

# Writing to Read

Evidence for How Writing  
Can Improve Reading

**Steve Graham and Michael Hebert  
Vanderbilt University**

**A Report from Carnegie Corporation of New York**

## **About the Alliance for Excellent Education**

The Alliance for Excellent Education is a Washington, DC-based national policy and advocacy organization that works to improve national and federal policy so that all students can achieve at high academic levels and graduate high school ready for success in college, work, and citizenship in the twenty-first century. The Alliance focuses on America's six million most-at-risk secondary school students—those in the lowest achievement quartile—who are most likely to leave school without a diploma or to graduate unprepared for a productive future.

The Alliance's audience includes parents, educators, the federal, state, and local policy communities, education organizations, business leaders, the media, and a concerned public. To inform the national debate about education policies and options, the Alliance produces reports and other materials, makes presentations at meetings and conferences, briefs policymakers and the press, and provides timely information to a wide audience via its biweekly newsletter and regularly updated website, [www.all4ed.org](http://www.all4ed.org).

## **About Carnegie Corporation of New York**

Carnegie Corporation of New York, which was established by Andrew Carnegie in 1911 “to promote the advancement and diffusion of knowledge and understanding,” is one of the oldest, largest, and most influential of American grantmaking foundations. The foundation makes grants to promote international peace and to advance education and knowledge—primary concerns to which founder Andrew Carnegie devoted the foundation. For more information, visit [www.carnegie.org](http://www.carnegie.org).

## The Authors

**Steve Graham** is the Currey-Ingram Professor of Special Education and Literacy, a chair he shares with Karen R. Harris, at Vanderbilt University's Peabody College of Education. Dr. Graham's research interests include how writing develops, why some students have difficulty mastering this critical skill, and the identification of effective writing practices. He is the current editor of *Exceptional Children* and the former editor of *Contemporary Educational Psychology* and has written over 250 publications, including *Handbook of Writing Research*, *Best Practices in Writing Instruction*, *Writing Better, Powerful Writing Strategies for All Students*, and *Handbook of Learning Disabilities*, and *APA Handbook of Educational Psychology* (in preparation). He is the author of the influential meta-analysis of writing interventions, *Writing Next*, funded by Carnegie Corporation of New York. Dr. Graham is the recipient of the Council of Exceptional Children's Career Research Award, the Samuel A. Kirk Award from the Division of Learning Disabilities, and the Distinguished Research Award from the Special Education Interest Group of the American Educational Research Association.

**Michael Hebert** is a doctoral student in special education at Vanderbilt University's Peabody College of Education. He is in the Experimental Education Research Training Program (ExpERT) at Vanderbilt, supported by the U.S. Department of Education's Institute for Education Sciences (IES). Mr. Hebert's research interests include writing development, reading development, and how writing may influence reading development, especially for students with reading and writing difficulties. He has several years of classroom teaching experience at the elementary level, including a year teaching on a Navajo reservation in Arizona. Mr. Hebert has several years of experience as a reading specialist in El Segundo, California, where he taught students with reading difficulties, and he is a National Writing Project Fellow through the California Writing Project at UCLA.

## **Acknowledgments**

The authors would like to thank Andrés Henríquez, program officer at Carnegie Corporation of New York, who offered helpful suggestions in conceptualizing and reporting the research reviewed. We also wish to thank Paul Morphy, who provided technical assistance in calculating some effect sizes, as well as Rachel Mathias, Nicole Beitler, and Angeline Clark, who helped with various aspects of the project, including conducting electronic searches and locating studies. A special thanks goes to Andrew Wilson, Gina Biancarosa, and Bob Rothman, who took our original document and reworked it so that it was suitable for a broad audience. Finally, we especially appreciated feedback from the National Writing Project on how to make the initial draft of the document better.

Steve Graham

Michael Hebert

## **CONTENTS**

---

Foreword by Vartan Gregorian .....	1
Executive Summary .....	3
Introduction .....	7
Recommendations for Using Writing to Improve Reading, as Identified by Meta-Analysis .....	9
Implementing the Recommendations .....	23
A Research Agenda for the Future .....	27
References.....	31
Appendix A: Meta-Analysis Methodology .....	37
Appendix B: Details of Experimental and Quasi-Experimental Studies Supporting Key Elements of the Impact of Writing on Reading.....	49

---

## FOREWORD

Around the world, from the cave paintings in Lascaux, France, which may be 25,000 years old, to the images left behind by the lost Pueblo cultures of the American Southwest, to the ancient aboriginal art of Australia, the most common pictograph found in rock paintings is the human hand. Coupled with pictures of animals, with human forms, with a starry night sky or other images that today, we can only identify as abstract, we look at these men's and women's hands, along with smaller prints that perhaps belong to children, and cannot help but be deeply moved by the urge of our ancestors to leave some permanent imprint of themselves behind.

Clearly, the instinct for human beings to express their feelings, their thoughts, and their experiences in some lasting form has been with us for a very long time. This urge eventually manifested itself in the creation of the first alphabet, which many attribute to the Phoenicians. When people also began to recognize the concept of time, their desire to express themselves became intertwined with the sense of wanting to leave behind a legacy, a message about who they were, what they had done and seen, and even what they believed in. Whether inscribed on rock, carved in cuneiform, painted in hieroglyphics, or written with the aid of the alphabet, the instinct to write down everything from mundane commercial transactions to routine daily occurrences to the most transcendent ideas—and then to have others read them, as well as to read what others have written—is not simply a way of transferring information from one person to another, one generation to the next. It is a process of learning and hence, of education.

Ariel and Will Durant were right when they said, “Education is the transmission of civilization.” Putting our current challenges into historical context, it is obvious that if today's youngsters cannot read with understanding, think about and analyze what they've read, and then write clearly and effectively about what they've learned and what they think, then they may never be able to do justice to their talents and their potential. (In that regard, the etymology of the word *education*, which is “to draw out and draw forth”—from oneself, for example—is certainly evocative.) Indeed, young people who do not have the ability to transform thoughts, experiences, and ideas into written words are in danger of losing touch with the joy of inquiry, the sense of intellectual curiosity, and the inestimable satisfaction of acquiring wisdom that are the touchstones of humanity. What that means for all of us is that the essential educative transmissions that have been passed along century after century, generation after generation, are in danger of fading away or even falling silent.

In a recent report, the National Commission on Writing also addresses this concern. They say, “If students are to make knowledge their own, they must struggle with the details, wrestle with the facts, and rework raw information and dimly understood concepts into language they can communicate to someone else. In short, if students are to learn, they must write.”

It is in this connection that I am pleased to introduce *Writing to Read*, which builds on *Writing Next* by providing evidence for how writing can improve reading. As both reports warn, American students today are not meeting even basic literacy standards and their teachers are often at a loss for how to help them. In an age overwhelmed by information (we are told, for example, that all available information doubles every two to three years), we should view this as a crisis, because the ability to read, comprehend, and write—in other words, to organize information into *knowledge*—can be viewed as tantamount to a survival skill. Why? Because in the decades ahead, Americans face yet another challenge: how to keep our democracy and our society from being divided not only between rich and poor, but also between those who have access to information and knowledge, and thus, to power—the power of enlightenment, the power of self-improvement and self-assertion, the power to achieve upward mobility, and the power over their own lives and their families’ ability to thrive and succeed—and those who do not.

Such an uncrossable divide will have devastating consequences for the future of America. Those who enrich themselves by learning to read with understanding and write with skill and clarity do so not only for themselves and their families, but for our nation as well. They learn in order to preserve and enhance the record of humanity, to be productive members of a larger community, to be good citizens and good ancestors to those who will follow after them. In an age of globalization, where economies sink or swim on their ability to mine and manage knowledge, as do both individual and national security, we cannot afford to let this generation of ours and, indeed, any other, fall behind the learning curve. Let me bring us back to where we began: for all of us, the handprint must remain firmly and clearly on the wall.

Vartan Gregorian

President, Carnegie Corporation of New York

\*Note: This text originally appeared as the forward to *Writing Next*, and is reprinted here with minor changes. Our deep thanks to Vartan Gregorian for permitting us to reprint it.

---

## EXECUTIVE SUMMARY

### The Challenge

Although some progress has been made in improving the literacy achievement of students in American schools during the last twenty years (Lee, Grigg, and Donahue, 2007; Salah-Din, Persky, and Miller, 2008), the majority of students still do not read or write well enough to meet grade-level demands. Poor literacy skills play a role in why many of these students do not complete high school. Among those who do graduate, many will not be ready for college or a career where reading and writing are required. These young people will find themselves at a serious disadvantage in successfully pursuing some form of higher education, securing a job that pays a living wage, or participating in social and civic activities.

The financial and social costs of poor literacy have been well documented (Greene, 2000). The consequences of poor reading and writing skills not only threaten the well-being of individual Americans, but the country as a whole. Globalization and technological advances have changed the nature of the workplace. Reading and writing are now essential skills in most white- and blue-collar jobs. Ensuring that adolescents become skilled readers and writers is not merely an option for America, it is an absolute necessity.

### The Approach

During this decade there have been numerous efforts to identify instructional practices that improve adolescents' literacy skills, such as *Reading Next* (Biancarosa and Snow, 2004), which drew a set of fifteen instructional recommendations for an effective adolescent literacy program based on the professional knowledge and research of nationally known and respected literacy researchers. Such efforts also include systematic reviews of high-quality research to identify effective instructional practices for improving the comprehension of struggling adolescent readers (Scammacca et al., 2007), as well as similar analyses to identify effective practices for improving adolescent students' writing (Graham and Perin, 2007a; Rogers and Graham, 2008).

Despite these efforts, educators and policymakers need additional evidence-based practices for improving the literacy skills of students in American schools.

One often-overlooked tool for improving students' reading, as well as their learning from text, is writing. Writing has the theoretical potential for enhancing reading in three ways. First, reading and writing are both functional activities that can be combined to accomplish specific goals, such as learning new ideas presented in a text (Fitzgerald and Shanahan, 2000). For instance, writing about information in a science text should facilitate comprehension and learning, as it provides the reader with a means for recording, connecting, analyzing, personalizing, and manipulating key ideas from the text. Second, reading and writing are connected, as they draw upon common knowledge and cognitive processes (Shanahan, 2006). Consequently, improving students' writing skills should result in improved reading skills. Third, reading and writing are both communication activities, and writers should gain insight about reading by creating their own texts (Tierney and Shanahan, 1991), leading to better comprehension of texts produced by others.

This report provides evidence answering the following three questions:

1. Does writing about material students read enhance their reading comprehension?
2. Does teaching writing strengthen students' reading skills?
3. Does increasing how much students write improve how well they read?

Although writing is typically recommended as a part of a strong literacy program (e.g., Biancarosa and Snow, 2004), and several important reviews have selectively examined the impact of writing on reading (e.g., Applebee, 1984; Emig, 1977; Klein, 1999; Neville and Searls, 1991; Smith, 1988; Stotsky, 1982), the special strength of this report is that it comprehensively summarizes high-quality research using the powerful statistical method of meta-analysis. This technique allows researchers to determine the consistency and strength of the effects of an instructional practice, and to highlight practices holding the most promise.

*Writing Next* presented the results of a large-scale statistical review of research on the effects of specific types of writing interventions, and identified specific teaching techniques for improving the quality of adolescent students' writing. *Writing to Read* draws on the same type of statistical review of the research to highlight writing techniques shown to enhance students' reading.

To be successful, students today need strong literacy skills, and also need to be able to use these skills as tools for ongoing learning. This report builds on *Writing Next* by identifying writing practices found to be effective in helping students increase their reading skills and comprehension. We hope that besides providing classroom teachers with research-supported information about how writing can improve reading, our data will stimulate discussion and action at the policy and research levels, leading to the greater use of writing as a tool for enhancing reading and a greater emphasis on the teaching of writing in our nation's schools.

## The Recommendations

### Writing Practices That Enhance Students' Reading

This report identifies a cluster of closely related instructional practices shown to be effective in improving students' reading. We have grouped these practices within three core recommendations, here listed in order of the strength of their supporting evidence.

- I. **HAVE STUDENTS WRITE ABOUT THE TEXTS THEY READ.** Students' comprehension of science, social studies, and language arts texts is improved when they write about what they read, specifically when they
  - **Respond to a Text in Writing (Writing Personal Reactions, Analyzing and Interpreting the Text)**
  - **Write Summaries of a Text**
  - **Write Notes About a Text**
  - **Answer Questions About a Text in Writing, or Create and Answer Written Questions About a Text**
  
- II. **TEACH STUDENTS THE WRITING SKILLS AND PROCESSES THAT GO INTO CREATING TEXT.** Students' reading skills and comprehension are improved by learning the skills and processes that go into creating text, specifically when teachers
  - **Teach the Process of Writing, Text Structures for Writing, Paragraph or Sentence Construction Skills (Improves Reading Comprehension)**
  - **Teach Spelling and Sentence Construction Skills (Improves Reading Fluency)**
  - **Teach Spelling Skills (Improves Word Reading Skills)**
  
- III. **INCREASE HOW MUCH STUDENTS WRITE.** Students' reading comprehension is improved by having them increase how often they produce their own texts.

*Writing to Read* does not identify all the ways that writing can enhance reading, any more than *Writing Next* identified all of the possible ways to improve students' writing. However, all of the *Writing to Read* instructional recommendations have shown clear results for improving students' reading.

Nonetheless, even when used together these practices do not constitute a full curriculum. The writing practices described in this report should be used by educators in a flexible and thoughtful way to support students' learning.

The evidence is clear: writing can be a vehicle for improving reading. In particular, having students write about a text they are reading enhances how well they comprehend it. The same result occurs when students write about a text from different content areas, such as science and social studies.

This result is consistent with the finding from *Writing Next* that writing about science, math, and other types of information promotes students' learning of the material. In addition, teaching writing not only improves how well students write, as demonstrated in *Writing Next*; it also enhances students' ability to read a text accurately, fluently, and with comprehension. Finally, having students spend more time writing has a positive impact on reading, increasing how well students comprehend texts written by others. Taken together, these findings from *Writing to Read* and *Writing Next* highlight the power of writing as a tool for improving both reading and content learning.

## INTRODUCTION

### Literacy Is Critical to Success in the Twenty-first Century

Past generations of Americans with only a high school education were able to find jobs that paid a living wage without difficulty (Berman, 2009). Today, such jobs are becoming increasingly rare. Technological innovations, globalization, and changes in the workplace have increased the need for young people to obtain some form of higher education, whether it is in a two- or four-year college or involves technical or career coursework. Somewhere between one half to two thirds of new jobs in the future will require a college education and higher-level literacy skills (Carnevale and Derocers, 2004; Kirsch, Braun, Yamamoto, and Sum, 2007). The largest projected area for job growth is the service industry, with 20.5 million new jobs added to the economy during this decade (Berman, 2001). High-level literacy skills are almost a universal requirement for employees in this industry, as in professions such as finance, insurance, real estate, construction, and manufacturing. For example, almost 70 percent of salaried employees in these industries use writing as part of their jobs (National Commission on Writing, 2004). Over 90 percent of white-collar workers and 80 percent of blue-collar workers indicate that writing skill is important to job success (National Commission on Writing, 2006).

The growing demand for higher levels of education and literacy skills places new pressures on American schools. High schools must do more than graduate students: they must also prepare students for higher education and satisfying employment (Gewertz, 2009).

#### CAUSE FOR CONCERN

- Forty percent of high school graduates lack the literacy skills employers seek (National Governors Association, 2005).
- Lack of basic skills costs universities and businesses as much as \$16 billion annually (Greene, 2000).
- Poor writing skills cost businesses \$3.1 billion annually (National Commission on Writing, 2004).
- Only one out of three students is a proficient reader (Lee, Grigg, and Donahue, 2007).
- Only one out of four twelfth-grade students is a proficient writer (Salahu-Din, Persky, and Miller, 2008).
- One out of every five college freshman must take a remedial reading course (SREB, 2006).
- Nearly one third of high school graduates are not ready for college-level English composition courses (ACT, 2005).
- Three out of ten high school students do not graduate on time (Gewertz, 2009).
- Over half of adults scoring at the lowest literacy levels are dropouts (National Center for Educational Statistics, 2005).

Yet right now our high schools are not doing nearly enough to prepare young people for the future. Only seven in ten American students graduate from high school in four years (Gewertz, 2009). Many adolescents drop out of school because of poor literacy skills. It is unlikely that high school graduation rates will rise, or that college- and career-readiness efforts will prove successful, unless our schools help adolescents learn to read and write at a higher level.

## Struggling Readers and Writers

According to findings from the 2007 National Assessment of Educational Progress (NAEP), only 33 percent of fourth-grade students and 31 percent of eighth-grade students perform at or above the “proficient” level (defined as solid academic performance) in reading (Lee, Grigg, and Donahue, 2007). In contrast, 34 percent of fourth-grade students and 43 percent of eighth-grade students score at the “basic” level, denoting only partial mastery of the literacy skills needed at their grade level. The rest of the students (33 percent of fourth graders and 26 percent of eighth graders) scored below this basic level.

As with reading, only a small percentage of students showed solid academic performance in writing on the 2007 NAEP (Salahu-Din, Persky, and Miller, 2008). Thirty-three percent of eighth-grade students and 24 percent of twelfth-grade students performed at or above the “proficient” level. This means that two thirds of eighth-grade students and three quarters of twelfth-grade students score at either the basic level or below in writing.

The knowledge and skills needed for higher education and for employment are now considered to be identical (ACT, 2005).

Problems acquiring needed literacy skills are heightened for students who do not speak English as their first language, students who have a disability, or who are black, Hispanic, or Native American. Reading and writing performance of these groups of students on the 2007 NAEP was significantly lower than the literacy performance of students who were native English speakers, who did not have a disability, or who were white, respectively. The results from the NAEP clearly demonstrate that large numbers of adolescents need interventions to help them become better readers and writers.

# RECOMMENDATIONS FOR USING WRITING TO IMPROVE READING, AS IDENTIFIED BY META-ANALYSIS

Writing is often recommended as a tool for improving reading. In *Reading Next* (Biancarosa and Snow, 2004), intensive writing was identified as a critical element of an effective adolescent literacy program. *Reading Next* stated that writing instruction improves reading comprehension and that the teaching of writing skills such as grammar and spelling reinforces reading skills. It is also believed that writing about a text improves comprehension, as it helps students make connections between what they read, know, understand, and think (Carr, 2002).

This report provides long-needed guidance for teachers and policymakers by identifying specific writing practices that enhance students' reading abilities. The special contribution of this report is that it draws on empirical evidence in grades 1–12 in doing so. Its findings show that having students write about texts they read, explicitly teaching writing skills and processes, and having students write more *do* improve reading skills and comprehension.

We set out to collect, categorize, and analyze experimental and quasi-experimental data on the effectiveness of writing practices for improving students' reading skills and comprehension.

The empirical evidence from this analysis resulted in the identification of research-supported writing practices for improving students' reading.

The method used, meta-analysis, provides a measure of effectiveness using the effect size statistic.

## A TECHNICAL NOTE ON EXPERIMENTAL AND QUASI-EXPERIMENTAL STUDIES

The benefit of using experimental and quasi-experimental types of studies for our review is that they allow for stronger inferences about cause-and-effect relationships than do other types of studies. In both, children in an experimental group receive a specific intervention (or treatment) and their performance is compared to a control group of children that receives a different treatment or no treatment. Experimental studies control for preexisting differences between students in the two groups through random assignment to a group, while quasi-experimental studies do so through other means. For the current analysis, we only included quasi-experimental studies that assessed students' reading performance at the start of the study, so that possible preexisting differences between students in each condition could be controlled.

## The Meta-Analysis

Meta-analysis is a statistical technique for integrating, summarizing, and interpreting sets of empirical research that involve quantitative measures (Lipsey and Wilson, 2001). In this report, meta-analysis was used to investigate the effectiveness of writing about text, the effectiveness of the teaching of writing, and the effectiveness of having students write more

This is the first meta-analysis examining the effects of different writing practices on students' reading performance. Previous meta-analyses focused only on single practices, such as the impact of sentence combining on reading comprehension (e.g., Neville and Searls, 1991), aggregated reading measures with other types of outcome measures (Bangert-Drowns, Hurley, and Wilkinson, 2004), or did not isolate the effect of the writing practice (Moore and Readence, 1984). The findings in this report are cumulative in that they build on earlier reviews examining the impact of writing on reading (e.g., Applebee, 1984; Emig, 1977; Graham and Perin, 2007a; Klein, 1999; Moore and Readence, 1984; Neville and Searls, 1991; NICHD, 2000; Smith, 1988; Stotsky, 1982). All pertinent studies from these prior reviews were included, and new studies were located through an extensive search of the literature (see Appendix A for details).

The recommendations from this review are in no way meant to detract from the significant contributions that other types of research make to the understanding of the effects of writing on reading. Likewise, many perspectives, including cognitive, sociocultural, rhetorical, cross-curricular, linguistic, and student centered (see Fitzgerald and Shanahan, 2000; Shanahan, 2006), contribute to knowledge of how writing influences reading.

## A TECHNICAL NOTE ON META-ANALYSIS

### What is a meta-analysis?

Meta-analysis is a particularly powerful way of summarizing large bodies of research, as it aggregates conceptually similar quantitative measures by calculating an effect size for each study. The strength of meta-analysis is that it allows consideration of both the strength and the consistency of a treatment's effects.

### What is an effect size?

An effect size reports the average difference between one type of instruction and a control condition. It indicates the **strength** of the effect. The following guidelines provide a benchmark for interpreting the magnitude of an effect:

0.20 = **small** or mild effect

0.50 = **medium** or moderate effect

0.80 = **large** or strong effect

A **positive** effect size means the writing treatment had a positive effect on students' reading when compared to the control condition.

A **negative** effect size means that the control condition had a stronger effect on students' reading than the writing treatment.

Although these guidelines are commonly accepted, it is important to interpret an effect size within the context of a given field.

Consequently, the findings from this meta-analysis are compared to findings from other meta-analyses examining different reading interventions (i.e., NICHD, 2000; Rosenshine and Meister, 1994; Slavin, Cheung, Groff, and Lake, 2008). Such comparison better contextualizes the power of writing as a means of improving reading achievement.

Also, it is important to remember that a large number of factors that influence youngsters' literacy outcomes and the difficulty of improving reading, especially for older students, render any significant effect meaningful.

**Appendix A** describes the methodology used in the meta-analysis. **Appendix B** lists all the studies that were analyzed and provides descriptive information about each.

## THE RECOMMENDATIONS

### Effective Practices for Strengthening Reading Through Writing

- I. **HAVE STUDENTS WRITE ABOUT THE TEXTS THEY READ.** Students' comprehension of science, social studies, and language arts texts is improved when they write about what they read, specifically when they
  - **Respond to a Text in Writing (Writing Personal Reactions, Analyzing and Interpreting the Text)**
  - **Write Summaries of a Text**
  - **Write Notes About a Text**
  - **Answer Questions About a Text in Writing, or Create and Answer Written Questions About a Text**
  
- II. **TEACH STUDENTS THE WRITING SKILLS AND PROCESSES THAT GO INTO CREATING TEXT.** Students' reading skills and comprehension are improved by learning the skills and processes that go into creating text, specifically when teachers
  - **Teach the Process of Writing, Text Structures for Writing, Paragraph or Sentence Construction Skills (Improves Reading Comprehension)**
  - **Teach Spelling and Sentence Construction Skills (Improves Reading Fluency)**
  - **Teach Spelling Skills (Improves Word Reading Skills)**
  
- II. **INCREASE HOW MUCH STUDENTS WRITE.** Students' reading comprehension is improved by having them increase how often they produce their own texts.

In the following sections, we discuss each of these findings in turn by discussing the theory behind the practices and the results of the analysis. In several places, we also elaborate the activities involved in implementing the practices. Results are reported in effect size statistics, which allow us to understand the magnitude of impact an instructional practice can have on student outcomes.

When reading these sections, readers should keep in mind three important aspects of effect sizes. First, while it is tempting to regard practices that have large effect sizes as more effective than those with small effect sizes, effect sizes cannot be interpreted in this fashion. The effects we estimate for a particular practice always exist in relation to whatever practices were used in the “control” condition. In short, the effects for any two practices described in this report cannot be compared directly to or against each other.

Second, we report the effect sizes we found for two types of tests commonly used in research: norm-referenced tests and researcher-designed tests (see sidebar on page 12). Norm-referenced tests generally yield much smaller effect sizes than researcher-designed tests do. For example, two of the most robust reading instructional practices for improving children's reading comprehension, Reciprocal Teaching and generating questions, have effect sizes of 0.32 and 0.36 respectively when assessed using norm-referenced tests, and effect sizes of 0.88 and 0.86 respectively when assessed using researcher-designed

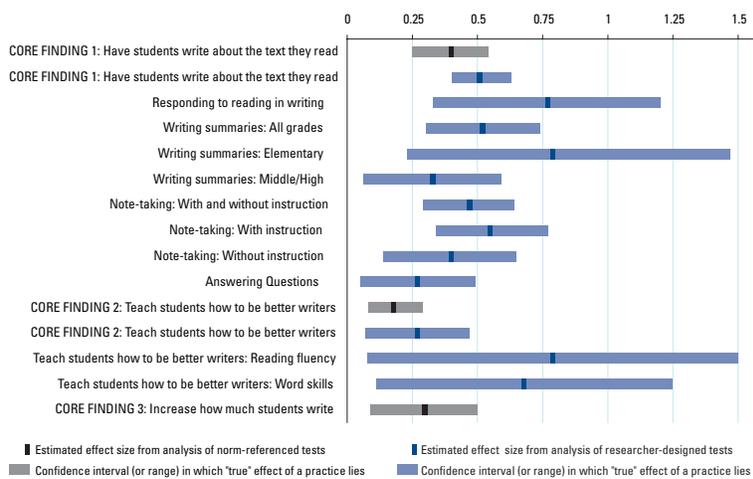
measures (Rosenshine and Meister, 1994; Rosenshine, Meister, and Chapman, 1996). Similar differences in effect sizes for different tests are found throughout our report (see graph below).

Third, because effect sizes are statistics, we can estimate more than the average effect size—we can also estimate a confidence interval. The confidence interval specifies the range in which we think the “true” effect of a practice lies. Thus, we present confidence intervals around the effect sizes we found in Figure 1. In general, confidence intervals tend to be smaller when the number of studies we have is bigger and also when tests are more precise. In fact, readers will likely note that we have a few very large confidence intervals for some of the effects. These large ranges suggest that we are less certain of a practice’s real effect, but critically we are still quite certain that there is an effect because none of these confidence intervals extends as low as zero. As a result, even when confidence intervals are large, we are reasonably certain that these practices do affect students in a positive way, we are just less certain of how large that effect is.

### NORM-REFERENCED VS. RESEARCH-DESIGNED TESTS

Norm-referenced tests are designed to represent an individual’s ability relative to the range of abilities of a population on a measured skill. In contrast, researcher-designed tests generally do not have the time or the resources to sample the full range of abilities of a measured skill, and therefore cannot place an individual’s performance in that context. Even so, researchers generally take steps to ensure that their test results are as reliable as possible. Because of these differences, norm-referenced tests tend to have smaller margins of error when estimating student abilities. As a result, norm-referenced tests tend to yield smaller effect sizes and smaller confidence intervals. Nonetheless, both types of tests yield important information about the effectiveness of instruction. Whereas norm-referenced tests help us understand how well a targeted skill generalizes to other similar tasks, researcher-designed tests help us understand how well an intervention impacts a targeted skill.

### WRITING TO READ EFFECT SIZES WITH CONFIDENCE INTERVALS



## I. HAVE STUDENTS WRITE ABOUT THE TEXT THEY READ

Average Weighted Effect Size = 0.40 Published Standardized Norm-Referenced Tests (Based on 11 Studies)  
Average Weighted Effect Size = 0.51 Researcher-Designed Tests (Based on 50 Studies)

Comprehending a text involves actively creating meaning by building relationships among ideas in text, and between the text and one's knowledge, beliefs, and experiences (Wittrock, 1990). Having students write about a text should enhance reading comprehension because it affords greater opportunities to think about ideas in a text, requires them to organize and integrate those ideas into a coherent whole, fosters explicitness, facilitates reflection, encourages personal involvement with texts, and involves students transforming ideas into their own words (Applebee, 1984; Emig, 1977; Klein, 1999; Smith, 1988; Stotsky, 1982). In short, writing about a text should enhance comprehension because it provides students with a tool for visibly and permanently recording, connecting, analyzing, personalizing, and manipulating key ideas in text.

The evidence shows that having students write about the material they read *does* enhance their reading abilities. In fact, fifty-seven out of sixty-one outcomes (93 percent) were positive, indicating a consistent and positive effect for writing about what is read. The impact of writing about reading applied broadly across different levels of schooling, as students participating in this research were in grades 2–12, with the majority in middle or high school. These positive effects were evident when students wrote about text in science and social studies as well as in English (60 percent of comparisons involved these disciplines; see Appendix B).

These effect sizes compared favorably with effects obtained by other researchers examining the impact of specific reading approaches, such as reading programs at the secondary level, reciprocal teaching (a popular method for teaching comprehension), and vocabulary instruction. The effect size for writing about text that was read (0.40) exceeded each of these effects, providing additional validation of its effectiveness as a tool for improving students' reading comprehension.

Writing about read texts was also an effective activity for lower-achieving students. In twelve studies involving such students, the average weighted effect size for writing about a text was 0.63. However, the average weighted effect size for writing about text activities was not greater than zero when lower-achieving students were not explicitly taught how to use them. This was not the case when such instruction was provided, as was true in the other nine studies. Although these findings must be viewed cautiously due to the small number of studies, they suggest that having lower-achieving students write about text without teaching them how to do so may not be effective. Our findings are consistent with findings from other reviews that explicit instruction is an important ingredient in the successful teaching of literacy practices (e.g., Graham and Perin, 2007a; NICHD, 2000).

Writing about a text proved to be better than just reading it, reading and rereading it, reading and studying it, reading and discussing it, and receiving reading instruction. These above-mentioned reading activities were undertaken 87 percent of the time by students in the control conditions.

The average weighted effect sizes for writing about text read versus these control conditions was positive and significant (0.35 for published standardized norm-referenced tests in nine studies and 0.49 for researcher-designed ones in forty-four studies).

We next consider how different types of writing about reading activities influence students' comprehension of text. These analyses are based on the findings from the sixty-one studies above.

## Have Students Respond to a Text (Writing Personal Reactions, Analyzing and Interpreting the Text)

### Average Weighted Effect Size = 0.77 Researcher-Designed Tests (Based on 9 Studies)

Writing an extended response to material involves either a personal reaction to the text or analysis and interpretation of it. The former includes writing a personal response to narrative material read or writing about a personal experience related to it. Analysis and interpretation activities, in contrast, focus on writing an analysis of the characters in a novel, writing a paper showing how to apply material that was read, composing a letter to another student explaining how to play a game described in a text, and analyzing a text in writing to develop a particular point of view. Newer and better understandings of textual material are likely to occur when students write about text in extended ways involving analysis, interpretation, or personalization (Langer and Applebee, 1987).

Our review of the data shows that extended writing has a strong and consistently positive impact on reading comprehension. All nine of the comparisons produced a positive outcome. Extended writing produced greater comprehension gains than simply reading the text, reading and rereading it, reading and studying it, reading and discussing it, and receiving reading instruction. These reading activities served as control conditions in all nine studies. (Note that in contrast to the other

### EXTENDED WRITING: EXAMPLES

With **guided journal writing** students respond to text by answering open-ended questions about it in writing. For example, students might be asked to analyze why they think characters acted as they did and indicate what they would do in the same situation.

Source: Wong, Kuperis, Jamieson, Keller, and Cull-Hewitt (2002).

Students might also be asked to complete an **analytic essay** about the material they are reading. For instance, after reading about the history of the industrial revolution, students might be asked to write an essay in which they identify the three most important reasons for industrial growth during the nineteenth and twentieth centuries and explain the reasons for each of their choices.

Source: Langer and Applebee (1987).

writing about reading activities studied in this review, students were not expressly taught how to write extended responses. Finally, for writing a personal response to text, students applied this procedure over a three- to fourth-month period in several studies.)

## Have Students Write Summaries of a Text

**Average Weighted Effect Size = 0.52 Researcher-Designed Tests (Based on 19 Studies)**

Transforming a mental summary of text into writing requires additional thought about the essence of the material, and the permanence of writing creates an external record of this synopsis that can be readily critiqued and reworked. As a result, summary writing seems likely to improve comprehension of the material being summarized.

Summary writing practices studied ranged from writing a synopsis with little to no guidance (e.g., writing a one-sentence summary) to the use of a variety of different guided summarizing strategies such as writing a summary of text using a set of rules or steps; developing a written outline of text and converting it to a summary; locating the main idea in each paragraph and summarizing it; and creating a written/graphic organizer of important information and converting it to a summary.

For students in grades 3–12, writing summaries about text showed a consistently positive impact on reading comprehension. Seventeen of the nineteen comparisons (89 percent) produced a positive outcome. While summary writing significantly improved middle and high school students' comprehension of text (average weighted effect size = 0.33 based on eleven studies), it had an even stronger effect on elementary students' comprehension (average weighted effect size = 0.79 based on four studies).

### SUMMARY WRITING: EXAMPLES

Students are directly taught rules for how to **write a summary of material read**. This can involve teaching them how to write a summary of a paragraph using the following operations:

- 1) identify or select the main information;
- 2) delete trivial information;
- 3) delete redundant information; and
- 4) write a short synopsis of the main and supporting information for each paragraph.

In teaching this strategy, the teacher first explains each step and its purposes. Use of the strategy is then modeled, and students practice applying it, receiving teacher help and assistance as needed.

Source: Rinehart, Stahl, and Erickson (1986).

A different summary writing method focuses on the summarization of longer text. Students begin by creating a skeleton outline, starting with a thesis statement for the passage. Next, they generate main idea subheadings for each section of the text, and add two or three important details for each main idea. They then convert their outline into a written summary of the whole text.

Source: Taylor and Beach (1984).

Writing summaries about a text proved to be better than simply reading it, reading and rereading it, reading and studying it, and receiving reading instruction. The above reading activities served as control conditions in all but four studies (74 percent). The average weighted effect size decreased slightly, to 0.48, when summary writing was compared to control conditions only involving reading activities.

## Have Students Write Notes About a Text

Average Weighted Effect Size = 0.47 Researcher-Designed Tests (Based on 23 Studies)

The act of taking written notes about text material should enhance comprehension (Kiewra, 1989; Peverly et al., 2007). This writing practice involves sifting through a text to determine what is most relevant and transforming and reducing the substance of these ideas into written phrases or key words. Intentionally or unintentionally, note takers organize the abstracted material in some way, connecting one idea to another, while blending new information with their own knowledge, resulting in new understandings of texts.

In the studies we reviewed, taking notes about text ranged from a prompt to take notes with little or no direction to the use of a wide variety of structured note-taking procedures such as developing a written outline of text; designing a written chart showing the relationship between key ideas, details, concepts, and vocabulary in text; and taking notes about text and separating these notes into different columns related to main ideas, details, and questions.

For students in grades 3–12, the various note-taking activities studied had a moderate and consistently positive impact on reading comprehension. Twenty-one of the twenty-three comparisons (91 percent) produced a positive outcome.

Taking notes about text proved to be better than just reading, reading and rereading, reading and studying, reading and underlining important information, and receiving explicit instruction in reading practices. The above reading activities served as the control conditions in all but two studies. The average weighted effect size increased slightly, to 0.48, when note taking was compared to control conditions only involving reading activities.

### NOTE TAKING: EXAMPLES

**Structured note taking** involves creating a written organizational structure for material read. With one approach, students are taught how to create an organizer resembling a flow chart, depicting changes in the events of a story over time.

Source: Denner (1987).

**Concept mapping** is another approach for helping students organize their notes about material read. Students place each important concept from text in a circle and then show how the concepts link together using words and lines. One way of teaching this strategy is to first present a model of an *expert concept map* for a particular reading. After discussing this map, students then practice completing other *expert maps* that are incomplete, moving from more to less complete maps, until they can create their own map for material read.

Source: Chang, Chen, and Sung (2002).

## Have Students Answer Questions About a Text in Writing, or Create and Answer Written Questions About a Text

Average Weighted Effect Size = 0.27 Researcher-Designed Tests (Based on 8 Studies)

Answering questions about a text can be done verbally, but there is greater benefit from performing such activities in writing. Writing answers to text questions makes them more memorable, as writing an answer provides a second form of rehearsal. This practice should further enhance the quality of students' responses, as written answers are available for review, reevaluation, and reconstruction (Emig, 1977).

For generating or responding to questions in writing, students either answered questions about a text in writing; received practice doing so; wrote their own questions about text read; or learned how to locate main ideas in a text, generated written questions for them, and then answered them in writing. These practices had a small but consistently positive impact on improving the reading comprehension of students in grade 6–12 when compared to reading or reading instruction. All eight of the studies resulted in a positive outcome for generating or answering questions in writing.

### QUESTIONS: EXAMPLES

**Answering questions in writing** involves writing responses to questions inserted into text or presented at the end of a segment of text. For example, students may be asked to write short answers to four questions (one detail, two inferences, and one main idea) after reading a segment of text. They then check and correct their responses before reading the next segment of text.

Source: Peverly and Wood (2001).

**Generating questions in writing** is a strategy where students create written questions about text. For instance, students are taught the difference between a good question and a bad question, and then practice generating and answering their own questions about text. If they cannot answer a question, they generate a new one that can be answered.

Source: Cohen (1983).

## II. TEACH STUDENTS THE WRITING SKILLS AND PROCESSES THAT GO INTO CREATING TEXT

While writing and reading are not identical skills, both rely on common processes and knowledge (Fitzgerald and Shanahan, 2000). Consequently, educators have long believed that the benefits of writing instruction carry over to improved reading. Our evidence shows that writing instruction does in fact strengthen a variety of reading skills.

### Teach the Process of Writing, Text Structures for Writing, Paragraph or Sentence Construction Skills (Improves Reading Comprehension)

Average Weighted Effect Size = 0.18 Published Standardized Norm-Referenced Tests (Based on 12 Studies)

Average Weighted Effect Size = 0.27 Researcher-Designed Tests (Based on 5 Studies)

Teaching patterns for constructing sentences or larger units of text should improve reading skills. The practice of putting smaller units of writing together to create more complex ones should result in

greater skill in understanding such units in reading (Neville and Searls, 1991). This is the basic premise behind the writing instructional strategy known as sentence combining (Saddler and Graham, 2005). Better understanding of even larger units in text should be facilitated by teaching students basic structures for writing paragraphs, or common elements included in specific types of writing, such as persuasive essays.

Writing instruction did in fact show a small, but consistently positive, impact on reading comprehension when measured by both norm-referenced published standardized tests and researcher-designed tests. The outcomes in all studies were positive. The control condition in most of these studies (79 percent) was reading or reading instruction. When only these studies were considered, the average weighted effect size rose slightly, to 0.23 on published standardized norm-referenced tests (based on nine studies) and 0.30 on researcher-designed tests (based on four studies).

The effect of writing instruction on published standardized norm-referenced tests compares favorably with effects obtained in two other reviews examining the impact of a range of reading programs (Slavin et al., 2008) and vocabulary instruction (Elleman et al., 2009). (However, it was smaller than the effect of 0.32 obtained by Rosenshine and Meister [1994] for reciprocal teaching of comprehension strategies.)

It is important to note that there was variability in the types of writing instruction provided to students. These different types of writing instruction included the process approach, where students write frequently for real audiences; engage in cycles of planning, drafting, and revising text; take personal responsibility and ownership of writing projects; interact and help each other with their writing; participate in a supportive writing environment; and receive assistance and instruction as needed (Graham and Perin, 2007b). Note that studies examining process writing were limited to grades 1–4.

### WRITING INSTRUCTION: EXAMPLES

One writing instructional procedure that facilitates reading growth is **sentence combining**. With this method, the teacher models how to combine simpler sentences into more complex ones. Students then practice combining similar sentences. An interesting twist on this approach is to have students combine sentences in material they are reading or disassemble such sentences.

Source: Hunt and O'Donnell (1970).

Students' reading skills can also be enhanced by teaching them how to use **text structure** as an aid for writing text. To illustrate, students are taught the basic elements of persuasion by identifying and discussing them in model essays. They then write their own persuasive texts using these elements, and revise the texts based on feedback from peers and the teacher.

Source: Crowhurst (1991).

We also included studies where other writing skills were systematically and explicitly taught to students. In several studies, this practice involved teaching a variety of skills, including how to write sentences, paragraphs, and longer units of text. In other instances, it involved teaching students how to write

more sophisticated sentences by learning how to combine less complex sentences into more complex ones. It further included several studies where students learned to use the structure of specific types of texts as a model or tool for writing their own papers. Finally, the spelling of content words was taught in one investigation. Studies examining the effectiveness of these approaches (instruction in spelling; instruction in writing sentences, paragraphs, and longer units of text) were limited to grades 4–12. In these twelve studies, the average weighted effect size on norm-referenced standardized measures of reading was 0.16. (Although small, the effect was statistically significant and compared favorably to the 0.17 effect size obtained by Slavin et al. [2008] in their meta-analysis of middle and high school reading programs.)

### **Teach Spelling and Sentence Construction Skills (Improves Reading Fluency)**

**Average Weighted Effect Size = 0.79 Published Standardized Norm-Referenced and Researcher-Designed Tests Combined (Based on 4 Studies)**

Teaching students how words are spelled provides them with schemata about specific connections between letters and sounds, making it easier for them to identify and remember words in text containing these connections (Ehri, 1987; Moats, 2005/2006). The practice of putting smaller units of writing together in order to create more complex ones—from letters to words or words to sentences—should result in greater skill in understanding of these units in reading (Ehri, 2000; Neville and Searls, 1991).

In three of the four studies examining the impact of writing instruction on reading fluency, spelling skills were taught. In the other study, students were taught how to write more sophisticated sentences by combining simpler sentences into more complex ones. The overall effect size for these studies combined both standardized tests (two studies) and researcher-designed tests (two studies).

Writing instruction had a strong and consistent impact on improving students' reading fluency. *All* of the studies yielded a positive outcome. With one exception, the control condition was reading instruction. When the exception was eliminated, the average weighted effect size rose to 0.87. (Note that the studies reviewed all involved students in grades 1–7. Consequently, the impact of writing instruction on the reading fluency of older students is not known.)

### **Teach Spelling Skills (Improves Word Reading Skills)**

**Average Weighted Effect Size = 0.68 Published Standardized Norm-Referenced and Researcher-Designed Tests Combined (Based on 5 Studies)**

As noted above, teaching students how to spell theoretically makes it easier for them to identify and remember words in text (Ehri, 1987; Moats, 2005/2006). More explicitly, spelling and word reading rely on the same underlying knowledge, and therefore instruction and practice in one should aid development of the other (Ehri, 2000; Snow, Griffin, and Burns, 2005).

Spelling instruction had a moderate and consistent impact on improving students' word reading skills. The five studies examining the impact of writing instruction on word reading skills all involved spelling instruction. The overall effect size for these studies combined both standardized tests (two studies) and researcher-designed tests (three studies). All of the studies yielded a positive outcome. These findings support the claim that learning to spell supports reading (Graham, 2000; Moats, 2005/2006).

With one exception, the control condition was reading or reading instruction. Notably, when the exception was eliminated, the average weighted effect size rose to 0.77. (Because all studies involved students in grades 1–5, we cannot generalize the findings to older students.)

### III. INCREASE HOW MUCH STUDENTS WRITE

Average Weighted Effect Size = 0.30 Published Standardized Norm-Referenced Tests (Based on 6 Studies)

Reading and writing are communication activities, and writers can gain insights about reading by creating a text for an audience to read, even when the student is the intended audience (Nelson and Calfee, 1998). The process of creating a text prompts students to be more thoughtful and engaged when reading text produced by others. By writing, students learn to make their assumptions and premises explicit as well as observe the rules of logic when composing a text (Applebee, 1984), making them more aware of such issues in the material they read. Finally, writing involves generating meaning by using experience and knowledge to create a text and build relationships among words, sentences, and paragraphs (Wittrock, 1990).

According to the data we reviewed, increasing how much students write does in fact improve how well they read. The average weighted effect size on published standardized norm-referenced tests was small in all the studies we reviewed, but still consistently positive, as all studies yielded positive outcomes. The control condition in each of these experiments was either reading or reading instruction. Activities for increasing the amount of writing in the studies reviewed included writing about self-selected topics or topics chosen in collaboration with peers, setting aside fifteen extra minutes a day for sustained writing, using the Internet to write to pen pals, writing journal entries about daily experiences, interacting with others using a dialogue journal, and writing short passages using inference words. (Since all of the studies we reviewed involved students in grades 1–6, this finding cannot be generalized to older students.)

#### INCREASING STUDENTS' WRITING: EXAMPLES

**Pen palling** is a method in which two or more writers dialogue with each other about topics of interest. This can involve a younger student writing to an older student and vice versa.

Source: Dana, Scheffler, Richmond, Smith, and Draper (1991).

**Daily writing about self-selected topics** allows students to write about any topic of their choice. This can be done as a journal activity where the teacher reads and responds to something written by the student in a journal (without editing or correcting). Students sharing their writing with the teacher becomes optional over time.

Source: Peters (1991).

An average weighted effect size of 0.30 on published standardized norm-referenced tests compares favorably with effects obtained by other researchers examining the impact of specific approaches to teaching reading. It exceeded the overall effect of 0.17 for a range of reading programs studied by Slavin et al. (2008) as well as the effect of 0.10 for vocabulary instruction obtained by Elleman et al. (2009), and was equivalent to the effect of 0.32 obtained by Rosenshine and Meister (1994) for reciprocal teaching of comprehension strategies.

## **IMPLEMENTING THE RECOMMENDATIONS**

From its humble beginnings 5,000 years ago as a method of keeping track of stored goods, writing's value has skyrocketed. Writing and the explicit teaching of writing has played a central role in education in many historical periods, from the ancient Greeks through much of the twentieth century. The Greeks valued writing for its rhetorical and persuasive powers; the Romans prized eloquence in writing; and the British of the eighteenth and nineteenth centuries saw it as a tool for instilling moral values. As scholars began to study writing systematically, it became clear that the written word is an indispensable tool for communication and achievement. In today's electronic world, writing provides an almost instantaneous means for communicating with family, friends, and colleagues (Graham, 2006). People use writing to explore who they are, to combat loneliness, and to chronicle their experiences. Writing is beneficial both psychologically and physiologically (Smyth, 1998). Writing is also a valuable tool for learning (Bangert-Drowns, Hurley, and Wilkenson, 2004; Graham and Perin, 2007a), enabling us to gather, preserve, and transmit information with great detail and accuracy. The permanence of the written word makes ideas readily available for review and evaluation. Writing's explicitness encourages the establishment of connections between ideas, and its active nature can foster the exploration of unexamined assumptions (Applebee, 1984).

This meta-analysis provides empirical support for another important role for writing: as an effective tool for improving students' reading. Writing about text enhances youngsters' comprehension of it. Teaching students how to write strengthens their comprehension, fluency, and word reading skills. Increasing how much students write improves how well they read.

The impact of writing and writing instruction in this review was especially notable as its effects on published norm-referenced standardized tests rivaled the impact of directly teaching reading skills to students. While we are not saying that writing practices should replace reading instruction, these practices provide teachers and schools with another effective tool for strengthening students' reading skills. (See Biancarosa and Snow [2004] and NICHD [2000] for other effective practices.) Given the importance of reading to young people's social, academic, and eventual occupational success, as well as the large number of students who struggle with reading, this is a noteworthy finding. Yet despite its importance for reading, learning, communicating, self-expression, self-exploration, and future employment, writing is not yet a priority in many of our schools. The National Commission on Writing (2003) indicates that efforts to improve writing are virtually nonexistent in current attempts to reform schools.

Note, however, that the effects of these writing practices on reading are likely to be minimal for students who write infrequently or receive little to no explicit instruction in how to write. For example, Weber and Henderson (1989) found that more writing instruction produced greater reading gains than less writing instruction.

In a national survey of writing practices at the high school level, Kiuahara, Graham, and Hawken (2009) found that students were rarely asked to complete writing assignments involving analysis and interpretation. Assignments that involved writing more than a single paragraph occurred less than once a month in 50 percent of classes. Applebee and Langer (2006) reported similar results, based on data from the National Assessment of Educational Progress. Kiuahara and colleagues further indicated that high school writing instruction was infrequent, even in language arts classes, and increasingly infrequent in social studies and science classes. Many teachers (60 percent of science teachers, for example) reported that they felt unprepared to teach writing. Although teachers in the elementary grades spend more time teaching writing and are better prepared to teach writing practices (Cutler and Graham, 2008; Graham, Harris, MacArthur, and Fink-Chorzempa, 2003), most elementary students only spend about twenty minutes a day writing.

Many evidence-based practices for teaching writing already exist. In *Writing Next* (Graham and Perin, 2007a), eleven effective instructional practices for students in grades 4–12 were identified through a comprehensive meta-analysis of the writing intervention research (see Graham, MacArthur, and Fitzgerald [2007] for a more detailed presentation of these practices). A number of these writing practices, such as teaching writing processes or how to construct more complex sentences, also had a positive impact on students' reading skills in this review. The challenge is helping schools and teachers make these and other effective practices an integral part of their literacy programs. This report proves that good writing instruction is vital to realizing the goal of literacy for all.

## Putting the Recommendations into Practice

This report identifies writing practices that hold promise for improving students' reading. For one of the activities involving writing about text, **note taking**, the impact on reading was stronger when students were explicitly taught how to apply this skill. Other activities, such as **answering questions in writing** and **responding to text by writing a personal reaction or analyzing and interpreting it**, may also benefit from instruction, even though they had a strong positive impact on comprehension even when no instruction was given.

**Writing about text activities** had a positive impact on struggling students' understanding of a text. An important key to success in using these activities with lower-achieving students was to provide them with ongoing practice and explicit instruction.

### THE OPTIMAL MIX

Researchers do not know what combination or how much of the different writing about text practices should be emphasized. The four practices validated here—questions, note taking, summary writing, and extended response—serve different purposes. Consequently, how they are applied will depend on goals established by the learner and the teacher.

It is also likely that students will need more or less support in applying these practices, depending upon their familiarity with the practices and their own capabilities.

The **writing about text activities** validated in this review were applied with a variety of reading material, including narrative and expository texts. They were also effective in a variety of different disciplines, including science, social studies, and the language arts. Many content-area teachers do not use writing to promote students' learning (Kiuahara, Graham, and Hawken, 2009), but the findings from this report and *Writing Next* suggest that such techniques should be used more often. When students read texts in science, social studies, and the language arts, their comprehension of this material is improved by writing about it. Likewise, writing about information presented in math, science, and other content classes enhances their learning of this material, as was shown in *Writing Next*.

While most of the research (81 percent) examining the effectiveness of writing about text activities was conducted with students in grade six or above, such activities had a strong and positive impact on reading comprehension as early as second grade (Adams-Boating, 2001). Perhaps not surprisingly, writing about text activities was used almost exclusively in the language arts in the earliest grades (2–4), but by fifth grade such activities enhanced students' comprehension of science and social studies texts (see Appendix B).

**Writing instruction** that strengthened students' reading skills included both process writing and skills instruction. Both types of approaches to writing instruction were found to promote better student writing in *Writing Next*. Some literacy experts (Freedman, 1993; Smith, 1994) have argued that instructional approaches like

### COMBINING WRITING AND READING INSTRUCTION

One purpose of this meta-analysis was to look specifically at the effects of writing instruction on reading. It did not look at the effects of integrated reading and writing instruction on either reading or writing. But this does not mean that writing and reading instruction should be treated as separate entities. We believe that reading and writing instruction will be even more effective when they are designed to work together to achieve common goals and reinforce the reciprocal acquisition of central literacy knowledge, skills, and strategies.

process writing, which rely on informal and incidental learning methods, should not be combined with approaches that emphasize the explicit and systematic instruction of skills and processes. While there is very little evidence on this issue, studies have found that combining process writing with more explicit instructional approaches enhances students' writing (see Graham and Perin, 2007b). Further, teachers overwhelmingly view combining process writing and skills instruction as a positive practice (Cutler and Graham, 2008; Graham, Harris, Fink-Chorzempa, and MacArthur, 2002).

The National Commission on Writing (2003) recommended that schools double the amount of time students spend writing. Our finding that **increasing how much students write improves their comprehension of texts produced by others** is consistent with this recommendation (at least for grades 1–6). Writing time can be extended by having students use writing across the curriculum and write more at home. Note that the fact that a writing intervention was effective in the studies we reviewed does not guarantee that it will be effective in all other situations. No intervention is effective with all students in all situations. These writing practices should be used and combined flexibly and thoughtfully.

## **A RESEARCH AGENDA FOR THE FUTURE**

This report is the only comprehensive review applying meta-analytic procedures to determine the effects of multiple writing practices on students' reading performance. Included studies date from the 1930s to the present. A considerable body of studies has accumulated over the years, resulting in ninety-three comparisons examining the effects of writing on reading. The available studies involve a variety of disciplines, including the language arts, science, social studies, and second-language learning, conducted with students in urban, suburban, and rural schools. The existing body of experimental and quasi-experimental research is large enough to draw conclusions and recommendations that will help policymakers and educators reengineer our schools to meet the goal of literacy for all.

Unfortunately, there are a number of gaps in the research base, and areas where more evidence is needed. Thus, we need to create a research agenda that will strengthen the knowledge base for policy and practice. It appears that interest in this area of research is declining, as only ten experimental or quasi-experimental studies were published during the last decade. We hope this report will spur new research efforts into the effectiveness of writing practices in strengthening literacy, especially in the areas listed below.

- There is a special need for studies conducted with low-achieving students. Across the three questions posed by our study, we were able to locate only eighteen studies where an effect size could be computed for such students. There were just an additional three comparisons involving English language learners (each focused on writing-to-learn activities). So even though a solid body of research into the literacy-strengthening effect of writing practices now exists, fewer than 25 percent of the comparisons focused on the most vulnerable students. This serious gap in the literature was especially evident for studies examining the effect of writing instruction, as well as the effect of extra writing on reading. (Also, it was not possible to determine if there was a relationship between student achievement level and the effectiveness of different writing practices.)
- Cross-comparisons of the effect of different writing practices on different aspects of performance are also needed. Such cross-comparisons were beyond the scope of this report, but different writing practices most likely influence different aspects of performance (Langer and Applebee, 1987).
- So far, almost no research has been conducted on how to bring the writing practices reviewed here to scale. More research is also needed to determine the mechanisms leading to the effectiveness of a specific writing practice for improving reading. The impact of writing on a broader array of reading outcomes should be considered also, as very few studies consider any reading component beyond comprehension.

- The rich nature of the practice of writing and its relative neglect in instructional research make it inevitable that many potentially effective practices have not yet been studied. Research is needed not only to verify the effectiveness of unstudied existing practices, but to develop and test new ones. Such research could determine whether different writing practices can be combined together in productive ways. For instance, a recent study by Lee and Collins (2008) employed a variety of writing activities to foster students' thinking about text. It is possible that more complex and multi-component practices will yield stronger reading gains.
- Digital writing is a rapidly growing field of interest for many educators, and digital devices are becoming more popular in the classroom. The 2011 NAEP Framework will include a digital platform for writing assessments in grades 8–11. Therefore, more research is needed on the effects of digital technologies for writing activities in our nation's schools.
- An especially promising area for future research involves studying a greater range of "writing about text" practices, especially those that involve conducting written analyses/interpretation of text or developing a written response based on personal reactions to the text. These practices yielded a relatively large average weighted effect size, but only a few different such activities were tested.
- There are also many gaps in our knowledge about the impact of writing instruction on reading. Does the "process writing" approach to writing instruction strengthen the reading skills of adolescent readers? Do youngsters become better readers as a result of explicit instruction in planning and revising? Both of these approaches improve students' writing (Graham and Perin, 2007b), but it is unclear if their effects extend to reading. It is likely that the impact of writing instruction on reading can be strengthened if educators design instruction to intentionally promote such a result. Clearly, research is needed to determine how best to make these connections.
- More research is needed on the *long-term* effects of writing and writing instruction on reading.
- This review did not include studies that were conducted in special schools for students with disabilities (such as deafness, autism, or emotional disturbance), since our purpose was to draw instructional recommendations for regular public and private school settings. But this omission should not be interpreted to mean that writing, reading, or writing to enhance reading is unimportant for these students.
- A high level of literacy cannot be acquired during a few school years or rest solely on the efforts of individual students or teachers. Helping our nation's students become good readers and writers is a collaborative effort involving all stakeholders in the educational process.

Our shared goal is to achieve a high level of literacy for all students, thereby helping our nation's young people to lead more fulfilled, productive lives. This report shows that writing practices can be used to make a significant contribution to the goal of literacy for all.

---

## CONCLUSION

Writing practices cannot take the place of effective reading practices (see Biancarosa and Snow [2004] and NICHD [2000] for a review of such practices). Instead, writing practices complement reading practices and should always be used in conjunction, with each type of practice supporting and strengthening the other.

This study shows that students' reading abilities are improved by writing about texts they have read; by receiving explicit instruction in spelling, in writing sentences, in writing paragraphs, in text structure, and in the basic processes of composition; and by increasing how much and how frequently they write. Our evidence shows that these writing activities improved students' comprehension of text over and above the improvements gained from traditional reading activities such as reading text, reading and rereading text, reading and discussing text, and receiving explicit reading instruction.

The empirical evidence that the writing practices described in this report strengthen reading skills provides additional support for the notion that writing should be taught and emphasized as an integral part of the school curriculum. Previous research has found that teaching the same writing process and skills improved the quality of students' writing (Graham and Perin, 2007a; see also Graham, in press; Rogers and Graham, 2008) and learning of content (as demonstrated in Graham and Perin [2007a] and Bangert-Drowns, Hurley, and Wilkinson [2004]). Students who do not develop strong writing skills may not be able to take full advantage of the power of writing as a tool to strengthen reading.

## REFERENCES

- ACT. (2005). *College readiness standards*. Iowa City, IA. Available at [www.act.org](http://www.act.org)
- Adams, M. (1990). *Beginning to read: Thinking and learning about print*. Cambridge, MA: MIT Press.
- Adams-Boating, A. (2001). *Second graders' use of journal writing and the effects on reading comprehension*. Unpublished master's thesis, Keen University, Sydney, Australia.
- Applebee, A. (1984). Writing and reasoning. *Review of Educational Research*, 54, 577–596.
- Applebee, A., and Langer, J. (2006). *The state of writing instruction: What existing data tell us*. Albany, NY: Center on English Learning and Achievement.
- Bangert-Drowns, R. L., Hurley, M. M., and Wilkinson, B. (2004). The effects of school-based writing-to-learn interventions on academic achievement: A meta-analysis. *Review of Educational Research*, 74, 29–58.
- Barton, W. A. (1930). *Contributions to education no. 411: Outlining as a study procedure*. New York, NY: Columbia University Bureau of Publications.
- Bates, L., Breslow, N., and Hupert, N. (2009). *Five states' efforts to improve adolescent literacy*. Washington, DC: IES.
- Berman, I. (2009, February 25). Supporting adolescent literacy achievement. *Issue Brief*, 1–15.
- Berman, J. (2001, November). Industry output and employment projections to 2010. *Monthly Labor Review*, 40.
- Biancarosa, G., and Snow, C. (2004). *Reading next—A vision for action and research in middle and high school literacy: A report to Carnegie Corporation of New York*. Washington, DC: Alliance for Excellence in Education.
- Bus, A., and van Ijendoorn, M. (1999). Phonological awareness and early reading: A meta-analysis of experimental training studies. *Journal of Educational Psychology*, 91, 403–414.
- Callahan, T. F. (1977). *The effects of sentence-combining exercises on the syntactic maturity, quality of writing, reading, and attitudes of ninth grade students*. Unpublished dissertation, University of New York at Buffalo.
- Carnevale, A., and Derochers, D. (2004). *Standards for what? The economic roots of K–16 reform*. Princeton, NJ: ETS.
- Carr, S. (2002). Assessing learning processes: Useful information for teachers and students. *Intervention in School and Clinic*, 37, 156–162.
- Chang, K. E., Chen, I., and Sung, Y. T. (2002). The effect of concept mapping to enhance text comprehension and summarization. *Journal of Experimental Education*, 71, 5–23.
- Cohen, R. (1983). Self-generated questions as an aid to reading comprehension. *Reading Teacher*, 36, 770–775.
- Cortina, J. M., and Nouri, H. (2000). *Effect size for ANOVA designs* (Vol. 129). Thousand Oaks, CA: Sage Publications Inc.
- Crowhurst, M. (1991). Interrelationships between reading and writing persuasive discourse. *Research in the Teaching of English*, 25, 314–338.
- Cutler, L., and Graham, S. (2008). Primary grade writing instruction: A national survey. *Journal of Educational Psychology*, 100, 907–919.

- Dana, M. E., Scheffler, A. J., Richmond, M. G., Smith, S., and Draper, H. S. (1991). Writing to read: Pen palling for a purpose. *Reading Improvement*, 28, 113–118.
- Denner, P. R. (1987). *Comparison of the effects of episodic organizers and traditional note taking on story recall*. ERIC Document Reproduction Service No. ED270731.
- Denner, P. R. (1992). Comparison of the effects of episodic mapping and traditional note taking on the recall of historical text. Paper presented at the Northern Rocky Mountain Educational Research Association, Rapid City, SD.
- Doctorow, M., Wittrock, M. C., and Marks, C. (1978). Generative recall and reading comprehension. *Journal of Educational Psychology*, 70, 109–118.
- Ehri, L. (1987). Learning to read and spell words. *Journal of Reading Behavior*, 19, 5–31.
- Ehri, L. (2000). Learning to read and learning to spell: Two sides of a coin. *Topics in Language Disorders*, 20, 19–49.
- Ehri, L., Nunes, S., Stahl, S., and Willows, D. (2001). Systematic phonics instruction helps students learn to read: Evidence from the National Reading Panel's meta-analysis. *Review of Educational Research*, 71, 393–447.
- Elleman, A., Lind, E., Morphy, P., and Compton, D. (2009). The impact of vocabulary instruction on passage-level comprehension of school-age children: A meta-analysis. *Journal of Research on Educational Effectiveness*, 2, 1–44.
- Emig, J. (1977). Writing as a mode of learning. *College Composition and Communication*, 28, 122–128.
- Fitzgerald, J., and Shanahan, T. (2000). Reading and writing relations and their development. *Educational Psychologist*, 35, 39–50.
- Freedman, A. (1993). Show and tell? The role of explicit teaching in the learning of new genres. *Research in the Teaching of English*, 27, 222–251.
- Gewertz, C. (2009, June 11). Beyond a focus on graduation: Postsecondary work seen as key to success. *Education Week*, 28(34), 6–9.
- Gleser, L. J., and Olkin, I. (1994). Stochastically dependent effect sizes. In H. Cooper and L. V. Hedges (Eds.), *The handbook of research synthesis* (pp. 339–355). New York: Russell Sage Foundation.
- Graham, S. (2000). Should the natural learning approach replace traditional spelling instruction? *Journal of Educational Psychology*, 92, 235–247.
- Graham, S. (2006). Writing. In P. Alexander and P. Winne (Eds.), *Handbook of educational psychology* (pp. 457–477). Mahway, NJ: Erlbaum.
- Graham, S. (in press). Teaching writing. In P. Hogan (Ed.), *Cambridge encyclopedia of language sciences*. Cambridge University Press, Cambridge, UK.
- Graham, S., and Hebert, M. (under review). *A meta-analysis of the effects of writing and writing instruction on reading*. Manuscript submitted for publication.
- Graham, S., and Perin, D. (2007a). *Writing next: Effective strategies to improve writing of adolescents in middle and high schools*. New York, NY: Carnegie Corporation of New York.
- Graham, S., and Perin, D. (2007b). A meta-analysis of writing instruction for adolescent students. *Journal of Educational Psychology*, 99, 445–476.
- Graham, S., MacArthur, C., and Fitzgerald, J. (2007). *Best practices in writing instruction*. New York, NY: Guilford.

- Graham, S., Harris, K. R., Fink-Chorzempa, B., and MacArthur, C. (2002). Primary grade teachers' theoretical orientations concerning writing instruction: Construct validation and a nationwide survey. *Contemporary Educational Psychology, 27*, 147–166.
- Graham, S., Harris, K. R., MacArthur, C., and Fink-Chorzempa, B. (2003). Primary grade teachers' instructional adaptations for weaker writers: A national survey. *Journal of Educational Psychology, 95*, 279–293.
- Graham, S., Morphy, P., Harris, K., Fink-Chorzempa, B., Saddler, B., Moran, S., and Mason, L. (2008). Teaching spelling in the primary grades: A national survey of instructional practices and adaptations. *American Educational Research Journal, 45*, 796–825.
- Greene, J. (2000). *The cost of remedial education: How much Michigan pays when students fail to learn basic skills*. Midland, MI: Mackinac Center for Public Policy.
- Hedges, L.V. (1982). Estimation of effect size from a series of independent experiments. *Psychological Bulletin, 92*, 490–499.
- Hillocks, G. (1986). *Research on written composition: New directions for teaching*. Urbana, IL: National Council of Teachers of English.
- Hunt, K. W., and O'Donnell, R. (1970). *An elementary school curriculum to develop better writing skills*. ERIC Document Reproduction Service No. ED050108.
- Kamil, M., Mosenthal, P., Pearson, D., and Barr, R. (2000). *Handbook of reading research* (Vol. 3). London: Erlbaum.
- Kelley, K. (1984). *The effects of writing instruction on reading comprehension and story writing ability*. Unpublished dissertation, University of Pittsburgh.
- Kiewra, K. (1989). A review of note-taking: The encoding-storage paradigm and beyond. *Educational Psychology Review, 1*, 147–174.
- Kirsch, I., Braun, H., Yamamoto, K., and Sum, A. (2007). *America's perfect storm: Three forces changing our nation's future*. Princeton, NJ: ETS.
- Kiuhara, S., Graham, S., and Hawken, L. (2009). Teaching writing to high school students: A national survey. *Journal of Educational Psychology, 101*, 136–160.
- Klein, P. (1999). Reopening inquiry into cognitive processes in writing-to-learn. *Educational Psychology Review, 11*, 203–270.
- Langer, J., and Applebee, A. (1987). *How writing shapes thinking: A study of teaching and learning*. Urbana, IL: National Council of Teachers of English.
- Lee, J., and Collins, J. (2008). When writing intensive reading comprehension (WIRC) instruction works: Preliminary results of a two year experiment in low-performing urban schools. Unpublished paper, State University of New York at Buffalo.
- Lee, J., Grigg, W., and Donahue, P. (2007). *The nation's report card: Reading 2007*. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education, Washington, DC.
- Licata, K. P. (1993). *Writing about mathematical relations in science: Effects on achievement*. State University of New York at Buffalo.
- Linden, M., and Wittrock, M. C. (1981). The teaching of reading comprehension according to the model of generative learning. *Reading Research Quarterly, 17*, 44–57.
- Lipsey, M., and Wilson, D. (2001). *Practical meta-analysis*. Thousand Oaks, CA: Sage.

- Moats, L. (2005/2006). How spelling supports reading—and why it is more regular and predictable than you may think. *American Educator*, 12–22, 42–43.
- Moore, D., and Readence, J. (1984). A quantitative and qualitative review of graphic organizer research. *Journal of Educational Research*, 78, 11–17.
- National Center for Educational Statistics. (2005). *A first look at the literacy of America's adults in the 21<sup>st</sup> century*. Washington, DC: U.S. Government Printing Office.
- National Commission on Writing. (2003, April). *The neglected r: The need for a writing revolution*. Available at [www.collegeboard.com](http://www.collegeboard.com)
- National Commission on Writing. (2004). *Writing: A ticket to work or a ticket out: A survey of business leaders*. Available at [www.collegeboard.com](http://www.collegeboard.com)
- National Commission on Writing. (2005). *Writing: A powerful message from state government*. Available at [www.collegeboard.com](http://www.collegeboard.com)
- National Commission on Writing. (2006). *Writing and school reform*. Available at [www.collegeboard.com](http://www.collegeboard.com)
- National Governors Association. (2005). *Reading to achieve: A governor's guide to adolescent literacy*. Washington DC: NGA Center for Best Practices.
- National Institutes of Children's Health and Development (NICHD) (2000). *Report of the national reading panel: Teaching students to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction: Reports of the subgroups*. Bethesda, MD: National Institute of Child Health and Human Development, National Institutes of Health.
- Nelson, N., and Calfee, R. (1998). The reading–writing connection. In N. Nelson and R. Calfee (Eds.), *Ninety-seventh yearbook of the National Society for the Study of Education* (Part II, pp. 1–52). Chicago, IL: National Society for the Study of Education.
- Neville, D., and Searls, E. (1991). A meta-analytic review of the effects of sentence-combining on reading comprehension. *Reading Research and Instruction*, 31, 63–76.
- Peters, P.A. (1991). *A self-generated writing program and its effects on the writing and reading growth in second-grade children*. Unpublished dissertation, Boston University.
- Peverly, S., Ramaswamy, V., Brown, C., Sumowski, J., Alidoost, M., and Garner, J. (2007). What predicts skill in lecture note taking? *Journal of Educational Psychology*, 99, 167–180.
- Peverly, S. T., and Wood, R. (2001). The effects of adjunct questions and feedback on improving the reading comprehension skills of learning-disabled adolescents. *Contemporary Educational Psychology*, 26, 25–43.
- Placke, E. (1987). *The effects of cognitive strategy instruction on learning disabled adolescents' reading comprehension and summary writing*. Unpublished dissertation, State University of New York.
- Pressley, M., Graham, S., and Harris, K. R. (2006). The state of educational intervention research. *British Journal of Educational Psychology*, 76, 1–19.
- Pressley, M., Yokoi, L., Rankin, J., Wharton–McDonald, R., and Mistretta, J. (1997). A survey of the instructional practices of grade 5 teachers nominated as effective in promoting literacy. *Scientific Studies of Reading*, 1, 1–16.
- Rinehart, S. D., Stahl, S. A., and Erickson, L. G. (1986). Some effects of summarization training on reading and studying. *Reading Research Quarterly*, 21, 422–438.
- Rogers, L., and Graham, S. (2008). A meta-analysis of single subject design writing intervention research. *Journal of Educational Psychology*, 100, 879–906.

- Rosenshine, B., and Meister, C. (1994). Reciprocal teaching: A review of the research. *Review of Educational Research*, 64, 479–530.
- Rosenshine, B., Meister, C., and Chapman, C. (1996). Teaching students to generate questions: A review of the intervention studies. *Review of Educational Research*, 66, 181–221.
- Scammacca, N., Roberts, G., Vaughn, S., Edmonds, M., Wexler, J., Reutebuch, C., and Torgesen, J. (2007). *Intervention for struggling readers: A meta-analysis with implications for practice*. Portsmouth, NH: RMC Research Corp.
- Saddler, B., and Graham, S. (2005). The effects of peer-assisted sentence combining instruction on the writing performance of more and less skilled young writers. *Journal of Educational Psychology*, 97, 43–54.
- Salahu-Din, D., Persky, H., and Miller, J. (2008). *The nation's report card: Writing 2007*. NCES 2008–468. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education, Washington, DC.
- Shadish, W. R., Robinson, L., and Congxiao, L. (1999). *ES: A computer program for effect size calculation*. Memphis, TN: University of Memphis.
- Shanahan, T. (2006). Relations among oral language, reading, and writing development. In C. MacArthur, S. Graham, and J. Fitzgerald (Eds.), *Handbook of writing research* (pp. 171–183). New York, NY: Guilford.
- Slater, W. (1982). *The effects of structural organizers and rhetorical predicates on the recall of expository text*. Unpublished thesis, University of Minnesota.
- Slavin, R., Cheung, A., Groff, C., and Lake, C. (2008). Effective reading programs for middle and high schools: A best evidence synthesis. *Reading Research Quarterly*, 43, 290–322.
- Smith, C. (1988). Does it help to write about your reading? *Journal of Reading*, 31, 276–277.
- Smith, C. (moderator). (1994). *Whole language: The debate*. Bloomington, IN: ERIC Clearinghouse on Reading, English, and Communication.
- Smith, M. L., Glass, G. V., and Miller, T. I. (1980). *The benefits of psychotherapy*. Baltimore: Johns Hopkins University Press.
- Smyth, J. (1998). Written emotional expression: Effect sizes, outcome types, and moderating variables. *Journal of Consulting and Clinical Psychology*, 66, 174–184.
- Snow, C., Griffin, P., and Burns, M. (Eds.). (2005). *Knowledge to support the teaching of reading: Preparing teachers for a changing world*. San Francisco, CA: Jossey-Bass.
- Southern Regional Education Board (SREB). (2006). *Getting students ready for college and careers*. Atlanta: Southern Regional Education Board.
- Stotsky, S. (1982). The role of writing in developmental reading. *Journal of Reading*, 31, 320–340.
- Stotsky, S. G. (1988). Commentary. *Research in the Teaching of English*, 22, 89–99.
- Sullivan, M. A. (1977). *The effects of sentence-combining exercises on syntactic maturity, quality of writing, reading ability, and attitudes of students in grade eleven*. Unpublished dissertation, University of New York at Buffalo.
- Taggart, A., et al. (2001). *The national economic downturn and determining youth employment prospects: The case for a young adult job stimulus program*. Chicago, IL: Alternative School Network.
- Taylor, B. M., and Beach, R. W. (1984). The effects of text structure instruction on middle-grade students' comprehension and production of expository text. *Reading Research Quarterly*, 19, 134–146.

- Tierney, R., and Shanahan, T. (1991). Research on the reading-writing relationship: Interactions, transactions, and outcomes. In R. Barr, M. Kamil, P. Mosenthal, and D. Pearson (Eds.), *The handbook of reading research* (Vol. 2; pp. 246–280). New York, NY: Longman.
- Uhry, J. K., and Shepherd, M. J. (1993). Segmentation/spelling instruction as part of a first-grade reading program: Effects on several measures of reading. *Reading Research Quarterly*, 28, 218–233.
- Vidal-Abarca, E., and Gilabert, R. (1995). Teaching strategies to create visual representations of key ideas in content area text materials: A long-term intervention inserted in school curriculum. *European Journal of Psychology of Education*, 10, 433–447.
- Weber, W. R., and Henderson, E. H. (1989). A computer-based program of word study: Effects on reading and spelling. *Reading Psychology*, 10, 157–171.
- Wittrock, M. (1990). Generative processes of comprehension. *Educational Psychologist*, 24, 345–376.
- Wolf, I. (1986). *Meta-analysis: Quantitative methods for research synthesis*. Beverly Hills, CA: Sage.
- Wong, B. Y. L., Kuperis, S., Jamieson, D., Keller, L., and Cull-Hewitt, R. (2002). Effects of guided journal writing on students' story understanding. *Journal of Educational Research*, 95(3), 179–193.