program, *Summer Explorers* (Bruning & Schweiger, 1997), examined the role and timing of observation on informational text recall by elementary school students. Students ($N = 206$) in Grades 3–5 observed and read about the Madagascar Giant Hissing Cockroach (MHC). Three conditions were employed: (1) students first observing live MHCs, then reading facts about them; (2) students first reading facts about MHCs and then observing them; and (3) students only reading facts about MHCs. Students in the observation conditions recalled more facts than those in the no observation condition, with Grade 4 and 5 students benefitting more from the observation experience than Grade 3 students. Grade 3 students showed heightened levels of interest but not improved recall in the observation conditions, findings consistent with potential developmental differences in metacognitive awareness for instructional activities.

1. Introduction

Contemporary views on science education emphasize acquiring scientific literacy through active, inquiry-based participation in science-related activities, with observation seen as a primary tool for inquiry (Bruning, Schraw, & Norby, 2011; Linn & Eylon, 2006). This emphasis on inquiry has led to programs that teach systematic observational skills to early elementary-aged students (e.g., Gelman & Brenneman, 2012). Observation – for instance, seeing a spider, butterfly, or deer in its natural habitat – clearly is an essential component of scientific inquiry and can provide a powerful stimulus to subsequent learning (e.g., Guthrie, McRae, & Klauda, 2007). Referring to this observation–learning relationship, Guthrie, Alao, and Rinehart (1997) have stated, "If this real-world interaction leads to conceptual questions that students desire to answer, they will read, write, and discuss with enthusiasm (p. 441)."

As Guthrie et al. (2007) have argued, however, observation itself is not all that is needed to become an "expert" on any scientific topic. For example, while students' sighting coyotes in a prairie setting or observing them in a zoo gives them unique knowledge and can stimulate a strong desire to learn more about coyotes, other forms of learning are needed to build essential knowledge, such as how their characteristics, behaviors, and habitats relate to those of other canines (e.g., dingoes, wolves, etc.). Reading, especially of informational texts, is arguably the most prominent among these other forms of learning, providing the descriptive and comparative information needed for deep conceptual understanding. To date, however, little

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empirical work has focused specifically on how relationships between observation and reading of related informational texts can affect recall of science-related informational content. These connections, we argue, merit further exploration.

This article reports previously unpublished data gathered in a study conducted in the context of an observation-based summer program for elementary school students (*Explorers*, Bruning & Schweiger, 1997). The purpose of this study was to examine the effects observation and its timing might have upon the recall of information encountered in learning from informational text sources and on interest in learning more about what was observed. It also sought to gather information on how age-related factors might influence relationships between observation and learning from reading. As described in the following sections, we posited that observation can stimulate both cognitive (e.g., directing learning, providing episodic anchors for later experience) and motivational responses (e.g., providing novel experiences, enhancing situational interest) that may increase engagement and learning from text-related information.

1.1. Observation and informational text

There has been increasing recent recognition of the importance of early experience with informational texts. For instance, Duke (2004) and others (e.g., Gregg & Sekeres, 2006) have pointed out a neglect of informational texts in the early grades, resulting in policy-oriented proposals calling for greater emphasis on informational texts early in the elementary years (e.g., National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010). Britt, Richter, and Rouet (2014) argue that unfamiliarity with text structure of expository texts is a significant challenge for young learners attempting to gain scientific literacy. Gregg and Sekeres (2006) have suggested that children need to be taught how to comprehend and learn from expository texts in younger grades (K-3), positing that providing students with "realia," or actual objects that students can see and touch, will increase their interest and motivation for reading expository texts. Similarly, Schwan, Grajal, and Lewalter (2014) describe the need for authencity that involves the learner being provided with something "real" or "original" commonly with hands-on approaches. This coincides with Duke's (2004) emphasis on providing authentic purposes for reading expository texts. She has argued that students having real experiences or purposes for reading will better engage and comprehend information from that reading. Providing observational experiences for students prior to exposure to expository texts has the potential to create just such authentic experiences and purposes for learning. Categories and knowledge of relationships young children have acquired from their visual world, even though tacit and typically unexpressed, may help direct their attention and assist in organizing the knowledge coming to them through the relatively abstract dimension of a text description. Because of the immediacy of visual perception, observation also may play a motivational role in reading tied to the child's visual-perceptual world.

As indicated previously, contemporary theories of science learning emphasize the active construction of knowledge through direct experience (Linn & Eylon, 2006; NSTA, 2004). Observation, a vital component of this experience, gives students the opportunity to form schematic representations with which text-based information can be integrated. It also arguably establishes episodic memories that can later serve to anchor subsequent text-based information. For instance, analogous work with pictures and learning from text by Glenberg and Langston (1992) led them to conclude that pictures accompanying text can help build mental models from which inferences can be drawn more flexibly than when no pictures are involved. Varelas, Pieper, Arsenault, Pappas, & Keblawe-Shamah (2014) reported on a five-day instructional sequence with 28 Latina/o third graders that combined dialogical read-alouds with hands-on activities related to earthworms. Their findings, using a qualitative, interpretive framework led them to conclude that hands-on experiences and the use of informational texts have a synergistic relationship within science instruction and that both are needed in combination for appropriate meaning making to take place.

In terms of motivation, observation clearly functions to direct students' attention, provides opportunities for sharing new discoveries with peers, encourages questioning, and increases situational interest (Guthrie et al., 2006, 2007), coinciding with Deci and Ryan (1987) description of autonomy-supporting environments with the goal of developing self-determined learners in our schools (Deci, Vallerand, Pelletier, & Ryan, 1991). When this framework is adopted, a fundamental shift – from teacher centered to student centered – is likely to occur in the classroom. The novel experience of observation also is likely to heighten student curiosity. Given that students have enough background knowledge to form questions, observational experiences can create curiosity as students seek to resolve gaps in their knowledge that become apparent to them while observing (Lowenstein, 1994). Observation may also capitalize on personal (long-standing, stable) or situational (contextually based) interest. Hidi and her colleagues (Hidi, 1990; Hidi & Renninger, 2006) have argued that situational interest, which appropriate observational experiences are likely to stimulate, can be a particularly effective tool for motivating students with low levels of background knowledge. Maintaining interest is important for unmotivated students given that higher levels of interest have been shown to increase learning from text (Schiefele, 1999).

A number of prior studies have shown that observation generally can have positive effects both on enhancing memory and increasing interest in a topic. For instance, Henry (1992) reported on a class of 51 middle school students who were asked to recall their experiences from a field trip to an art museum that took place 18 months previously. One hundred percent of the students provided description about the artwork, 88% provided judgments about the artwork, and 78% provided an analysis of the artwork that included at least some formal components. In the realm of science, Finson and Enochs (1987) reported significantly more positive attitudes toward science and technology for visiting versus nonvisiting students after a trip to a science/technology related museum. Chang and Linn (2014) showed that use of an online visualization program by middle-school students led to significant gains in performance on knowledge integration items