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The Sixth Pillar of Reading Instruction:

Knowledge Development

Gina N. Cervetti

cervetti@umich.edu

University of Michigan

School of Education

610 E. University Avenue, Rm. 4039

Ann Arbor, MI 48109

Elfrieda H. Hiebert

hiebert@textproject.org

TextProject, Inc., and University of California, Santa Cruz

106 Phelan Court

Santa Cruz, CA 95060

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Abstract

The National Reading Panel (NRP) identified five pillars, or essential components, of reading instruction that lead to the highest chance of reading success—phonemic awareness, phonics, fluency, vocabulary, and comprehension. A decade after the NRP's report, the majority of US states adopted the Common Core State Standards/English Language Arts & Literacy (CCSS/ELA). One of the most significant changes of the CCSS/ELA is a focus on knowledge development as part of literacy development and focus on the acquisition of literacy skills specific to different disciplines. In highlighting these connections between ELA and knowledge as part of literacy, the CCSS/ELA provide an opportunity for teachers to emphasize what research has validated for decades: that knowledge is a critical component of the reading process. In this column, we describe why knowledge development should be viewed as the sixth pillar of reading instruction and how teachers can increase their students' knowledge building through reading.

In 2000, the National Reading Panel (NRP; NICHD, 2000) identified five pillars, or essential components, of reading instruction that lead to the highest chance of reading success—phonemic awareness, phonics, fluency, vocabulary, and comprehension. Since its publication almost 15 years ago, the report has had an enormous impact on reading instruction and policy.

A decade after the release of the NRP report, the majority of US states adopted the Common Core State Standards/English Language Arts & Literacy (CCSS/ELA; NGA Center for Best Practices & CCSSO, 2010). Among the significant changes brought by the CCSS/ELA is a focus on knowledge development as part of literacy development and a focus on the acquisition of literacy skills specific to learning in different disciplines. The CCSS/ELA call for increases in the proportion of informational texts at all grade levels and indicate that, "by reading texts in history/social studies, science, and other disciplines, students build a foundation of knowledge in these fields that will also give them the background to be better readers in all content areas" (p. 10).

In forming connections between ELA and disciplinary study and in focusing on increasing the amount of informational reading students are doing, the CCSS/ELA provide an opportunity to realize what we have known for decades: that knowledge is a critical component of the reading process, which has a tremendous impact on what students understand and learn from reading. In light of this opportunity, we propose that a sixth pillar be added to the components of reading instruction: knowledge development.

The Significance of Knowledge in Reading

Knowledge supports every aspect of reading from reading accuracy and fluency (e.g., Priebe, Keenan, & Miller, 2012) to literal and inferential comprehension (e.g., Reutzel & Morgan, 1990). Studies have found that readers who have more knowledge of the topic of a text

make fewer errors during oral reading and make higher-quality, meaning preserving miscues when they do make errors (Priebe, et al., 2012; Taft & Leslie, 1985). For example, Priebe et al. reported that prior knowledge seemed to provide semantic (meaning) constraints on the process of identifying a word, leading to a higher rate of accurate identification and reducing readers' reliance on graphic information alone.

Knowledge also strongly influences students' comprehension of text (Best, Floyd, & McNamara, 2008). Prior knowledge impacts the ability of readers to understand and make inferences within a text. It also supports their ability to remember information that is central to understanding an informational text, rather than remembering peripheral information (e.g., Miller & Keenan, 2009). In studies that assess both general reading ability and topic knowledge, knowledge is often the better predictor of comprehension (e.g., Recht & Leslie, 1988).

Knowledge of a text's topic seems to support comprehension by freeing up limited attentional resources, so readers can focus on making meaning. Very familiar background knowledge can be activated automatically during reading with little cost to limited working memory resources (Graesser, Singer, & Trabasso, 1994). Prior knowledge also helps readers fill in gaps in texts, easing comprehension (Ozuru, Dempsey, & McNamara, 2009). As a result, individuals with more knowledge about a text's content are better able to use the context of a text to make sense of new information, and they are better able to form connections across different parts of a text (Rapp, van den Broek, McMaster, Kendeou, & Espin, 2007). Knowledge of a text's topic, thus, supports understanding of a particular text and also increases the likelihood that readers will acquire new information and vocabulary knowledge as they read.

Knowledge not only seems to facilitate understanding because it provides a base of information to support comprehension, but also because it influences how readers interact with

text. For example, higher knowledge readers seem to spend more time making sense of ambiguous text—slowing down and persisting through difficulties—which helps them understand and remember what they read (e.g., McNamara & Kintsch, 1996).

The CCSS/ELA and Knowledge-Building

The CCSS provides an opening to act upon the understanding that knowledge matters for reading development. Increased attention to informational texts was evident in the wave of state standards that preceded the CCSS/ELA, but the new standards foreground knowledge-development as a focus and outcome of ELA instruction. This foregrounding of knowledge is evident in a number of features of the Standards.

- **Strong content knowledge is one of the seven features of being College and Career Ready (CCR):** General knowledge and discipline-specific expertise characterizes students who are ready for college and the workplace.
- **A cluster of the standards is devoted to integration of knowledge and ideas:** Integration of knowledge and ideas forms one of four clusters of standards (alongside Key Ideas and Details, Craft and Structure, and Range of Reading and Level of Text Complexity).
- **Standards for reading with informational texts are presented separately from standards for reading with narrative texts:** Each of the four clusters of reading standards are represented by separate, but equivalent, representations for literature and informational text.
- **The amount of informational text increases relative to narrative text over the school years:** The CCSS writers provided ratios for the amount of narrative and informational texts that should form the foundation of the school day at different grade levels, using the

guidelines from the National Assessment Governing Board (NAGB, 2009) for the reading assessment: 50:50 at Grade 4, 45:55 at Grade 8, and 30:70 at Grade 12. The CCSS/ELA extend the guidelines to the entire grade span: 50-50 for Grades K-5 and 30-70 for Grades 6-12 (Achieve the Core, 2012).

These four features support a focus on knowledge development as the sixth pillar of reading instruction. However, while much attention has been paid to the turn toward more informational text across the school years, less attention has been paid to the connection between reading more informational text and knowledge building and learning in the disciplines. Educators at all levels—classroom to university—will need to collaborate to determine how best to make knowledge building at the center of the CCSS/ELA. In the section that follows, we map out some suggestions to support that effort.

Using the CCSS as a Springboard for the 6th Pillar

One way to support knowledge-building as part of ELA instruction is to link the texts that students use in learning to read and write with content-area instruction. There is substantial evidence that linking literacy instruction and content-area learning is beneficial for students' literacy development (Cervetti, 2013). Periods of the school day should continue to be devoted to content-area instruction within the ELA classroom, but students can also read and respond to texts that emphasize the critical themes of disciplines within ELA instruction. A new set of science standards (Next Generation Science Standards; NGSS Lead States, 2013) and social studies standards (National Council for Social Studies, 2013) provide guidance for these connections.

One of the most important benefits of using concept-rich texts and text sets in ELA instruction is that it supports a focus on the development of conceptual understanding, rather

than simply the acquisition of facts. Research has shown that, while many types of knowledge—factual, domain-specific, general ideas about the world, and word meanings—support reading comprehension, conceptual knowledge has the strongest impact on comprehension (Tarchi, 2010).

To illustrate the nature of this instruction, we have identified a strand from the NGSS for the Grade 4-5 grade band—engineering. Among various topics of the NGSS, engineering seems especially germane to ELA in that the processes of solving problems have an analogue to the processes of most human endeavors, including those in narratives.

The NGSS provides the standard "Engineering design" in three sections: (a) science and engineering practices, (b) disciplinary core ideas, and (c) crosscutting concepts). There is also a section of each standard that makes connections to the CCSS/ELA. The crosscutting concept for the Engineering standard is "Influence of science, engineering, and technology on society and the natural world" (NGSS, 2013, p. 32). As this statement illustrates, the themes within the content standards are stated globally. To develop the knowledge implicit in global themes, the grain size of content needs to be smaller. We used the Massachusetts curriculum framework for technology/engineering (Massachusetts Department of Education, 2006), one of the first states to identify with engineering standards, and also extended reading on the topic to identify the topics in Table 1.

We then chose a small sample of texts for use in Grade 4-5 classrooms to support building and extending knowledge about engineering. Among the texts are several open-access magazine articles, illustrating a critical source for knowledge-building in classrooms. We use the themes and texts in Table 1 to illustrate how ELA instruction supports knowledge-building of

concepts around engineering. When reading sets of conceptually-rich texts, we can support students' comprehension and knowledge building in the following ways:

- **Discussions**. The research literature is full of evidence about the critical role of discussion in comprehension and learning from reading (e.g., Murphy, Wilkinson, Soter, Hennessey, & Alexander, 2009). Discussions that build knowledge are guided by questions that call on students to think deeply about important concepts in texts and connect information from different parts of texts or across multiple texts. In particular, why and how questions direct students' attention to important information in a text, help them form connections across different parts of a text, and help students monitoring their comprehension (Hartman, 1995).
- **Argument and elaboration**. Research with adults has shown that asking students to engage with multiple, topically-related texts in order to construct arguments and explain phenomena facilitates integrated understandings more than asking students to answer text-based questions (Cerdán and Vidal-Abarca, 2008). Reading to construct arguments seems to be particularly powerful in helping student gain deeper and more integrated understandings of texts (Bråten & Strømsø, 2010).
- **Applications and extensions.** It is important to give students reasons to read and make sense of the concepts they are developing across texts by providing opportunities to apply their learning. This may involve writing to communicate their learning to an audience within or outside of the classroom. It may also involve applying the concepts to their investigations in content-area study.

Using the first set of books in Table 1, which focus on the utility of everyday items developed by engineers, you might engage students in a discussion of cross-cutting questions,

such as how technologies have solved problems in everyday life and made us safer. You might ask students to develop an argument for or against a claim, such as "People will always need new inventions to solve problems." You might help students apply their learning about inventions that changed our lives as they work in science instruction to generate engineering-based and evaluate solutions to problems (NGSS 3-5-ETS1-2).

Conclusions

In using content-area connections to support students' knowledge-building as part of ELA instruction, we create opportunities for rich engagement with the kinds of reading and writing that are the focus of ELA instruction under the CCSS/ELA. It provides opportunities for students to form connections among series of events and ideas (CCSS.ELA-LITERACY.RI.2.3), to integrate knowledge across different texts on the same topic (CCSS.ELA-LITERACY.RI.2.9), to read and comprehend technical texts at a range of difficulties (CCSS.ELA-LITERACY.RI.2.10), and to write topic-driven informative texts (CCSS.ELA-LITERACY.W.2.2). At the same time, we build the knowledge that will prepare students to engage in content-area learning as they continue in school. It is time to recognize knowledge-building as the critical sixth pillar of reading instruction.

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Table 1.

Grade 4-5 Texts Dealing with Engineering Design

Concept	Relevant Text
Many of the things we use every day were designed by engineers, working to solve a problem.	*You wouldn't want to live without cell phones* (Pipe, 2015) *Switched on, flushed down, tossed out: Investigating the hidden workings of your home* (Romanek, 2005)
One source of creative thinking for solutions is the natural world (e.g., bird's wings and airplane's wings)	*Biomimicry: Inventions inspired by nature* (Lee, 2011) *Nature got there first: Inventions inspired by nature* (Gates, 2010)
Huge engineering projects, such as bridges, tunnels, and dams, require considerable teamwork and collaboration among many groups of people.	*Built to last* (Sullivan, 2005) *The Hoover Dam* (Mann, 2006)
Engineers with unique solutions to problems can face many obstacles in getting their ideas accepted and implemented.	*Victor Wouk: The father of the hybrid car* (Callery, 2009) *Electrical wizard: How Nikola Tesla lit up the world* (Rusch, 2013)
Using materials and tools to solve problems	*Taking out trash by the ton* (FYI for Kids,

and invent solutions is a process in which people of all ages can engage.	2014) *From grease to gold* (FYI for Kids, 2014)