

A Report to Carnegie Corporation of New York

WRITING NEXT

**EFFECTIVE STRATEGIES TO IMPROVE
WRITING OF ADOLESCENTS IN MIDDLE
AND HIGH SCHOOLS**

By Steve Graham and Dolores Perin



ALLIANCE FOR
EXCELLENT EDUCATION

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Based in Washington, D.C., the Alliance for Excellent Education is a national policy and advocacy organization that works to ensure that all children graduate from high school prepared for college and work and to be contributing members of society. It focuses on the needs of the six million 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.

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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 Next*. As the report warns, American students today are not meeting even basic writing 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, when 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 or 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

EXECUTIVE SUMMARY

A Writing Proficiency Crisis

Writing well is not just an option for young people—it is a necessity. Along with reading comprehension, writing skill is a predictor of academic success and a basic requirement for participation in civic life and in the global economy. Yet every year in the United States large numbers of adolescents graduate from high school unable to write at the basic levels required by colleges or employers. In addition, every school day 7,000 young people drop out of high school (Alliance for Excellent Education, 2006), many of them because they lack the basic literacy skills to meet the growing demands of the high school curriculum (Kamil, 2003; Snow & Biancarosa, 2003). Because the definition of *literacy* includes both reading and writing skills, poor writing proficiency should be recognized as an intrinsic part of this national literacy crisis.

This report offers a number of specific teaching techniques that research suggests will help 4th- to 12th-grade students in our nation's schools. The report focuses on all students, not just those who display writing difficulties, although this latter group is deservedly the focus of much attention. The premise of this report is that all students need to become proficient and flexible writers. In this report, the term *low-achieving writers* is used to refer to students whose writing skills are not adequate to meet classroom demands. Some of these low-achieving writers have been identified as having learning disabilities; others are the “silent majority” who lack writing proficiency but do not receive additional help. As will be seen in this report, some studies investigate the effects of writing instruction on groups of students across the full range of ability, from more effective to less effective writers, while others focus specifically on individuals with low writing proficiency.

Recent reports by the National Commission on Writing (2003, 2004, 2005) have helped to bring the importance of writing proficiency forward into the public consciousness. These reports provide a jumping-off point for thinking about how to improve writing instruction for all young people, with a special focus on struggling readers. *Reading Next* (Biancarosa & Snow, 2004), commissioned by Carnegie Corporation of New York, used up-to-date research to highlight a number of key elements seen as essential to improving reading instruction for adolescents (defined as grades 4–12). *Writing Next* sets out to provide guidance for improving writing instruction for adolescents, a topic that has previously not received enough attention from researchers or educators.

While *Reading Next* presented general methods and interventions that several of America's most respected adolescent literacy experts found to be useful for improving reading instruction, *Writing Next* highlights specific teaching techniques that work in the classroom. It does so by summarizing the results of a large-scale statistical review of research into the effects of specific types of writing instruction on adolescents' writing proficiency. Although several important reviews of research on writing instruction exist (e.g., Langer & Applebee, 1987; Levy & Ransdell, 1996; MacArthur, Graham, & Fitzgerald, 2006; Smagorinsky, 2006), the special strength of this report is its use of a powerful statistical method known as meta-analysis. This technique allows researchers to determine the *consistency* and *strength* of the effects of instructional practices on student writing quality and to highlight those practices that hold the most promise.

The Recommendations

Eleven Elements of Effective Adolescent Writing Instruction

This report identifies 11 elements of current writing instruction found to be effective for helping adolescent students learn to write well and to use writing as a tool for learning. It is important to note that all of the elements are supported by rigorous research, but that even when used together, they do not constitute a full writing curriculum.

1. **Writing Strategies**, which involves teaching students strategies for planning, revising, and editing their compositions
2. **Summarization**, which involves explicitly and systematically teaching students how to summarize texts
3. **Collaborative Writing**, which uses instructional arrangements in which adolescents work together to plan, draft, revise, and edit their compositions
4. **Specific Product Goals**, which assigns students specific, reachable goals for the writing they are to complete
5. **Word Processing**, which uses computers and word processors as instructional supports for writing assignments
6. **Sentence Combining**, which involves teaching students to construct more complex, sophisticated sentences
7. **Prewriting**, which engages students in activities designed to help them generate or organize ideas for their composition
8. **Inquiry Activities**, which engages students in analyzing immediate, concrete data to help them develop ideas and content for a particular writing task
9. **Process Writing Approach**, which interweaves a number of writing instructional activities in a workshop environment that stresses extended writing opportunities, writing for authentic audiences, personalized instruction, and cycles of writing

10. **Study of Models**, which provides students with opportunities to read, analyze, and emulate models of good writing
11. **Writing for Content Learning**, which uses writing as a tool for learning content material

The *Writing Next* elements do not constitute a full writing curriculum, any more than the *Reading Next* elements did for reading. However, all of the *Writing Next* instructional elements have shown clear results for improving students' writing. They can be combined in flexible ways to strengthen adolescents' literacy development. The authors hope that besides providing research-supported information about effective writing instruction for classroom teachers, this report will stimulate discussion and action at policy and research levels, leading to solid improvements in writing instruction in grades 4 to 12 nationwide.

INTRODUCTION

Although the nation has made progress recently in improving the literacy achievement of its elementary school students, adolescent literacy levels have remained stagnant (Lemke et al., 2004; National Center for Education Statistics, 1999, 2006; Olson, 2006). As a result, attention has begun to turn to the need to improve the literacy of adolescent students. One example of this new focus is the recently created Striving Readers Initiative, a federal program to help school districts meet the challenge of improving adolescents' literacy skills, for which the U.S. Congress appropriated just over \$29 million for the 2006–07 school year.

Several reports have drawn attention to the adolescent literacy crisis (e.g., Kamil, 2003; American Diploma Project, 2004; Carnevale, 2001; National Commission on Writing, 2004). Among them, *Reading Next* outlined elements of literacy instruction with a strong track record of positive results among adolescents (Biancarosa & Snow, 2004). While these reports and others have brought much-needed attention to adolescents' literacy needs, they were concerned more with reading than with writing skills.

Low-Achieving Writers: Scope of the Problem

Writing is sometimes seen as the “flip side” of reading. It is often assumed that adolescents who are proficient readers must be proficient writers, too. If this were the case, then helping students learn to read better would naturally lead to the same students writing well. However, although reading and writing are complementary skills whose development runs a roughly parallel course, they do not necessarily go hand in hand. Many adolescents are able to handle average reading demands but have severe difficulties with writing. Moreover, the nature of the relationship between reading and writing skills changes over time

CAUSE FOR ALARM

- **Seventy percent of students in grades 4–12 are low-achieving writers** (Persky et al., 2003).
- **Every school day, more than 7,000 students drop out of high school** (Pinkus, 2006).
- **Only 70% of high school students graduate on time with a regular diploma, and fewer than 60% of African-American and Latino students do so** (Greene & Winters, 2005).
- **Students who enter ninth grade in the lowest 25% of their class are 20 times more likely to drop out than are the highest-performing students** (Carnevale, 2001).
- **Nearly one third of high school graduates are not ready for college-level English composition courses** (ACT, 2005).
- **Over half of adults scoring at the lowest literacy levels are dropouts, and almost a quarter of these persons are high school graduates** (National Center for Education Statistics, 2005).

Continued on Page 8

(Fitzgerald & Shanahan, 2000). Researchers know that reading and writing often draw from the same pool of background knowledge—for example, a general understanding of the attributes of texts. At the same time, however, writing differs from reading. While readers form a mental representation of thoughts written by someone else, writers formulate their own thoughts, organize them, and create a written record of them using the conventions of spelling and grammar.

Therefore, although writing and reading are both vital aspects of literacy, they each require their own dedicated instruction. What improves reading does not always improve writing. This report responds to the strong need for information about how to improve classroom writing instruction to address the serious problem of adolescent writing difficulty.

The National Assessment of Educational Progress (NAEP) writing exam was last given in 2002 (Persky, Daane, & Jin, 2003); it measured the writing skills of 4th, 8th, and 12th graders and translated their scores into three levels of proficiency: Basic, Proficient, or Advanced. A disturbing finding was that only 22% to 26% of students scored at the Proficient level across the three grades, and very few were found to write at the Advanced level (Persky et al., 2003, Table 2.1). Even worse, alarmingly high proportions of students were found to be at or below the Basic level. Not only did 15% of 4th and 8th graders and 26% of 12th graders test below the Basic level, but 58%, 54%, and 51% of students, respectively, at these grade levels tested at the Basic level. In sum, 72% of 4th-grade students, 69% of 8th-grade students, and 77% of 12th-grade students did not meet NAEP writing proficiency goals.

These results clearly demonstrate that very large numbers of adolescents need interventions to help them become better writers. Some, especially those who score at or below the Basic level on the NAEP, require more help than others.

Consequences

A wide range of jobs require employees to produce written documentation, visual/text presentations, memoranda, technical reports, and electronic messages. The explosion of electronic and wireless communication in everyday life brings writing skills into play as never before. Recent reports by the National Commission on Writing (2004, 2005) reveal that the majority of both public and private employers say that writing proficiency has now become critical in the workplace and that it directly affects hiring and promotion decisions. The demand for writing proficiency is not limited to

CAUSE FOR ALARM

- College instructors estimate that **50% of high school graduates are not prepared for college-level writing** (Achieve, Inc., 2005).
- U.S. graduates' **literacy skills are lower than those of graduates in most industrialized nations**, comparable only to the skills of graduates in Chile, Poland, Portugal, and Slovenia (OECD, 2000).

The knowledge and skills required for higher education and for employment are now considered equivalent (ACT, 2006; American Diploma Project, 2004).

professional jobs but extends to clerical and support positions in government, construction, manufacturing, service industries, and elsewhere. In fact, about 30% of government and private sector employees require on-the-job training in basic writing skills. Private companies spend an estimated \$3.1 billion annually on remediation, and state governments spend an estimated \$221 million annually (National Commission on Writing, 2005).

Young people who have difficulty writing are not fully equipped to meet the demands of college, either. A recent study by ACT (2005) revealed that about a third of high school students intending to enter higher education do not meet readiness benchmarks for college-level English composition courses (among certain ethnic groups, 50% or more of adolescents do not meet ACT benchmarks), making it unlikely that they will be able to learn effectively in the college setting.

Many students begin postsecondary education at a community college. However, at least a quarter of new community college students enroll in remedial writing courses (National Center for Education Statistics, 2003). Compounding the problem, remedial enrollments appear to underestimate the number of students who actually need help with writing (Perin, 2006). Community colleges have always attempted to meet the needs of students with reading and writing difficulties, and many would argue that doing so is a core part of their mission. Many 2-year institutions find it difficult, however; they are not equipped to teach writing effectively to such large numbers of students, and the presence of students with poor academic skills in their classrooms can undermine the quality of the regular academic curriculum (Grubb et al., 1999; Perin & Charron, 2006).

Why Writing Is Important

Most contexts of life (school, the workplace, and the community) call for some level of writing skill, and each context makes overlapping, but not identical, demands. Proficient writers can adapt their writing flexibly to the context in which it takes place.

In the school setting, writing plays two distinct but complementary roles. First, it is a skill that draws on the use of strategies (such as planning, evaluating, and revising text) to accomplish a variety of goals, such as writing a report or expressing an opinion with the support of evidence. Second, writing is a means of extending and deepening students' knowledge; it acts as a tool for learning subject matter

WRITING IN THE WORKPLACE

Thirty-five percent of high school graduates in college and 38% of high school graduates in the workforce feel their writing does not meet expectations for quality (Achieve, Inc., 2005).

About half of private employers and more than 60% of state government employers say **writing skills impact promotion decisions** (National Commission on Writing, 2004, 2005).

“Poorly written applications are likely to doom candidates’ chances for employment” (National Commission on Writing, 2005, p. 4).

Writing remediation costs American businesses as much as \$3.1 billion annually (National Commission on Writing, 2004).

(Keys, 2000; Shanahan, 2004; Sperling & Freedman, 2001). Because these roles are closely linked, *Reading Next* recommended that language arts teachers use content-area texts to teach reading and writing skills and that content-area teachers provide instruction and practice in discipline-specific reading and writing.

RECOMMENDATIONS: 11 KEY ELEMENTS OF EFFECTIVE ADOLESCENT WRITING INSTRUCTION AS IDENTIFIED BY META-ANALYSIS

This report provides long-needed guidance for teachers and policymakers by identifying specific instructional practices that improve the quality of adolescent students' writing. The special contribution of this report is that it draws from empirical evidence.

The authors set out to collect, categorize, and analyze experimental and quasi-experimental research on adolescent writing instruction in order to determine which elements of existing instructional methods are reported to be effective by research. The method used, meta-analysis, provides a measure of effectiveness using the effect size statistic. On the basis of the effect sizes found, *Writing Next* presents 11 elements of effective adolescent writing instruction. (A detailed description of the methodology used is found in Appendix A.)

Effective Elements to Improve Writing Achievement in Grades 4 to 12

- | | |
|---------------------------|----------------------------------|
| 1. Writing Strategies | 7. Prewriting |
| 2. Summarization | 8. Inquiry Activities |
| 3. Collaborative Writing | 9. Process Writing Approach |
| 4. Specific Product Goals | 10. Study of Models |
| 5. Word Processing | 11. Writing for Content Learning |
| 6. Sentence-Combining | |

No single approach to writing instruction will meet the needs of all students. Also, some extant techniques may be effective but have not yet been studied rigorously. There is a tremendous need for more research on and dissemination of adolescent writing interventions that work, so that administrators and teachers can select the strategies that are most appropriate, whether for whole classrooms, small groups, or individual students.

Though each instructional element is treated as a distinct entity, the different elements are often related, and the addition of one element can stimulate the inclusion of another. In an ideal world, teachers would be able to incorporate all of the 11 key elements in their everyday writing curricula, but the list may also be used to construct a unique blend of elements suited to specific student needs. The elements should not be seen as isolated but rather as interlinked. For instance, it is difficult to implement the process writing approach (element 9) without having peers work together (element 3) or use prewriting supports (element 7). A mixture of these elements is likely to generate the biggest return. It remains to be seen what that optimal mix is, and it may be different for different subpopulations of students. However, it is important to stress that these 11 elements are not meant to constitute a curriculum.

The instructional elements are ordered according to their average effect. Therefore, elements with larger effect sizes are presented before those with smaller effect sizes. However, many of the effect sizes differ only minimally, so readers should be cautious in interpreting the differences in effect strength. Appendix B lists references for the studies used in determining the elements, in the same order as the elements.

The report's findings are based strictly on experimental and quasi-experimental research, as this is the only type of research that allows for rigorous comparison of effects across studies. While a range of methodologies have been used to study writing—from research into the history of writing instruction to surveys of student attitudes about writing to studies that aim to describe the actions of particularly successful teachers—there have been few efforts to compare the effectiveness of specific teaching strategies. Meta-analysis fills this gap.

It is also important to note that the findings in this report are cumulative, in that they build on earlier meta-analyses of writing instruction (Bangert-Drowns, 1993; Bangert-Drowns, Hurley, & Wilkinson, 2004; Goldberg, Russell, & Cook, 2003; Graham, 2006; Graham & Harris, 2003; Hillocks, 1986). This report includes all of the studies of adolescents reviewed in the prior meta-analyses. Further, the report adapts some of the earlier authors' categorizations of instruction, such as some of those used by Hillocks (1986). In addition, these earlier meta-analyses have been considerably extended by (a) updating the earlier findings; (b) reorganizing earlier instructional categories to incorporate newer findings; and (c) examining the impact of instruction more recently studied.

Benefits of Meta-analytic Approach

By their very nature, meta-analyses are concerned with quantitative data; as noted above, this report looked at experimental and quasi-experimental research on writing instruction. Its conclusions should in no way detract from the important contributions that other types of research make to an understanding of how to teach writing. For instance, the report's conclusions do not reflect the findings from a number of excellent observational studies that examine the writing practices of effective teachers of writing (e.g., Pressley, Yokoi, Rankin, Wharton-McDonald, & Mistretta, 1997), studies that measure the correlations between writing performance and particular teaching procedures (e.g., Applebee, Langer, Nystrand, & Gamoran, 2003), or single-subject design studies (e.g., De La Paz, 1999). Likewise, many perspectives, including cognitive (Hayes, 2000), sociocultural (Prior, 2006), and discourse (Chafe & Tannen, 1987), inform the study of writing (Sperling & Freedman, 2001).

THE OPTIMAL MIX

In the medical profession, treatment is tailored to individual patient needs; at times, more than one intervention is needed to effectively treat a patient.

Similarly, educators need to test mixes of intervention elements to find the ones that work best for students with different needs.

Researchers do not know what combination or how much of each of the recommended activities is needed to maximize writing instruction for adolescents in general or low-achieving writers in particular. Nor do they yet know what combination of elements works for which types of writers.

Although these viewpoints were not equally represented in the research studies included in this analysis, each is critical to understanding writing development. Finally, the recently published third edition of *Research on Composition* (Smagorinsky, 2006) provides a broad overview of the field—covering topics such as rhetoric, second language writing, multimodal composition, and home and workplace writing—and a survey of research and theory over the past 20 years (see also *Handbook of Writing Research*; MacArthur, Graham, & Fitzgerald, 2006).

With such a wide range of writing instruction practices and perspectives, this review of the literature aims not to describe the full context of the high-functioning classroom but to provide specific practices that have demonstrated effectiveness across a number of contexts—a purpose to which meta-analysis is ideally suited. For any of the practices reviewed, contexts can vary widely. For instance, they may include any grade between 4th and 12th; they may or may not be inclusive classrooms serving students with learning disabilities or writing in their second language; and they may involve teachers with very different beliefs about what good writing instruction entails. However, meta-analysis allows consideration of both the strength and consistency of a practice's effects.

A TECHNICAL NOTE ON META-ANALYSIS

What is a Meta-analysis?

Meta-analysis is a particularly powerful way of synthesizing large bodies of research, as it relies on quantitative studies and permits the calculation of **effect sizes**. The strength of meta-analysis as an approach is that it allows consideration of both the *strength* and *consistency* of a practice's effects.

What is an Effect Size?

Effect sizes report the average difference between a type of instruction and a comparison condition. They indicate the **strength** of the effect. The following guidelines make these numbers more meaningful.

0.20 = **small** or mild effect

0.50 = **medium** or moderate effect

0.80 = **large** or strong effect

Positive effect sizes mean the instruction had a positive effect on student writing.

Negative effect sizes mean the instruction had a negative effect on student writing.

Although these guidelines are commonly accepted, it is important to interpret effect sizes within the context of a given field. For instance, the National Reading Panel report (National Institute of Child Health and Human Development, 2000) found an effect size of 0.53 for phonemic awareness instruction, while effect sizes for fluency instruction ranged from 0.35 to 0.50. More research is needed to establish the range of effect sizes for writing strategies identified in the current meta-analysis.

Also, it is important to note that the large number of factors that affect adolescent literacy outcomes and the difficulty in improving writing ability render *any* significant effect meaningful.

Appendix A sets out the methodology used in the meta-analysis. **Appendix B** lists all of the categories for which four or more studies were analyzed and provides descriptive information about each study.

The Outcome of Writing Instruction

The authors followed in the footsteps of previous researchers by using writing quality as the outcome studied. Writing quality is defined here in terms of coherently organized essays containing well-developed and pertinent ideas, supporting examples, and appropriate detail (Needels & Knapp, 1994). Writing quality was included as the primary outcome, or one of several primary outcomes, in all previous meta-analyses on procedures for teaching writing (Bangert-Drowns, 1993; Goldberg et al., 2003; Graham, 2006; Graham & Harris, 2003; Hillocks, 1986). Writing quality served as the sole outcome measure because the authors were interested in identifying treatments that had a broad impact on writing performance. The only exceptions involved studies examining the teaching of summarization, in which completeness and accuracy of summaries were assessed, and writing-to-learn studies, in which content learning was the outcome measure.

The 11 Key Elements of Adolescent Writing Instruction

Writing Strategies (Effect Size = 0.82)

Teaching adolescents strategies for planning, revising, and editing their compositions has shown a dramatic effect on the quality of students' writing. Strategy instruction involves explicitly and systematically teaching steps necessary for planning, revising, and/or editing text (Graham, 2006). The ultimate goal is to teach students to use these strategies independently.

Strategy instruction may involve teaching more generic processes, such as brainstorming (e.g., Troia & Graham, 2002) or collaboration for peer revising (MacArthur, Schwartz, & Graham, 1991). In other instances, it involves teaching strategies for accomplishing specific types of writing tasks, such as writing a story (Fitzgerald &

Markham, 1987) or a

persuasive essay (Yeh, 1998).

Whether generic or highly focused, explicitly teaching adolescents strategies for planning, revising, and/or editing has a strong impact on the quality of their writing.

Writing strategy instruction has been found especially effective for adolescents who have difficulty writing, but it is also a powerful technique for adolescents in general. For example, 11 studies with low-achieving writers and 9 studies with students representing normal variation within the classroom were reviewed.

The average weighted effect size for the studies with low-achieving writers (1.02) was larger than the average weighted effect size for students across the full range of ability in regular classrooms (0.70).

WRITING STRATEGIES: AN EXAMPLE

Self-Regulated Strategy Development (SRSD) is an approach for helping students learn specific strategies for planning, drafting, and revising text. SRSD instruction is also characterized by explicit teaching, individualized instruction, and criterion-based versus time-based learning. Children are treated as active collaborators in the learning process. Instruction takes place in six stages:

Develop Background Knowledge: Students are taught any background knowledge needed to use the strategy successfully.

Describe It: The strategy as well as its purpose and benefits is described and discussed.

Model It: The teacher models how to use the strategy.

Memorize It: The student memorizes the steps of the strategy and any accompanying mnemonic.

Support It: The teacher supports or scaffolds student mastery of the strategy.

Independent Use: Students use the strategy with few or no supports.

Students are also taught a number of self-regulation skills (including goal setting, self-monitoring, self-instruction, and self-reinforcement) designed to help them manage writing strategies, the writing process, and their behavior. Mnemonics are introduced to help students remember strategies to increase writing performance. Two such strategies are PLAN and WRITE:

PLAN (*Pay attention to the prompt, List the main idea, Add supporting ideas, Number your ideas*)

WRITE (*Work from your plan to develop your thesis statement, Remember your goals, Include transition words for each paragraph, Try to use different kinds of sentences, and Exciting, interesting, \$10,000 words*).

Sources: De La Paz & Graham, 2002; Harris & Graham, 1996

Self-Regulated Strategy Development (SRSD) is a particularly effective approach for teaching writing strategies. The average weighted effect size for SRSD studies (1.14) was larger than for non-SRSD studies (0.62). SRSD is characterized by explicit instruction of writing strategies and self-regulation procedures (e.g., self-assessment and goal setting), as well as individualized instruction and criterion-based learning (see box above).

Strategy instruction is well supported by research. Its effects appear to be more dramatic for lower-achieving writers than for those across the full range of ability. Although SRSD had stronger effects than most other strategy approaches, the meta-analysis indicates moderate to strong effects of writing strategy instruction in general.

Summarization (Effect Size = 0.82)

Writing instruction often involves explicitly and systematically teaching students how to summarize texts. The summarization approaches studied ranged from explicitly teaching summarization strategies to enhancing summarization by progressively “fading” models of a good summary. In fact, students can learn to write better summaries from either a rule-governed or a more intuitive approach. Overall, teaching adolescents to summarize text had a consistent, strong, positive effect on their ability to write good summaries.

Collaborative Writing (Effect Size = 0.75)

Collaborative writing involves developing instructional arrangements whereby adolescents work together to plan, draft, revise, and edit their compositions. It shows a strong impact on improving the quality of students’ writing.

Studies of this approach compared its effectiveness with that of having students compose independently. The effect sizes for all studies were positive and large. Collectively, these investigations show that collaborative arrangements in which students help each other with one or more aspects of their writing have a strong

positive impact on quality. It was not possible to draw separate conclusions for low-achieving writers, as only two studies (Dailey, 1991; Macarthur et al., 1991) involved these students specifically. However, in both studies the effect size exceeded 1.00.

COLLABORATIVE WRITING: ONE APPROACH

Collaborative writing involves peers writing as a team. In one approach, a higher achieving student is assigned to be the Helper (tutor) and a lower achieving student is assigned to be the Writer (tutee). The students are instructed to work as partners on a writing task. The Helper student assists the Writer student with meaning, organization, spelling, punctuation, generating ideas, creating a draft, rereading essays, editing essays, choosing the best copy, and evaluating the final product. Throughout the intervention, the teacher’s role is to monitor, prompt, and praise the students, and address their concerns.

Source: Yarrow & Topping, 2001

Specific Product Goals (Effect Size = 0.70)

Setting product goals involves assigning students specific, reachable goals for the writing they are to complete. It includes identifying the purpose of the assignment (e.g., to persuade) as well as characteristics of the final product.

Specific goals in the studies reviewed included (a) adding more ideas to a paper when revising, or establishing a goal to write a specific kind of paper and (b) assigning goals for specific structural elements in a composition. Compared with instances in which students were simply given a general overall goal, these

SETTING SPECIFIC PRODUCT GOALS: ONE APPROACH

Setting specific product goals provides students with objectives to focus on particular aspects of their writing. For example, students may be instructed to take a position and write a persuasive letter designed to lead an audience to agree with them. In addition to this general goal, teachers provide explicit subgoals on argumentative discourse, including a statement of belief, two or three reasons for that belief, examples or supporting information for each reason, two or three reasons why others might disagree, and why those reasons are incorrect.

Source: Ferretti, MacArthur, & Dowdy, 2000

relatively simple procedures resulted in a positive effect size, and the average effect was strong. It was possible to obtain effect sizes specifically for low-achieving writers in three of the five product goal studies (which involved disaggregating results reported in Ferretti, MacArthur, & Dowdy, 2000). The average effect for these students was similarly strong, providing some tentative evidence that, interpreted cautiously (because of the small sample), indicates that setting product goals is effective with adolescents who are weaker writers. Overall, assigning students goals for their written product had a strong impact on writing quality.

Word Processing (Effect Size = 0.55)

The use of word-processing equipment can be particularly helpful for low-achieving writers. In this type of instruction, students might work collaboratively on writing assignments using personal laptop computers, or they might learn to word-process a composition under teacher guidance. Typing text on the computer with word-processing software produces a neat and legible script. It allows the writer to add, delete, and move text easily. Word-processing software, especially in more recent studies, includes spell checkers as well.

Compared with composing by hand, the effect of word-processing instruction in most of the studies reviewed was positive, suggesting that word processing has a consistently positive impact on writing quality. The average effect on writing quality was moderate for students in general (effect size = 0.51), but for low-achieving writers it was larger (effect size = 0.70). Thus, word processing appears to be an effective instructional support for students in grades 4 to 12 and may be especially effective in enhancing the quality of text produced by low-achieving writers.

Sentence Combining (Effect Size = 0.50)

Sentence combining involves teaching students to construct more complex and sophisticated sentences through exercises in which two or more basic sentences are combined into a single sentence. Teaching adolescents how to write increasingly complex sentences in this way enhances the quality of their writing. Studies establishing the effectiveness of sentence combining primarily compared it with more traditional grammar instruction. The effect sizes for all studies were consistently positive and moderate in strength.

SENTENCE-COMBINING: ONE APPROACH

Sentence-combining is an alternative approach to more traditional grammar instruction. Sentence-combining instruction involves teaching students to construct more complex and sophisticated sentences through exercises in which two or more basic sentences are combined into a single sentence.

In one approach, students at higher and lower writing levels are paired to receive six lessons that teach (a) combining smaller related sentences into a compound sentence using the connectors *and*, *but*, and *because*; (b) embedding an adjective or adverb from one sentence into another; (c) creating complex sentences by embedding an adverbial and adjectival clause from one sentence into another; and (d) making multiple embeddings involving adjectives, adverbs, adverbial clauses, and adjectival clauses. The instructor provides support and modeling and the student pairs work collaboratively to apply the skills taught.

Only one study (Saddler & Graham, 2005) examined the effects of sentence combining on low-achieving writers. When the effects of sentence combining were disaggregated for different types of writers in this study (low-achieving and average writers), the effect size for the weaker writers was 0.46. Overall, the current analysis of sentence combining indicates that this focus of instruction has a moderate impact on improving the quality of the writing of adolescents in general.

Pre-writing (Effect Size = 0.32)

Pre-writing engages students in activities designed to help them generate or organize ideas for their composition. Engaging adolescents in such activities before they write a first draft improves the quality of their writing. Pre-writing activities include gathering possible information for a paper through reading or developing a visual representation of their ideas before sitting down to write. For example, some common pre-writing activities include encouraging group and individual planning before writing, organizing pre-writing ideas, prompting students to plan after providing a brief demonstration of how to do so, or assigning reading material pertinent to a topic and then encouraging students to plan their work in advance. It was not possible to draw separate conclusions for low-achieving writers, as all of the pre-writing studies involved students across the full range of ability in regular classrooms. Collectively, these investigations show that pre-writing activities have a positive and small to moderate impact on the quality of students' writing.

Inquiry Activities (Effect Size = 0.32)

Inquiry means engaging students in activities that help them develop ideas and content for a particular writing task by analyzing immediate, concrete data (comparing and contrasting cases or collecting and evaluating evidence).

Involving adolescents in writing activities designed to sharpen their inquiry skills improves the quality of their writing. Effective inquiry activities in writing are

characterized by a clearly specified goal (e.g., describe the actions of people), analysis of concrete and immediate data (observe one or more peers during specific activities), use of specific strategies to conduct the analysis (retrospectively ask the person being observed the reason for a particular action), and applying what was learned (assign the writing of a story incorporating insights from the inquiry process).

It was found that this type of instruction was last studied in 1986. The comparison conditions in the inquiry studies were relatively similar, primarily involving writing activities facilitated by teachers. It was not possible to draw any specific conclusions for low-achieving writers, as all of the studies involved the full range of students in a typical classroom. Despite the lack of new research, the evidence suggests that engaging students in inquiry activities in which they analyze data before writing is an effective instructional practice.

Process Writing Approach (Effect Size = 0.32)

The process writing approach involves a number of interwoven activities, including creating extended opportunities for writing; emphasizing writing for real audiences; encouraging cycles of planning, translating, and reviewing; stressing personal responsibility and ownership of writing projects; facilitating high levels of student interactions; developing supportive writing environments; encouraging self-reflection and evaluation; and offering personalized individual assistance, brief instructional lessons to meet students' individual needs, and, in some instances, more extended and systematic instruction. The overall effect of the process writing approach was small to moderate, but significant. Only three studies specifically examined the impact of the process writing approach with low-achieving writers, making it difficult to draw any conclusions about its efficacy for these students.

INQUIRY ACTIVITIES: AN EXAMPLE

Students examine and infer the qualities of a number of objects in order to describe them in writing. The students touch objects while wearing blindfolds, examine seashells, listen to sounds, do physical exercise, become aware of bodily sensations, examine pictures, pantomime brief scenarios, act out dialogues, and examine model compositions. Students' responses to these objects are elicited. Students list more and more precise details, and respond to each other's descriptions in small groups or whole classes under teacher guidance in order to become increasingly aware of the writing task and possible audience reactions to the written product. The students write and revise several compositions. The teacher makes comments on each draft of the composition with the intention of increasing specificity, focus, and impact of the writing.

Source: Hillocks, 1982

Explicit teacher training was a major factor in the success of the process writing approach. When teachers had such training, the effect was moderate (0.46), but in the absence of training the effect was negligible, except for students in grades four to six, where the effect size was small (0.27) but significant. Five of the six studies in which teachers received training in applying the process writing model were conducted by the National Writing Project (NWP) to provide support for its work. Additional research is needed to verify these findings, particularly as the content of NWP training has changed over time. Also, it was not always clear what teachers learned or subsequently applied in their classrooms in the NWP studies; random assignment did not occur in any of the NWP studies; NWP was a partner in much of this research; and in some instances the NWP teachers were volunteers. Nevertheless, it is interesting to note that many of the components included in a recent description of the NWP model (peers working together, inquiry, and sentence-combining; see Nagin, 2003) were found by this meta-analysis to enhance the quality of adolescents' writing.

The process writing approach stresses activities that emphasize extended opportunities for writing, writing for real audiences, self-reflection, personalized instruction and goals, and cycles of planning, translating, and reviewing.

Study of Models (Effect Size = 0.25)

The study of models provides adolescents with good models for each type of writing that is the focus of instruction.

Students are encouraged to analyze these examples and to emulate the critical elements, patterns, and forms embodied in the models in their own writing. The effects for all six

studies reviewed were positive, though small. It was not possible to draw separate conclusions for low-achieving writers, as none of the studies specifically addressed this population.

STUDY OF MODELS: AN EXAMPLE

An example of **Study of Models** involves presenting students with two models of excellent writing, such as a well-written essay that sets out to persuade the reader that UFOs exist and another well-written persuasive essay claiming that there is no such thing as a UFO. The teacher discusses the essays with the students. The next day, students are given the essay that claimed that UFOs do not exist and are asked to write a persuasive essay arguing for or against the position that girls are not better in math than are boys.

Source: Knudson, 1991

Writing for Content Area Learning (Effect Size = 0.23)

Writing has been shown to be an effective tool for enhancing students' learning of content material. Although the impact of writing activity on content learning is small, it is consistent enough to predict some enhancement in learning as a result of writing-to-learn activities.

About 75% of the writing-to-learn studies analyzed had positive effects. The average effect was small but significant. Unfortunately, it was not possible to draw separate conclusions for low-achieving writers, as none of the studies examined the impact of writing-to-learn activities specifically with

these students. Writing-to-learn was equally effective for all content areas (social studies, math, and science) and grades (4–6 versus 7–12) studied.

A Note About Grammar Instruction

Grammar instruction in the studies reviewed involved the explicit and systematic teaching of the parts of speech and structure of sentences. The

meta-analysis found an effect for this type of instruction for students across the full range of ability, but surprisingly, this effect was negative. This negative effect was small, but it was statistically significant, indicating that traditional grammar instruction is unlikely to help improve the quality of students' writing. Studies specifically examining the impact of grammar instruction with low-achieving writers also yielded negative results (Anderson, 1997; Saddler & Graham, 2005). Such findings raise serious questions about some educators' enthusiasm for traditional grammar instruction as a focus of writing instruction for adolescents. However, other instructional methods, such as sentence combining, provide an effective alternative to traditional grammar instruction, as this approach improves students' writing quality while at the same time enhancing syntactic skills. In addition, a recent study (Fearn & Farnan, 2005) found that teaching students to focus on the function and practical application of grammar within the context of writing (versus teaching grammar as an independent activity) produced strong and positive effects on students' writing. Overall, the findings on grammar instruction suggest that, although teaching grammar is important, alternative procedures, such as sentence combining, are more effective than traditional approaches for improving the quality of students' writing.

WRITING-TO-LEARN: AN EXAMPLE

In a science class, the students study the human circulatory system. The teacher's goal is to help students develop alternative conceptualizations of the role of the heart, blood, and circulation. The science teacher asks the students to write summaries and answer questions in writing to increase their ability to explain information, elaborate knowledge leading to deeper understanding of the topic, comment on and interpret information in the written science text, communicate what has not been understood, and describe a change of belief they might be experiencing. Note that in the writing-to-learn approach, the teacher assigns writing tasks but does not provide explicit instruction in writing skills. Thus, writing is a tool of learning content material rather than an end in itself.

Source: Boscolo & Mason, 2001

IMPLEMENTING THE ELEMENTS

Although currently eclipsed by reading instruction, teaching students to write played a central role in education in many historical periods, from ancient Greek times through the 19th century. Indeed, writing well was once a central goal of education in both Europe and the United States. However, what is valued in writing, and thus the focus of writing instruction, has changed over the years. For example, while the Greeks prized rhetoric, or persuasive writing, the Romans prized eloquence. In the 18th- and 19th-century British Empire, the teaching of writing was seen as an important way to instill moral values. Although writing instruction played a prominent role in U.S. schools during the 19th century, by the 20th century it was already on the wane (Murphy, 1990). It is possible, though, that writing instruction will regain some of its earlier prominence as a result of the acknowledgement that writing difficulties are occurring across the nation.

Aims of Writing Instruction

Modern writing instruction in the United States recognizes that students need to write clearly and for a wide variety of real-life purposes. Thus, *flexibility* is now perhaps the most prized goal of writing instruction because the fully proficient writer can adapt to different contexts, formats, and purposes for writing.

Most contexts of life (school, the workplace, and the community) call for writing skills, and each context makes overlapping but not identical demands. Proficient writers can adapt their writing to its context. Writing is also produced in different formats, such as sentences, lists, outlines, paragraphs, essays, letters, and books. Proficient writers can flexibly move among most, if not all, of these formats. Proficient writers are also able to move among purposes that range from writing solely for themselves (as in a personal diary) to communicating with an external audience.

Writing in School

Despite the real-world need for flexibility in writing skill, classroom instruction sometimes over-emphasizes certain forms of writing over others. For example, many students are taught a specific and quite rigid structure for writing an essay, commonly known as the “five-paragraph essay.” Skilled writers, however, have more than that single structure to draw on when approaching a writing task. They have a variety of forms, strategies, knowledge, and skills at their disposal that they can apply flexibly to achieve their writing goals. Further, some teachers may overemphasize correct grammar or spelling at the expense of the expression of ideas. Excellent instruction in writing not only emphasizes correctness of forms and conventions, but also instills in writers the command of a wide variety of forms, genres, styles, and tones, and the ability to adapt to different contexts and purposes.

The use of different genres deserves special mention. Research has shown that, to the extent that teachers require writing in the early grades, they tend mainly to ask students to write stories,

descriptions of personal experiences, and other kinds of narratives. However, in the middle and high school years, writing assignments typically involve expository tasks, such as reporting, summarizing and analyzing factual information, and expressing an opinion with the support of evidence. Sixty percent of writing assignments in 4th grade, 65% in 8th grade, and 75% in 12th grade are expository in nature (Persky et al., 2003). Moreover, expository writing is the most frequently assigned writing task at the college level (Bridgeman & Carlson, 1984).

Writing plays two distinct roles in school. First, it is a skill that draws on subskills and processes such as handwriting and spelling; a rich knowledge of vocabulary; mastery of the conventions of punctuation, capitalization, word usage, and grammar; and the use of strategies (such as planning, evaluating, and revising text). All are necessary for the production of coherently organized essays containing well-developed and pertinent ideas, supporting examples, and appropriate detail (Needels & Knapp, 1994). This role can be characterized as “learning to write.” Second, writing is a means to extend and deepen students’ knowledge; it acts as a tool for learning subject matter (Keys, 2000; Shanahan, 2004; Sperling & Freedman, 2001). This role is called “writing to learn.” In fact, the roles of learning to write and of writing to learn are interdependent. It was for this reason that Biancarosa and Snow (2004) recommended that language arts teachers use content-area texts to teach reading and writing skills and that content-area teachers provide instruction and practice in discipline-specific reading and writing. Using writing tasks to learn content offers students opportunities to expand their knowledge of vocabulary; to strengthen the planning, evaluating, and revising process; and to practice grammar, spelling, punctuation, modes of argumentation, and technical writing (Yore, 2003).

Writing Develops

Writing proficiency develops over time. It begins as a kind of free association of ideas that a reader may find difficult to follow. From this comes a growing knowledge of stylistic conventions and more sophisticated uses of processes for planning, evaluating, and revising. Development continues with compositions marked by awareness of an audience and writing as a more unified and productive craft. Finally, at the most advanced stage, writing becomes a personal tool for transforming one’s own experiences and knowledge (Bereiter, 1980). As they become more proficient writers, students move gradually from “knowledge-telling” to “knowledge-transformation” (Bereiter & Scardamalia, 1987, pp. 5–6). Knowledge-telling is most typical of less proficient writers and involves writing content that could in principle also be conveyed orally. Knowledge-transformation is more complex; the writing process is used as a way to extend ideas and reasoning and as a vehicle for the development of knowledge, philosophical ideas, and personal awareness.

Effective writing instruction acknowledges that the smooth deployment of the higher-level writing strategies needed to plan, generate, and revise text depends on easy use of lower-level skills such as handwriting, keyboarding, spelling, grammar and punctuation, and access to appropriate vocabulary.

It will be harder for students to utilize strategies to write a coherent summary or persuasive essay if they are not fluent in the lower-level skills. At the same time, students who have difficulty with either lower-level writing skills or higher-level writing strategies will find it difficult to write to learn.

In-depth research performed with proficient adult writers has revealed important information about the mental activity that underlies the act of writing (Flower, 1979; Flower & Hayes, 1981; Graham, 2006). This work has shaped the design of contemporary writing instruction—for example, the planning, drafting, and revision process taught within the National Writing Project model (Pritchard & Marshall, 1994). According to this model, writing is made up of closely linked processes that operate simultaneously, as teachers model and guide students through various writing strategies. This research framework also emphasizes building the motivation of low-achieving writers, which has often gone into a steep decline by the time they are identified as needing help (Bruning & Horn, 2000; Garcia & de Caso, 2004).

Choosing Elements for Implementation

This report identifies elements of instruction that hold promise for improving writing ability. However, as mentioned earlier, together the instructional elements do not represent a curriculum. Before implementing any of the elements, educators should consider the needs of their students as revealed by assessment data. Such data include observations of students while they are writing, analysis of their writing samples (see, e.g., Needels & Knapp, 1994), and test scores. Just as with reading, writing intervention is most effective when matched to student needs. Once an intervention begins, assessment and diagnostic teaching should be used in an ongoing way to examine its effects (Barr, Blachowicz, Bates, Katz, & Kaufman, 2007). Not all elements are effective with all students and all teachers. Sometimes positive results are not seen immediately; implementing new elements of instruction often requires a significant investment of time to reveal their full potential (Graham & Harris, 2005). Moreover, the elements identified in this report have not been jointly tested or methodically compared with each other. Pending conclusive data on the relative effects of one strategy over another, teachers should choose on the basis of fit with existing instructional conditions and future goals.

ACCUMULATION OF RESEARCH ON ADOLESCENT WRITING INSTRUCTION

This report is intended to inform the public about empirical evidence that has accumulated over the years on what elements of writing instruction work best with adolescents. The last comprehensive review of writing was conducted 20 years ago (Hillocks, 1986). In the intervening years, researchers have focused their attention more narrowly, using meta-analysis to examine the impact of elements such as strategy instruction (Graham, 2006; Graham & Harris, 2003), word processing (Bangert-Drowns, 1993; Goldberg et al., 2003), and writing to learn (Bangert-Drowns et al., 2004). Studies from these reviews were included in the current review, as were new investigations uncovered through an extensive and rigorous search process.

A considerable body of research has accumulated since Hillocks (1986). Although there is much less research on writing than reading instruction, the current study located a total of 176 effect sizes, only 29 of which came from the Hillocks review. These effect sizes encompassed more than 25 categories of adolescent writing instruction, with four or more effect sizes available for 18 of the categories (for seven of these categories, the findings were not reliable enough or the instructional procedures too diverse to be included here). Twenty-six writing-to-learn studies with students in grades 4 to 12 were found, but only three of these (Boscolo & Mason, 2001; Hand, Hohenshell, & Prain, 2004; Wong, Kuperis, Jamieson, Keller, & Cull-Hewitt, 2002) were conducted after a writing-to-learn meta-analysis that surveyed the research available through 1999 (Bangert-Drowns et al., 2004). Thanks to all of this research, there is a reasonable body of experimental and quasi-experimental research from which policymakers and educators can draw conclusions and develop recommendations.

BURGEONING RESEARCH BASE

In 1986, Hillocks was able to calculate only 29 effect sizes for students in grades 4 to 12 from existing quasi-experimental and experimental studies of writing instruction. In 2005, 176 were located. **The writing instruction research base has grown more than 600 percent in just 20 years.**

The field of writing research has matured in the past 20 years. Unfortunately, the number of studies conducted with low-achieving writers, especially those from low-income families in inner-city settings, remains relatively small. Only 41 (23%) of the 176 effect sizes in this meta-analysis involved low-achieving writers in general or students with learning disabilities, low English language proficiency, or mild handicapping conditions. Although the current study did not examine whether effect sizes were moderated by the location of the study (i.e., urban, suburban, rural), there was a notable lack of experimental research with low-achieving writers in urban settings. So, even though there is an impressive amount of research testing different approaches to writing instruction, the lack of information on effective writing instruction for low-income, urban, low-achieving adolescent writers remains a serious gap in the literature.

Identifying what combination or how much of each of the recommended elements is needed to maximize writing instruction, for adolescents in general or for low-achieving writers in particular, was beyond the scope of this study. Also, because studies of many aspects of writing instruction remain to be done, the recommendations in this report do not address certain aspects of writing, such as teaching spelling, handwriting, punctuation, and vocabulary, or certain approaches to instruction, such as conferencing with students about their writing. The findings of the meta-analysis do not provide clear direction for the use of technological tools other than word processing, nor is there enough evidence to offer firm guidelines for how teachers can boost adolescents' motivation to write (c.f., Bruning & Horn, 2000; Garcia & de Caso, 2004). The conclusions of this report are based only on rigorous empirical data; the areas for which the report has no recommendations point to gaps in the current state of research on writing instruction.

A Research Agenda for Writing Instruction

Some instructional procedures have been investigated more often than others. Only four key elements in this report's list (strategy instruction, word processing, process writing approach, and writing-to-learn activities) yielded 10 or more studies that met the criteria established for selection for the meta-analysis. One other area of writing instruction—traditional grammar instruction—was the focus of more than 10 studies, but its effects were negative. Some other areas of instruction showed promise, but reliable conclusions could not be drawn because of limited evidence. In fact, some recommendations from previous reports have an uneven research record. For instance, increasing the frequency and amount of writing is generally proposed as an important practice because of widespread concerns about how little actual writing students do in schools (Applebee, 2000; National Commission on Writing, 2003), but evidence of a consistent effect is ambiguous. There were too few effect sizes, too much variability in effect sizes, too much diversity in the procedures used to promote extra writing time, and too many different comparison conditions to allow any reliable conclusions to be drawn about the impact of this approach. As was claimed many years ago (Braddock & Jones, 1969), it may well be that although it is important for students to engage frequently in writing practice, providing more opportunities to write without effective instruction and motivation is not enough to improve writing quality.

Although writing instruction has been researched much less often than reading instruction, it is an equally important component of literacy proficiency and encompasses, in itself, an extremely complex set of skills. The rich nature of the practice of writing and its relative neglect in instructional research make it inevitable that a whole compendium of possible approaches has not yet been studied. Research is clearly needed not only to identify additional effective practices that already exist but to develop new ones.

Several rather well-established practices still have small and uneven research bases. Text structure instruction, which involves explicitly and systematically teaching students about the structure of specific types of text, such as stories, informational text, and persuasive essays, has not been studied sufficiently. Another area in which more empirical evidence is needed is feedback, which involves giving students structured responses about their writing. This study identified five studies that examined the impact of feedback on the quality of students' writing, but the methods and outcomes were too variable to draw any reliable conclusions. In addition, a wide variety of external supports (such as prompts, guides, hints, and visual frameworks that structure the writing process) designed to facilitate students' writing are in use in classrooms but have not been studied adequately, so firm evidence for their efficacy is lacking. Further, as in the field of reading (Biancarosa & Snow, 2004), more attention needs to be directed at the impact of individualized instruction as well as small-group instruction, especially with low-achieving writers.

New practices in writing instruction have recently arisen and require investigation. For example, teachers have begun to use rubrics to teach students to reflect on and evaluate the quality of their own writing. The leveled lists of writing qualities or traits provided in a rubric give students tangible evaluation criteria. This approach is gaining support among educators. Vocabulary instruction in the context of writing is another practice that has been increasing recently and may be an effective procedure for improving students' writing.

When considered against a backdrop of the vast number of studies of reading instruction, research into writing instruction needs more attention (National Commission on Writing, 2003). The coming years must bring increased effort to collect stringent data on approaches to writing instruction that are used in classrooms but for which evidence is lacking. The list of writing elements offered in this report is limited by what has been studied rigorously thus far. Those who conduct the next meta-analysis of writing instruction, whether 5, 10, or 20 years from now, need a body of literature to review that scrutinizes a greater variety of instructional practices.

New researchers must take on the challenge of studying writing instruction in all its complexity. Reading research was once limited in much the same way as writing research now is, but consistent attention from the academic community brought forth a flood of knowledge about many aspects of the reading process. Writing must be next. The future success of the nation's young people depends on it.

A CHALLENGE

The results of this meta-analysis point toward a number of specific changes that teachers can make to promote increased writing proficiency among all their students. One important outcome of improved writing is students' ability to use it as a tool for understanding and analyzing subject-matter information. Setting high standards through implementing effective writing instruction sends adolescents a message that higher-level thinking about substantive material is important. In the words of an adolescent attending an innovative inner-city high school in New York City, "They wanted, like, essays. They wanted you to get it" (Herszenhorn, 2005).

Improving the writing abilities of adolescent students has social implications far beyond the classroom. Helping these young people to write clearly, logically, and coherently about ideas, knowledge, and views will expand their access to higher education, give them an edge for advancement in the workforce, and increase the likelihood they will actively participate as citizens of a literate society. Only the combined efforts of policymakers, educators, and researchers will make this happen.

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APPENDIX A: META-ANALYSIS METHODOLOGY

This appendix reviews in more detail the methodology in conducting the meta-analysis that yielded the *Writing Next* recommendations. A more in-depth description of the methodology can be found in a forthcoming publication (Graham & Perin, under review).

Location and Selection of Studies

This meta-analysis was performed to draw a series of instructional recommendations for teaching writing as well as update the conclusions drawn by Bangert-Drowns, Hurley, and Wilkinson (2004) about the effectiveness of writing as a tool for learning. The strategies used for locating and selecting studies for inclusion were influenced by nine main factors.

First, the search concentrated on two separate areas: learning-to-write and writing-to-learn. For learning-to-write, studies of the effectiveness of interventions designed to improve students' writing quality were looked for. For writing-to-learn, all relevant studies from Bangert-Drowns et al.'s (2004) meta-analysis were included and writing-to-learn studies conducted after 2000 were searched, since Bangert-Drown et al.'s (2004) search ended in 1999.

Second, the investigation was limited to studies of students in grades 4 to 12. Some studies that included students in grades 4 to 12 were eliminated if they also included students in the primary grades and it was not possible to calculate an effect size solely for the older students.

Third, studies of writing intervention in special schools for children with deafness, autism, or severe emotional disturbance were not included. While writing instruction is an important part of the curriculum for these students, the purpose of this review was to draw recommendations for writing instruction within regular school settings.

Fourth, only studies that used a measure of writing quality for the learning-to-write analysis were included. Writing quality was the primary outcome, or one of several primary outcomes, in all previous meta-analyses on writing instruction (Bangert-Drowns, 1993; Goldberg, Russell, & Cook, 2003; Graham, 2006; Graham & Harris, 2003; Hillocks, 1986). The review was limited to studies of writing quality to identify interventions that had a broad impact on writing performance. The only exception involved summary-writing instruction. Measures of quality for studies in this category were based on the completeness and accuracy of the written summary produced by students.

Fifth, studies in which reliability for the writing quality measure was questionable were excluded. For example, studies that provided no information on interrater reliability or that provided no training to raters were eliminated. Studies in which low levels of interrater reliability (i.e., below 0.60) were reported were also eliminated. Almost all contemporary measures of writing quality involve some degree of subjectivity, making the establishment of reliability of scoring procedures particularly important.

Sixth, writing-to-learn studies were eliminated if outcomes did not include an assessment of content-related academic achievement in addition to writing quality measures. These content-learning measures were conducted in the school setting where the investigation took place and varied in form, including such diverse assessments as final grades, locally constructed examinations, and standardized tests.

Seventh, only studies employing an experimental or quasi-experimental design were included. This method was consistent with most previous meta-analysis in writing (Bangert-Drowns, 1993; Bangert-Drowns et al., 2004; Goldberg et al., 2003; Graham, 2006; Graham & Harris, 2003; Hillocks, 1986). Consequently, each study in this meta-analysis compared at least two groups of students who received different instructional conditions. Correlational, qualitative, or single-subject design studies and studies in which students served as their own comparison group were not included. Even though each of these other types of research has much to add to the ongoing dialogue about effective instructional practices (see Pressley, Graham, & Harris, 2006), the review was concerned specifically with experimental and quasi-experimental studies.

Eighth, only studies that provided the data needed to calculate appropriate statistics, including an effect size, a weighted average effect size, and homogeneity, were included. For example, if a study did not provide information on the number of participants involved in the experiment (e.g., Kerchner & Kristinger, 1984), it was excluded, as it could not be used in the calculation of homogeneity or an average weighted effect size.

Ninth, a search that was as broad as possible was undertaken to identify relevant studies for both the learning-to-write and the writing-to-learn analyses. Included in this search were studies with students in grades 4 to 12 in previous meta-analyses of writing (i.e., Bangert-Drowns, 1993; Bangert-Drowns et al., 2004; Goldberg et al., 2003; Graham, 2006; Graham & Harris, 2003; Hillocks, 1986). Edited books and book series were also searched for possible studies (e.g., Gregg & Steinberg, 1980; Levy & Ransdell, 1996). Further, multiple searches in a number of databases, including ERIC, PsycINFO, ProQuest, Education Abstracts (i.e., Education Full Text), and Dissertation Abstracts, were run during May 2005 to identify relevant studies. Of 582 documents collected as well as the studies for grades 4 to 12 reported in Bangert-Drowns (1993), Bangert-Drowns et al. (2004), and Hillocks (1986), 142 studies were identified as suitable for inclusion. Some of these contained more than one intervention comparison, and a total of 176 different effect sizes were generated from these studies.

Categorizing Studies Into Intervention Conditions

Each study was read and then placed into pre-identified groupings. While some of the pre-identified groupings were developed from previous meta-analyses (Bangert-Drowns, 1993; Bangert-Drowns et al., 2004; Graham, 2006; Graham & Harris, 2003), others reflected the broad array of topics included in the electronic searches described in the previous section. Studies that did not fit neatly

into groupings were held apart until all studies had been read once. Then, studies in each pre-identified category were examined to determine if each investigation represented the same basic intervention. If they did not, they were held apart with studies not categorized during the initial reading. After all the groupings had been verified in this manner, uncategorized studies were reread and new groupings were constructed as needed. In a few instances, a study was placed into one of the pre-identified groupings. Studies in any new grouping as well as any pre-identified grouping in which an additional study was placed were read again to determine if each intervention represented the same basic approach. Some studies were placed into more than one grouping because they included two or more interventions.

As noted previously the groupings fell into two general types: learning-to-write and writing-to-learn. Writing-to-learn studies were not further categorized, but learning-to-write studies were. Learning-to-write groupings fell into three broad categories (explicit instruction, instructional supports, and mode of instruction). Because summary effect sizes were calculated only for groupings that contained four or more effect sizes, only those groupings are described by category here (a list of all groupings with four or more effect sizes is presented in Appendix B).

Explicit Instruction

A considerable number of studies focused on explicitly teaching skills, processes, or knowledge. All these studies involved sustained, direct, and systematic instruction designed to facilitate student mastery. Three categories—writing strategies, summarization, and sentence combining—yielded at least four or more effect sizes that provided a reliable estimate.

Strategy instruction shared some overlap with other categories classified as “explicit teaching.” While the primary focus was always on teaching planning, revising, and/or editing strategies, some studies (especially those involving the Self-Regulated Strategy Development model; Harris & Graham, 1996) also directly taught students knowledge and skills needed to use these processes. It is also important to note that some authors would classify strategy instruction as a process writing approach (see Pritchard & Honeycutt, 2006), as both are concerned with promoting students’ use of processes for planning, translating, and reviewing. Strategy instruction was not included under the process writing approach for two reasons: (a) explicit and sustained instruction in writing strategies is not common in many classrooms that use a process approach model (e.g., Anthony & Anderson, 1987) and (b) such instruction is rarely included in descriptions of the components of a process writing program (see, e.g., Nagin, 2003). Even though sentence combining is included as a component of the National Writing Project, this also was not included under the process writing approach, as it is only one of many elements included in this model.

Instructional Supports

Supporting students' writing involves providing some form of assistance that helps them carry out one or more processes involved in writing. These procedures include structuring how students carry out a particular writing process, having peers help each other as they compose, providing students with feedback on their performance, focusing students' attention on specific aspects of the task, and providing a model of what the end product should look like. Six supporting categories—collaborative writing, specific product goals, word processing, prewriting, inquiry activities, and study of models—yielded four or more effect sizes that provided a reliable estimate.

These procedures differ from the categories included under “explicit teaching” in a subtle but important way. The primary goal for explicit instruction categories, such as strategy instruction and sentence combining, is the immediate mastery of the declarative and procedural knowledge targeted for instruction. This goal is accomplished by directly teaching such knowledge until students can apply it independently. The mastery of processes, knowledge, or skills is more indirect with the supporting procedures described above, as students are assumed to internalize the use of these procedures as a result of applying them over time. For example, as students repeatedly analyze models of good writing and attempt to emulate them, it is assumed that they develop a better understanding of the criteria underlying good writing and that they increasingly begin to apply this newly acquired knowledge without having to rely on the models for assistance.

It is also important to realize that some of these supporting procedures are integral components of explicit teaching procedures. For example, with strategy instruction, students often help each other apply (and adapt) a strategy as they are learning to use it, they are encouraged to attain specific goals for their papers that can be achieved by using the strategy, and they receive feedback on how the strategy has enhanced their writing (Graham & Harris, 2003). These supporting procedures are not elements just of explicit teaching procedures, however, as many of them (e.g., prewriting and inquiry activities, feedback, and peers working together to compose a composition) are integral to the process approach to writing as well. Finally, it is noted that inquiry could be classified as a prewriting activity. However, it was decided to keep it as a separate category because it employs a set of distinctive features for developing and analyzing ideas, and it was also kept distinct in Hillocks' (1986) review (as was the study of models).

Mode of Instruction

In the meta-analysis conducted by Hillocks (1986), four categories (presentational, environmental, individualized, and natural process) encompassed teachers' mode or form of instruction. These modes differed in the role assumed by the teacher, the kinds and order of activities applied, and the specificity and clarity of objectives and learning tasks. The *presentational* mode was not examined, as there were too few studies. In addition, the *environmental mode* was not investigated, as this category has been criticized in terms of its distinctiveness and clarity (Applebee, 1986; Golden, 1986; Stotsky, 1988), and

most of the studies included in this category could also be placed in the inquiry activities category too. The *individualized mode* of instruction was also not included in this investigation, because the interventions included under this category were too diverse to form a cohesive treatment.

For the meta-analysis, the more common title *process writing approach* was adopted for what Hillocks called the *natural process mode*. Included under the “process writing” umbrella were studies that examined the effectiveness of the process writing approach as described by Graves (1983), the Writers’ Workshop (Calkins, 1981), the National Writing Project (Pritchard, 1987), and whole language (when a process writing approach was applied).

Coding of Study Features

Each study was coded for seven variables: grade, type of student, number of participants, writing genre, assignment of subjects, comparison condition, and publication type. These variables provided information on who received an intervention (grade and type of student), how broadly it was applied (number of participants), what genre it was designed to impact (writing genre), and what intervention served as the comparison condition. Most of these variables were also selected because it was assumed that they might account for variability in effect sizes beyond subject-level sampling error (assessed by the test of homogeneity). For example, variability in effect sizes may be related to systematic differences in the comparison condition, type or grade level of participants, and writing genre assessed. To establish reliability of the coding procedures used in this review, a doctoral student majoring in education was familiarized with each category and then asked to score 15% of the studies (randomly selected). Across studies and variables, interrater reliability between the graduate student and our coding was 94%. Two of the study feature variables are described below because they are included in Appendix B. See Graham and Perin (2006) for a fuller discussion of these and other features.

Grade. The specific grade(s) that participants attended were identified. In a few instances, it was known only that students were in high school, as the researchers did not identify the specific grade levels of the participants.

Type of student. Participants were labeled as LD (students with a learning disability only), low-achieving (poor writers only), MH (students with mild handicapping conditions, such as learning disabilities or speech and language difficulties), Average (average writers; this category did not include the weakest and strongest writers in a classroom), High (above-average writers only), ESL (students with English as a second language only), L2 (second language learners only), and Full-Range (representing the full range of writers found in typical classrooms). It should be noted that LD and MH categories are part of the broader low-achieving category, but students in these two categories were also receiving special education services. Each of these groups of youngsters is educated either exclusively or primarily in the general classroom. Unless indicated otherwise, students with LD and MH were poor writers.

An additional study feature was coded for investigations in two categories. In the strategy instruction category, studies were coded as using the Self-Regulated Strategy Development (SRSD) model (Harris & Graham, 1996, 1999) or not using this model. This was done because Graham (2006) found that the SRSD model yielded larger effect sizes than did other methods of strategy instruction combined. Studies in the category entitled “process approach to writing instruction,” which involved training of teachers, were identified as well. Five of the six identified studies involved training through the National Writing Project (Nagin, 2003). Such training (or the lack of it) may account for variability in effect sizes for the process writing intervention.

Calculation of Effect Sizes

Effect sizes were calculated as Cohen’s d or the standardized mean difference. The posttest mean performance of the comparison group was subtracted from that of the intervention group at posttest and divided by the pooled standard deviation of the two groups. To standardize the calculation of effect sizes, the learning-to-write effect sizes reported in previous meta-analysis on writing instruction (Bangert-Drowns, 1993; Goldberg et al., 2003; Graham, 2006; Graham & Harris, 2003; Hillocks, 1986) were recalculated because a variety of procedures were used in these prior reviews. The writing-to-learn effect sizes from Bangert-Drowns et al. (2004) were not recalculated, as 23 of the 26 studies were included in the previous review.

In calculating learning-to-write effect sizes, writing quality was used as the outcome. Holistic quality scores (a single score that measures general overall quality) were used over analytic scales (separate scores for specific aspects of writing, such as content, organization, vocabulary, mechanics, and so forth). If only an analytic scale was available, the scores for mechanics were excluded when calculating a mean effect size for quality. For writing-to-learn studies, effect sizes were calculated on the academic achievement measures most similar to typical classroom achievement measures, as was done by Bangert-Drowns et al. (2004).

A correction was made for small sample size bias in three instances in which the sample size was less than 20 (Hedges & Olkin, 1985). When means or standard deviations were unreported, effect sizes were calculated from t -tests, analysis of variance (ANOVA), or regression analysis (Lipsey & Wilson, 2001).

To avoid inflating sample size (Wolf, 1986) and violating the assumption of independence of data, only one effect size was computed for each study, with two exceptions. One exception involved comparisons of two interventions in which each intervention fit one of the established groupings and an effect size was calculated for both categories. For example, Curry (1997) compared strategy instruction (effect size = 0.51) and the process writing approach (effect size = -0.51). The other exception involved cases in which more than two different interventions were compared. When this occurred, an effect size for each intervention was calculated. For example, Knudson (1989) compared four different interventions.

Statistical Analysis of Effect Sizes

Analyses were conducted only for groupings that included four or more effect sizes based on the precedents set by Hillocks (1986). Nevertheless, it is recognized that small sample sizes are not very reliable, and a summary statistic is not reported for groupings with small samples and considerable variation in effect sizes.

Our meta-analysis employed a weighted fixed-effects model. For each grouping, we calculated the mean, standard deviation, and median for the unweighted effect sizes. We also calculated the mean and confidence interval for weighted effect sizes. While it is best to interpret the magnitude of an average weighted effect size (e.g., strategy instruction in writing) in relation to the distribution of other mean effect sizes in the same general area (i.e., other writing instructional approaches), in interpreting effect sizes, we used the generally accepted rule of thumb that an effect size of 0.20 is small, 0.50 is medium, and 0.80 is large (Lipsey & Wilson, 2001).

We also conducted a test of homogeneity to determine if the various effect sizes averaged together in a grouping estimated the same population effect size. When variability in effect sizes was larger than expected based on sampling error alone (i.e., the homogeneity test was statistically significant), this excess variability was examined to determine whether it could be accounted for by identifiable differences between studies (i.e., grade level). Using a fixed-effects model (Lipsey & Wilson, 2001), the effect size variance was partitioned in order to examine if a specific study feature (a) systematically differentiated between investigations with larger and smaller effect sizes and (b) accounted for the excess in variability. MetaWin software (Rosenberg, Adams, & Gurevitch, 2000) was used to conduct these analyses.

Note that not all of the analyses are included in this document. These can be obtained from Carnegie Corporation of New York or from a forthcoming article (Graham & Perin, 2006).

Limitations

Readers should keep in mind several caveats and limitations of this report's findings and recommendations.

First, only studies in which the performance of an experimental group was compared with that of a comparison group were included in this review. Consequently, the conclusions from this meta-analysis do not reflect the findings from a number of excellent observational studies that examined the writing practices of effective teachers of writing (e.g., Pressley, Yokoi, Rankin, Wharton-McDonald, & Mistretta, 1997), studies that measured the correlations between writing performance and particular teaching procedures (e.g., Applebee, Langer, Nystrand, & Gamoran, 2003), or single-subject design studies (e.g., De La Paz, 1999). Likewise, it was not possible to draw any conclusions about the effectiveness of a procedure such as dictation, as most of the research in this area involved students acting as their own comparison group (e.g., Graham, 1990).

Second, because the analysis was limited to studies that assessed the quality of students' writing, we can draw no conclusions about studies that did not examine effects on writing quality. Consequently, we were unable to analyze the viability of teaching basic text transcription skills, such as spelling or handwriting, to adolescents because the search did not yield any studies that examined whether such instruction had an impact on the writing quality of students in grades 4 through 12.

Third, some instructional procedures have been the focus of more research than others. Although vocabulary instruction (e.g., Duin & Graves, 1987) may be an effective procedure for improving students' writing, for example, not enough research is available to draw even a tentative conclusion about its impact. In addition, only four areas (strategy instruction, word processing, process writing approach, and grammar instruction) yielded 10 or more effect sizes. Less confidence can be placed in the reliability of an average effect size when it is based on a small number of studies.

Fourth, even for some areas that included a large number of effect sizes, not all grade levels were covered. For strategy instruction, for instance, there were no studies beyond 10th grade. The results of our meta-analysis do not permit a determination of whether the interventions are effective at specific grade levels. Interpretation of the findings from this review must be tempered by this fact.

Fifth, in only one instructional approach, strategy instruction, was it possible to examine whether type of student moderated outcome effects. Even though the authors wanted to determine whether an instructional approach was effective with low-achieving writers, it was difficult to do so. In addition the samples of low-achieving writers who participated in the studies in this review represented a mix of students, including those with and without learning disabilities.

Sixth, as with Hillocks (1986), a host of subjective decisions had to be made about what constituted a writing intervention grouping (e.g., process writing approach). In light of the reaction to Hillocks' review (see, e.g., Stotsky, 1988), other researchers will undoubtedly question one or more of the methodological decisions in the current meta-analysis. As a result, the reasoning process and decision-making has been made as transparent as possible, and reliability for the groupings decided upon is reported.

Finally, one concern with meta-analysis involves how coherent the intervention is for the comparison condition, which is also a concern in the current review. For some groupings, such as product goal setting, the comparison conditions were homogeneous. For other groupings, such as the process writing approach, there was considerable variation in the comparison conditions. In some of these instances (e.g., the process writing approach), it was possible to examine whether differences in comparison conditions were systematically related to the obtained average weighted effect size. In other instances, diversity in comparison conditions along with other factors (e.g., heterogeneity in effect sizes or variability in the interventions within a grouping) resulted in a decision not to report an average weighted effect size for a grouping, and these groupings are not discussed in the current report.

APPENDIX B: QUASI-EXPERIMENTAL AND EXPERIMENTAL STUDIES SUPPORTING THE 11 KEY ELEMENTS

Details of Quasi-experimental and Experimental Studies Supporting Key Elements of Adolescent Writing Instruction				
Study	Grades	Students	Instructional Approach	Effect Size
1. Writing Strategies				
Curry, K. A. (1997). <i>A comparison of the writing products of students with learning disabilities in inclusive and resource room settings using different writing instruction approaches</i> . Unpublished doctoral dissertation, Florida Atlantic University, Boca Raton, FL.	4	LD	Students taught planning strategies for story writing versus writing skills instruction SRSD	0.51
Glaser, C. (2005). <i>Improving the fourth-grade students' composition skills: Effects of strategy instruction and self-regulatory procedures</i> . Unpublished doctoral dissertation, University of Pottsborg, Germany.	4	Full range	Students taught a planning strategy for story writing versus unspecified comparison condition SRSD	1.24
Walser, T. M. (2000). <i>Teaching self-management of writing strategies to promote transfer</i> . Unpublished doctoral dissertation, Utah State University, Logan, UT.	4	Full range	Students taught planning and revising strategies for story writing versus direct instruction in narrative writing plus journal writing	0.91
Troia, G., & Graham, S. (2002). The effectiveness of a highly explicit, teacher-directed strategy instruction routine: Changing the writing performance of students with learning disabilities. <i>Journal of Learning Disabilities, 35</i> , 290–305.	4–5	LD	Students taught a planning strategy for persuasive writing versus partial process writing model	0.14
MacArthur, C., Schwartz, S., & Graham, S. (1991). Effects of a reciprocal peer revision strategy in special education classrooms. <i>Learning Disability Research and Practice, 6</i> , 201–210.	4–6	LD	Students taught a peer revising strategy for narrative writing as part of a process writing approach versus process writing instruction only SRSD	1.09

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Study	Grades	Students	Instructional Approach	Effect Size
Anderson, A. A. (1997). <i>The effects of sociocognitive writing strategy instruction on the writing achievement and writing self-efficacy of students with disabilities and typical achievement in an urban elementary school</i> . Unpublished doctoral dissertation, University of Houston, Houston, TX.	5	Full range LD	Students taught a planning strategy for story writing versus grammar and written literature summarization instruction SRSD	1.40
Sawyer, R., Graham, S., & Harris, K. R. (1992). Direct teaching, strategy instruction, and strategy instruction with explicit self-regulation: Effects on the composition skills and self-efficacy of students with learning disabilities. <i>Journal of Educational Psychology, 84</i> , 340–352.	5–6	LD	Students taught a planning strategy for story writing versus writing practice SRSD	1.86
De La Paz, S., & Graham, S. (1997). Effects of dictation and advanced planning instruction on the composing of students with writing and learning problems. <i>Journal of Educational Psychology, 89</i> , 203–222.	5–7	LD	Students taught a planning strategy for persuasive writing versus text structure instruction on persuasive essays SRSD	0.82
Fitzgerald, J., & Markham, L. (1987). Teaching children about revision in writing. <i>Cognition and Instruction, 4</i> , 3–24.	6	Full range	Students taught revising strategies versus reading good literature	0.32
Scardamalia, M., Bereiter, C., & Steinbach, R. (1984). Teachability of reflective processes in written composition. <i>Cognitive Science, 8</i> , 173–190.	6	Full range	Students taught strategies for being self-reflective when planning versus unspecified comparison condition	0.65
Welch, M. (1992). The PLEASE strategy: A metacognitive learning strategy for improving the paragraph writing of students with mild disabilities. <i>Learning Disability Quarterly, 15</i> , 119–128.	6	LD	Students taught a planning strategy for paragraph writing versus unspecified comparison condition	2.26

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Study	Grades	Students	Instructional Approach	Effect Size
Welch, M., & Jensen, J. (1990). Write, PLEASE: A video-assisted strategic intervention to improve written expression of inefficient learners. <i>Remedial and Special Education, 12</i> , 37–47.	6–8	Low-achieving	Students taught a planning strategy for paragraph writing versus unspecified comparison condition	0.72
Reynolds, C., Hill, D., Swassing, R., & Ward, M. (1988). The effects of revision strategy instruction on the writing performance of students with learning disabilities. <i>Journal of Learning Disabilities, 21</i> , 540–545.	6–8	LD	Students taught editing and sentence-level revising strategies versus directing students to plan, draft, and revise compositions	0.16
Gamelin, Y. M. A. (1996). <i>The effects of Cognitive Strategy Instruction in Writing (CSIW) on the writing skills of severely learning disabled students and their peers in an inclusive classroom</i> . Unpublished master's thesis, Simon Fraser University, Burnaby, British Columbia, Canada.	7	Full range	Students taught planning and revising strategies for compare/contrast essays versus process writing instruction	0.98
Yeh, S. (1998). Empowering education: Teaching argumentative writing to cultural minority middle-school students. <i>Research in the Teaching of English, 33</i> , 49–83.	7	Full range	Students taught a planning strategy for persuasive writing versus process writing approach	0.14
De La Paz, S., & Graham, S. (2002). Explicitly teaching strategies, skills, and knowledge: Writing instruction in middle school classrooms. <i>Journal of Educational Psychology, 94</i> , 291–304.	7–8	Full range	Students taught a planning strategy for persuasive writing versus traditional writing instruction SRSD	0.95
De La Paz, S. (2005). Teaching historical reasoning and argumentative writing in culturally and academically diverse middle school classrooms. <i>Journal of Educational Psychology, 97</i> , 139–158.	8	Full range	Students taught a planning strategy for writing historical text versus traditional writing instruction SRSD	1.36

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Study	Grades	Students	Instructional Approach	Effect Size
Simmons, D. C., Kameenui, E. J., Dickson, S., Chard, D., Gunn, B., & Baker, S. (1994). Integrating narrative reading comprehension and writing instruction for all learners. In D. J. Leu & C. K. Kinzer (Eds.), <i>Multidimensional aspects of literacy research, theory, and practice: 43rd yearbook of The National Reading Conference</i> (pp. 572–582). Chicago: National Reading Conference.	8	Full range	Students taught planning and revising strategies for narrative text versus narrative text structure instruction and general writing strategies	0.40
Wong, B. Y. L., Butler, D. L., Ficzero, S. A., & Kuperis, S. (1996). Teaching low achievers and students with learning disabilities to plan, write, and revise opinion essays. <i>Journal of Learning Disabilities, 29</i> , 197–212.	8–9	Low-achieving LD	Students taught planning and revising strategies for expository text versus no-treatment comparison condition	3.50
Bryson, M., & Scardamalia, M. (1996). Fostering reflectivity in the argumentative thinking of students with different learning histories. <i>Reading and Writing Quarterly: Overcoming Learning Difficulties, 12</i> , 351–384.	10	LD Full range	Students taught strategies for reflection when writing persuasive text versus instruction on basic elements of persuasive writing	1.27
2. Summarization				
Chang, K. E., Sung, Y. T., & Chen, I. D. (2002). The effect of concept mapping to enhance text comprehension and summarization. <i>Journal of Experimental Education, 71</i> , 5–23.	5	Full range	Students taught to summarize information by completing progressively faded expert summaries of text versus no-treatment comparison condition	0.81
Bean, T. W., & Steenwyk, F. L. (1984). The effect of three forms of summarization instruction on sixth graders' summary writing and comprehension. <i>Journal of Reading Behavior, 16</i> , 297–306.	6	Full range	Students taught rule-based strategy to summarize paragraph-length material versus advice to write summaries by finding the main ideas (i.e., no explicit instruction)	1.09

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Study	Grades	Students	Instructional Approach	Effect Size
Knight, J. E. (2003). <i>Helping able readers synthesize information from multiple sources in response to open-ended questions</i> . Unpublished doctoral dissertation, University of Maryland, College Park, MD.	8	High	Students taught how to synthesize information from multiple sources versus no-treatment comparison condition	0.18
Placke, E. (1987). <i>The effect of cognitive strategy instruction on learning disabled adolescents' reading comprehension and summary writing</i> . Unpublished doctoral dissertation, State University of New York, Albany, NY.	10–12	LD	Students taught strategies for summarizing main ideas in expository material versus cloze instruction (i.e., filling in missing words in reading materials)	1.12
3. Collaborative Writing				
Prater, D. L., & Bermúdez, A. B. (1993). Using peer response groups with limited English proficient writers. <i>Bilingual Research Journal</i> , 17, 99–116.	4	ESL	Peers helped each other choose topics as well as revise and edit text versus individual work on compositions	0.19
MacArthur, C., Schwartz, S., & Graham, S. (1991). Effects of a reciprocal peer revision strategy in special education classrooms. <i>Learning Disability Research and Practice</i> , 6, 201–210.	4–6	LD	Peers helped each other revise and edit text versus process writing instruction	1.09
Boscolo, P., & Ascorti, K. (2004). Effects of collaborative revision on children's ability to write understandable narrative texts. In L. Allal, L. Chanquoy, & P. Largy (Eds.), <i>Revision: Cognitive and instructional processes</i> (pp. 157–170). Boston: Kluwer Academic Publishers.	4, 6, 8	Full range	Peers helped each other revise text versus teacher correction of text	0.96

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Study	Grades	Students	Instructional Approach	Effect Size
Yarrow, F., & Topping, K. J. (2001). Collaborative writing: The effects of metacognitive prompting and structured peer interaction. <i>British Journal of Educational Psychology</i> , 71, 261–282.	5–6	Full range	Peers helped each other draft, revise, and edit text after receiving training in a process for composing text versus individual composition after training in a process for composing text	0.58
Olson, V. B. (1990). The revising processes of sixth-grade writers with and without peer feedback. <i>Journal of Educational Research</i> , 84, 22–29.	6	Full range	Peers provided each other with feedback on their compositions versus grammar instruction and individual writing using process writing approach	0.42
Hill, B. G. (1990). <i>A comparison of the writing quality of paired and unpaired students composing at the computer</i> . Unpublished doctoral dissertation, University of Texas, Austin.	8	High	Peers composed together on a word processor versus individual writing on a word processor	0.46
Dailey, E. M. (1991). <i>The relative efficacy of cooperative learning versus individualized learning on the written performance of adolescent students with writing problems</i> . Unpublished doctoral dissertation, John Hopkins University, Baltimore, MD.	9–12	LD Low-achieving	Peers helped each other plan, draft, and revise text versus individuals composing alone	1.18
4. Specific Product Goals				
Graham, S., MacArthur, C., & Schwartz, S. (1995). Effects of goal setting and procedural facilitation on the revising behavior and writing performance of students with writing and learning problems. <i>Journal of Educational Psychology</i> , 87, 230–240.	4–6	LD	Goal to add three pieces of information while revising versus goal to make paper better	0.77

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Study	Grades	Students	Instructional Approach	Effect Size
Schunk, D. H., & Swartz, C. W. (1993). Goals and progress feedback: Effects on self-efficacy and writing achievement. <i>Contemporary Educational Psychology, 18</i> , 337–354.	5	Full range	Goal to write a certain type of paragraph versus goal to do best	1.69
Schunk, D. H., & Swartz, C. W. (1993b). Writing strategy instruction with gifted students: Effects of goals and feedback on self-efficacy and skills. <i>Roeper Review, 15</i> , 225–230.	5	Full range	Goal to write a certain type of paragraph versus goal to do best	1.01
Ferretti, R. P., MacArthur, C. A., & Dowdy, N. S. (2000). The effects of an elaborated goal on the persuasive writing of students with learning disabilities and their normally achieving peers. <i>Journal of Educational Psychology, 92</i> , 694–702.	6, 8	Full range	Goal to include common persuasive elements versus goal to write persuasive paper	0.38
Page-Voth, V., & Graham, S. (1999). Effects of goal setting and strategy use on the writing performance and self-efficacy of students with writing and learning problems. <i>Journal of Educational Psychology, 91</i> , 230–240.	7–8	LD	Goal to include common persuasive elements versus goal to write persuasive paper	1.18
5. Word Processing				
Cheever, M. S. (1987). <i>The effects of using a word processor on the acquisition of composition skills by the elementary student</i> . Unpublished doctoral dissertation, Northwestern University, Evanston, IL.	4	Full range	Students composed on computer 1 day a week	0.30
Jackiewicz, G. (1995). <i>The effect of computer based instruction on writing at the elementary level</i> . (ERIC Document Reproduction Service No. ED380802)	4	Full range	Students used word processor during computer lab for 12 weeks	1.74

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Moore, M. A. (1987). <i>The effect of word processing technology in a developmental writing program on writing quality, attitude towards composing, and revision strategies of fourth and fifth grade students</i> . Unpublished doctoral dissertation, University of South Florida, Tampa, FL.	4–5	Full range	Students used word processor as part of writing program for more than 10 weeks	0.44
Lichtenstein, N. (1996). <i>The effect of word processing on writing achievement</i> . (ERIC Document Reproduction Service No. ED394146)	5	Full range	Students used word processor for all writing assignments for 20 weeks	0.75
Espinoza, S. F. (1992). <i>The effects of using a word processor containing grammar and spell checkers on the composition writing of sixth graders</i> . Unpublished doctoral dissertation, Texas Tech University, Lubbock, TX.	6	Full range	Students composed with word processor for 6 weeks	0.03
Miller, S. K. (1984). <i>Plugging your pencil into the wall: An investigation of word processing and writing skills at the middle school level</i> . Unpublished doctoral dissertation, University of Oregon, Eugene, OR.	6	High	Students composed paragraphs on word processor over 4 weeks	-0.09
Hagler, W. J. (1993). <i>The effects of the word processor on the revision behaviors of sixth grade students</i> . Unpublished doctoral dissertation, Auburn University, Auburn, AL.	6	Full range	Students wrote and revised compositions on word processor for 1 week	0.97
Dybdahl, C. S., Shaw, D. G., & Blahous, E. (1997). The impact of the computer on writing: No simple answers. <i>Computers in the Schools, 13</i> , 41–53.	6	Full range	Students used word processor for all assignments for 28 weeks	-0.18

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Study	Grades	Students	Instructional Approach	Effect Size
Lowther, D. L., Ross, S. M., & Morrison, G. M. (2003). When each one has one: The influences on teaching strategies and student achievement of using laptops in the classroom. <i>Educational Technology, Research and Development</i> , 51, 23–44.	6–7	Full range	Students had round-the-clock access to laptop computers for academic year	1.11
Shinn, J. A. (1986). <i>The effectiveness of word processing and problem solving computer use on the skills of learning disabled students</i> . Unpublished doctoral dissertation, United States International University, San Diego, CA.	6–8	LD Full range	Students composed with word processor and received problem-solving instruction on computer for 12 weeks	1.38
Lytle, M. J. (1987). <i>Word processors and writing: The relation of seventh grade students' learner characteristics and revision behaviors</i> . Unpublished doctoral dissertation, University of Oregon, Eugene, OR.	7	Full range	Students used word processor to write and revise all assignments	-0.05
Dalton, D. W., & Hannafin, M. J. (1987). The effects of word processing on written composition. <i>Journal of Educational Research</i> , 80, 338–342.	7	Low-achieving	Students used word processor for writing assignments for academic year	0.28
Lerew, E. L. (1997). <i>The use of computers to improve writing skills among low-achieving Hispanic students</i> . Unpublished doctoral dissertation, University of La Verne, La Verne, CA.	8	Low-achieving	Students used word processor for writing assignments for 20 weeks	0.89
Head, B. B. (2000). <i>Revision instruction and quality of writing by eighth grade students using paper and pencil or word processing</i> . Unpublished doctoral dissertation, Oakland University, Rochester, MI.	8	Full range	Students used word processor for 4 weeks	0.01

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Study	Grades	Students	Instructional Approach	Effect Size
Lam, F. S., & Pennington, M. C. (1995). The computer vs. the pen: A comparative study of word processing in a Hong Kong secondary classroom. <i>Computer Assisted Language Learning, 8</i> , 75–92.	9	Low-achieving	Students composed with word processor for academic year	0.33
Philhower, S. C. (1985). <i>The effects of the use of a word processing program on the writing skills of mildly handicapped secondary students</i> . Unpublished doctoral dissertation, University of Iowa, Iowa City, IA.	9–12	MH	Students composed with word processor for 16 weeks	0.51
Cirello, V. J. (1986). <i>The effect of word processing on the writing abilities of tenth grade remedial writing students</i> . Unpublished doctoral dissertation, New York University, New York.	10	Low-achieving	Students received 20 weeks of remedial writing instruction while using word processor	1.10
Silver, N. W., & Repa, J. T. (1993). The effect of word processing on the quality of writing and self-esteem of secondary school English-as-second-language students: Writing without censure. <i>Journal of Educational Computing Research, 9</i> , 265–283.	9–12	ESL	Students composed with word processor for 13 weeks	0.52
6. Sentence-Combining				
Saddler, B., & Graham, S. (2005). The effects of peer-assisted sentence-combining instruction on the writing performance of more and less skilled young writers. <i>Journal of Educational Psychology, 97</i> , 43–54.	4	Average Low-achieving	Sentence-combining instruction versus grammar instruction	0.42
Stoddard, E. P. (1982). <i>The combined effect of creative thinking and sentence-combining activities on the writing ability of above average ability fifth and sixth grade students</i> . Unpublished doctoral dissertation, University of Connecticut, Storrs.	5–6	High	Sentence-combining instruction versus unspecified comparison condition	0.66

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Pedersen, E. L. (1977). <i>Improving syntactic and semantic fluency in writing of language arts students through extended practice in sentence-combining</i> . Unpublished doctoral dissertation, University of Minnesota, Minneapolis.	7	Full range	Sentence-combining instruction added to traditional literacy instruction versus traditional literacy instruction	0.40
Howie, S. M. H. (1979). <i>A study: The effects of sentence combining practice on the writing ability and reading level of ninth grade students</i> . Unpublished doctoral dissertation, University of Colorado, Boulder.	9	Full range	Sentence-combining instruction versus grammar instruction	0.21
Kanellas, R., Carifio, J., & Dagostino, L. (1998). <i>Improving the expository writing skills of adolescents</i> . Oxford University Press, New York.	9	Average	Sentence-combining instruction versus grammar instruction	0.61
7. Prewriting				
Loader, L. M. (1989). <i>The effects of the semantic organizer on writing ability and motivation with fourth grade students</i> . Unpublished doctoral dissertation, University of Connecticut, Storrs.	4	Full range	Students completed a semantic web versus listing ideas for writing	0.32
Brodney, B., Reeves, C., & Kazelskis, R. (1999). Selected prewriting treatments: Effects on expository compositions written by fifth-grade students. <i>Journal of Experimental Education, 68</i> , 5–20.	5	Full range	Students read information on topic and were prompted to plan versus listening to information on topic	0.95
Brodney, B., Reeves, C., & Kazelskis, R. (1999). Selected prewriting treatments: Effects on expository compositions written by fifth-grade students. <i>Journal of Experimental Education, 68</i> , 5–20.	5	Full range	Students prompted to plan a paper after listening to information on topic versus only listening to information on topic	0.17

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Study	Grades	Students	Instructional Approach	Effect Size
Reece, J. E., & Cumming, G. (1996). Evaluating speech-based composition methods: Planning, dictation, and the listening word processor. In C. M. Levy & S. Ransdell (Eds.), <i>The science of writing: Theories, methods, individual differences, and applications</i> (pp. 361–380). Mahwah, NJ: Erlbaum. (Study 4)	5–6	Full range	Students encouraged to plan after brief demonstration of how to do so versus no-treatment comparison condition	0.61
Vinson, L. L. N. (1980). <i>The effects of two prewriting activities upon the overall quality of ninth graders' descriptive paragraphs</i> . Unpublished doctoral dissertation, University of South Carolina, Columbia.	9	Full range	Groups of students brainstorm ideas for paper, discuss which ideas to include, and organize their ideas prior to writing versus writing paragraphs with emphasis on correction of first draft	0.06
8. Inquiry Activities				
Hillocks, G., Jr. (1982). The interaction of instruction, teacher comment, and revision in teaching the composing process. <i>Research in the Teaching of English, 16</i> , 261–278.	7–8	Full range	Students examined or observed various activities and collected data to write about them versus writing that was facilitated by teacher discussion	0.14
Hillocks, G., Jr. (1982). The interaction of instruction, teacher comment, and revision in teaching the composing process. <i>Research in the Teaching of English, 16</i> , 261–278.	7–8	Full range	Students examined or observed various activities and collected data to write about them and then revised papers versus writing that was facilitated by student discussion	-0.05
Hillocks, G., Jr. (1979). The effects of observational activities on student writing. <i>Research in the Teaching of English, 13</i> , 23–35.	9, 11	Full range	Students examined or observed various activities and collected data to write about them versus instruction in paragraph writing	0.75

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Study	Grades	Students	Instructional Approach	Effect Size
Widvey, L. I. H. (1971). <i>A study of the use of a problem-solving approach to composition in high school English</i> . Unpublished doctoral dissertation, University of Nebraska, Lincoln.	11	Full range	Students formulated hypotheses, gathered and analyzed data, and made inferences to structure writing versus traditional writing instruction	0.65
Pisano, R. C. (1980). <i>The effectiveness of an intervention study in critical thinking skills designed to improve written composition in eleventh and twelfth graders</i> . Unpublished doctoral dissertation, Rutgers: The State University of New Jersey, New Brunswick.	11–12	Full range	Students asked to respond to questions designed to engage them in critical thinking about five literature topics versus teachers' regular questioning techniques	-0.07
9. Process Writing Approach				
Umbach, B. T. (1990). <i>A comparison of two methods of teaching written language to low-performing fourth graders in two rural schools</i> . Unpublished doctoral dissertation, Auburn University, Auburn, AL.	4	Low-achieving	Process writing approach versus instruction in strategies for drafting a paper	-0.03
Curry, K. A. (1997). <i>A comparison of the writing products of students with learning disabilities in inclusive and resource room settings using different writing instruction approaches</i> . Unpublished doctoral dissertation, Florida Atlantic University, Boca Raton, FL.	4	LD	Process writing approach versus skills instruction	0.69
Troia, G., & Graham, S. (2002). The effectiveness of a highly explicit, teacher-directed strategy instruction routine: Changing the writing performance of students with learning disabilities. <i>Journal of Learning Disabilities, 35</i> , 290–305.	4–5	LD	Modified process writing approach versus strategy instruction	-0.14

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Gorka, D. M. (1992). <i>The effects of a staff development program in writing process on learners' writing skills and attitudes toward writing</i> . Unpublished doctoral dissertation, Pennsylvania State University, University Park.	4–6	Full range	Staff training in process writing approach versus unspecified comparison condition with no training TRAINING STUDY	0.83
Pantier, T. F. (1999). <i>A comparison of writing performance of fifth grade students using the process writing approach and the Shurley Method</i> . Unpublished doctoral dissertation, Oklahoma State University, Stillwater.	5	Full range	Process writing approach versus grammar instruction	-0.30
Moye, M. J. (1993). <i>The impact of a cognitive strategy on students' composing skills</i> . Unpublished doctoral dissertation, College of William and Mary, Williamsburg, VA.	5	Full range	Process writing approach (including models and scales) versus teaching students to use graphic organizers	0.48
Robinson, M. E. (1986). <i>The writing performance and revision behavior of fifth grade process and non-process writing students during one-day and two-day writing sessions</i> . Unpublished doctoral dissertation, University of Maine, Orono.	5	Full range	Process writing approach versus traditional instruction	0.28
Varble, M. E. (1990). Analysis of writing samples of students taught by teachers using whole language and traditional approaches. <i>Journal of Educational Research</i> , 83, 245–251.	6	Full range	Whole-language instruction with process writing instruction versus skills instruction	-0.11
Gamelin, Y. M. A. (1996). <i>The effects of Cognitive Strategy Instruction in Writing (CSIW) on the writing skills of severely learning disabled students and their peers in an inclusive classroom</i> . Unpublished master's thesis, Simon Fraser University, Burnaby, British Columbia, Canada.	7	Full range	Process writing approach versus strategy instruction	-0.98

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Study	Grades	Students	Instructional Approach	Effect Size
Hayes, B. L. (1984). <i>The effects of implementing process writing into a seventh grade English curriculum</i> . Unpublished doctoral dissertation, Delta State University, Cleveland, MS.	7	Full range	Process writing approach versus traditional grammar instruction	0.22
Yeh, S. (1998). Empowering education: Teaching argumentative writing to cultural minority middle-school students. <i>Research in the Teaching of English, 33</i> , 49–83.	7	Full range	Process writing approach versus strategy instruction	-0.14
Olson, M. C., & DiStefano, P. (1980). Describing and testing the effectiveness of a contemporary model for in-service education in teaching composition. <i>Engineering Education, 12</i> , 69–76.	7-9	Full range	National Writing Project training in process writing approach versus unspecified comparison condition with no training TRAINING STUDY	0.40
Ganong, F. L. (1974). <i>Teaching writing through the use of a program based on the work of Donald M. Murray</i> . Unpublished doctoral dissertation, Boston University School of Education, Boston, MA.	9	Average, high	Early form of process writing approach versus more traditional approach in which students follow prescribed series of writing exercises	-0.13
Roberts, C. (2002). <i>The influence of teachers' professional development at the Tampa Bay Area Writing Project on student writing performance</i> . Unpublished doctoral dissertation: University of South Florida, Tampa, FL.	6–12	Full range	National Writing Project training in process writing approach versus unspecified comparison condition with no training TRAINING STUDY	0.14
Pritchard, R. J. (1987). Effects on student writing of teacher training in the National Writing Project Model. <i>Written Communication, 4</i> , 51–67.	7–12	Full range	National Writing Project training in process writing approach versus unspecified comparison condition with minimal or no training TRAINING STUDY	0.38

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Pritchard, R. J., & Marshall, J. C. (1994). Evaluation of a tiered model for staff development in writing. <i>Research in the Teaching of English, 28</i> , 259–285.	7–12	Full range	National Writing Project training in process writing approach versus unspecified comparison condition with no training TRAINING STUDY	0.50
Alloway, E., Carroll, J., Emig, J., King, B., Marcotrigiano, I., Smith, J., & Spicer, W. (1979). <i>The New Jersey Writing Project</i> . New Brunswick, NJ: Rutgers University, Educational Testing Program Service, and Nineteen New Jersey Public School Districts.	7–12	Full range	National Writing Project training in process writing approach versus unspecified comparison condition with no training TRAINING STUDY	0.39
Gauntlett, J. F. (1978). <i>Project WRITE and its effect on the writing of high school students</i> . Unpublished doctoral dissertation, Northern Arizona University, Flagstaff, AZ.	10–12	Full range	Process writing approach versus traditional instruction	0.02
Adams, V. A. (1971). <i>A study of the effects of two methods of teaching composition to twelfth graders</i> . Unpublished doctoral dissertation, University of Illinois, Champaign-Urbana.	12	High	Early form of process writing approach versus skills instruction	0.28
Reimer, M. (2001). <i>The effect of a traditional, a process writing, and a combined talking and writing instructional approach on the quality of secondary English students' written response</i> . Unpublished master's thesis, University of Manitoba, Canada.	9–12	Full range	Process writing approach versus traditional instruction	-1.00
Scannella, A. M. (1982). <i>A writing-as-process model as a means for improving compositions and attitudes toward composition in the high school</i> . Unpublished doctoral dissertation, Rutgers: The State University of New Jersey, New Brunswick.	9–12	Full range	Process writing approach versus traditional instruction	0.14

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10. Study of Models				
Knudson, R. E. (1989). Effects of instructional strategies on children's informational writing. <i>Journal of Educational Research</i> , 83, 91–96.	4, 6, 8	High	Students examined model pieces of writing to direct composition of their papers versus free writing	0.26
Knudson, R. E. (1991). Effects of instructional strategies, grade, and sex on students' persuasive writing. <i>Journal of Experimental Education</i> , 59, 141–152.	4, 6, 8	Full range	Students examined model pieces of writing to direct composition of their papers versus free writing	0.24
Thibodeau, A. E. (1964). <i>Improving composition writing with grammar and organization exercises utilizing differentiated group patterns</i> . Unpublished doctoral dissertation, Boston University School of Education, Boston, MA.	6	Full range	Students examined model pieces of writing for both narrative and expository writing versus traditional language arts instruction	0.44
Reedy, J. E., Jr. (1964). <i>A comparative study of two methods of teaching the organization of expository writing to ninth-grade pupils</i> . Unpublished doctoral dissertation, Boston University School of Education, Boston, MA.	9	Full range	Students examined model composition for six patterns used to organize expository writing versus instruction in the process of communication in writing	0.26
Vinson, L. L. N. (1980). <i>The effects of two prewriting activities upon the overall quality of ninth graders' descriptive paragraphs</i> . Unpublished doctoral dissertation, University of South Carolina, Columbia.	9	Full range	Students examined models used to illustrate concrete detail, sensory imagery, unnecessary detail, and single impression versus writing paragraphs with emphasis on correction of first drafts	-0.29
Caplan, R., & Keech, C. (1980). <i>Show-writing: A training program to help students be specific</i> . (Collaborative Research Study No. 2). Berkeley, CA: Bay Area Writing Project. (ERIC Document Reproduction Service No. ED198539)	12	Full range	Students examined models used to illustrate difference between showing and telling	0.11

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11. Writing for Content Learning				
Davis, B. H. (1990). <i>The effects of expressive writing on the social studies achievement, writing fluency, and learning retention of fourth-grade students</i> . Unpublished doctoral dissertation, Texas Tech University, Lubbock.	4	Full range	Social studies: Students made journal entries about social studies materials	0.12
Millican, B. R. (1994). <i>The effects of writing-to-learn tasks on achievement and attitude in mathematics</i> . Unpublished doctoral dissertation, University of North Texas, Denton.	4	Full range	Math: Students used writing activities to facilitate math learning	0.59
Lodholz, R. D. (1980). <i>The effects of student composition of mathematical verbal problems on student problem solving performance</i> . Unpublished doctoral dissertation, University of Missouri, Columbia.	4–5	Full range	Math: Students wrote verbal descriptions of math problems	-0.02
Boscolo, P., & Mason, L. (2001). Writing to learn, writing to transfer. In G. Rijlaarsdam, P. Tynjala, L. Mason, & K. Lonka (Eds.), <i>Studies in writing: Vol. 7. Writing as a learning tool: Integrating theory and practice</i> (pp. 83–104). The Netherlands: Kluwer Academic Publishers.	5	Full range	History: Students used writing for note-taking, commenting, synthesizing, reflection, and expressing doubt	1.04
Bauman, M. A. (1992). <i>The effect of teacher-directed journal writing on fifth-grade student mathematics achievement</i> . Unpublished doctoral dissertation, Marquette University, Milwaukee, WI.	5	Full range	Math: Students used writing-to-learn activities during math instruction	0.23

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Madden, B. R. (1992). <i>An investigation of the relationship between journal writing and mathematics achievement in fifth grade students in a rural unit school district</i> . Unpublished doctoral dissertation, Southern Illinois University, Edwardsville.	5	Full range	Math: Students completed journal entries in response to prompts about math material	0.33
Moynihan, C. M. (1994). <i>A model and study of the role of communication in the mathematics learning process</i> . Unpublished doctoral dissertation, Boston College, Boston, MA.	5	Full range	Math: Students wrote and shared journal entries about math activities	0.86
Dipillo, M. L. (1994). <i>A quantitative/qualitative analysis of student journal writing in middle-grade mathematics classes</i> . Unpublished doctoral dissertation, University of Akron, Akron, OH.	5–6	Full range	Math: Students made journal entries as part of math instruction	0.52
Baisch, C. L. (1990). <i>Writing methods used in the teaching of mathematics: An empirical study</i> . Unpublished master's thesis, Eastern Michigan University, Ypsilanti.	6	Full range	Math: Students used writing methods developed in English to learn math	-0.21
Konopak, B. C., Martin, S. H., & Martin, M. A. (1990). Using a writing strategy to enhance sixth-grade students' comprehension of content material. <i>Journal of Reading Behavior</i> , 22, 19–36.	6	Full range	History: Students used writing to explore historical knowledge	-0.01
Shepard, R. G. (1992). <i>Using writing for conceptual development in mathematics instruction</i> . Unpublished doctoral dissertation, Indiana University, Bloomington.	6	Full range	Math: Students completed writing assignments for math homework	0.20

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Ayers, W. E. (1993). <i>A study of the effectiveness of expressive writing as a learning enhancement in middle school science</i> . Unpublished doctoral dissertation, Temple University, Philadelphia, PA.	6–8	Full range	Earth science: Students used expressive writing activities to explore earth science	-0.77
Rivard, L. P. (1996). <i>The effect of talking and writing, alone and combined, on learning in science: An exploratory study</i> . Unpublished doctoral dissertation, University of Manitoba, Canada.	8	Full range	Science: Students wrote about tasks involving scientific explanation for real-world ecology problems	-0.46
Willey, L. H. (1988). <i>The effects of selected writing-to-learn approaches on high school students' attitudes and achievement</i> . Unpublished doctoral dissertation, Mississippi State University, Mississippi State.	8	Full range	Social studies: Students wrote journal entries and wrote about social studies material	0.04
Reaves, R. R. (1991). <i>The effects of writing-to-learn activities on the content knowledge, retention of information, and attitudes toward writing of selected vocational agriculture education students</i> . Unpublished doctoral dissertation, North Carolina State University, Raleigh.	9	Full range	Natural resources: Students completed various writing activities to promote learning about protecting ground water	-0.12
Johnson, L. A. (1991). <i>Effects of essay writing on achievement in algebra</i> . Unpublished doctoral dissertation, University of Connecticut, Storrs.	9	Full range	Algebra: Students provided instruction in how to answer math essay questions	0.55
Stewart, C. B. (1992). <i>Journal writing in mathematics classrooms: A practical inquiry</i> . Unpublished doctoral dissertation, Memphis State University, Memphis, TN.	9–10	Full range	Algebra: Students wrote in journals about class math activities	0.59

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Langer, J. A., & Applebee, A. N. (1987). <i>How writing shapes thinking</i> . Urbana, IL: National Council of Teachers of English. (Study 2)	9, 11	Full range	Social studies: Students used writing to reformulate and extend social studies material	-0.13
Langer, J. A., & Applebee, A. N. (1987). <i>How writing shapes thinking</i> . Urbana, IL: National Council of Teachers of English. (Study 3)	9, 11	Full range	Social studies: Students wrote summaries to review new material	0.18
Willey, L. H. (1988). <i>The effects of selected writing-to-learn approaches on high school students' attitudes and achievement</i> . Unpublished doctoral dissertation, Mississippi State University, Mississippi State.	10	Full range	Biology: Students wrote journal entries and wrote about biology activities	1.48
Hand, B., Hohenshell, L., & Prain, V. (2004). Exploring students' responses to conceptual questions when engaged with planned writing experiences: A study with year ten science students. <i>Journal of Research in Science Teaching</i> , 41, 186–210.	10	Full range	Biology: Students completed two writing assignments versus one writing assignment	0.77
Kasperek, R. F. (1993). <i>Effects of integrated writing on attitude and algebra performance of high school students</i> . Unpublished doctoral dissertation, University of North Carolina, Greensboro.	11	Full range	Algebra: Students completed two writing assignments versus one writing assignment	0.37
Wong, B. Y. L., Kuperis, S., Jamieson, D., Keller, L., & Cull-Hewitt, R. (2002). Effects of guided journal writing on students' story understanding. <i>Journal of Educational Research</i> , 95, 179–191.	12	Full range	English: Students made journal entries structured with general response questions about material read	1.68

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Bell, E. S., & Bell, R. N. (1985). Writing and mathematical problem solving: Arguments in favor of synthesis. <i>School Science and Mathematics, 85</i> , 210–221.	9–12	Full range	Math: Students solved math problems using writing to record steps	0.27
Licata, K. P. (1993). <i>Writing about mathematical relations in science: Effects of achievement</i> . Unpublished doctoral dissertation, State University of New York, Buffalo.	9–12	Full range	Math in science: Students wrote about mathematical relationships in science	0.27
Nieswandt, M. (1997, March). <i>Improving learning in chemistry classes through original writing about chemical facts</i> . Paper presented at the annual meeting of the American Educational Research Association, Chicago.	9–12	Full range	Chemistry: Students wrote about chemical facts	0.12
Traditional Grammar Instruction				
Saddler, B., & Graham, S. (2005). The effects of peer-assisted sentence-combining instruction on the writing performance of more and less skilled young writers. <i>Journal of Educational Psychology, 97</i> , 43–54.	4	Average Low-achieving	Traditional grammar instruction versus sentence-combining	-0.42
Anderson, A. A. (1997). <i>The effects of sociocognitive writing strategy instruction on the writing achievement and writing self-efficacy of students with disabilities and typical achievement in an urban elementary school</i> . Unpublished doctoral dissertation, University of Houston, Houston, TX.	5	Full range LD	Traditional grammar instruction versus planning or revising strategy instruction	-1.40

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Pantier, T. F. (1999). <i>A comparison of writing performance of fifth grade students using the process writing approach and the Shurley Method</i> . Unpublished doctoral dissertation, Oklahoma State University, Stillwater.	5	Full range	Traditional grammar instruction versus process writing approach	0.30
Thibodeau, A. L. (1964). <i>A study of the effects of elaborative thinking and vocabulary enrichment exercises on written composition</i> . Unpublished doctoral dissertation, Boston University School of Education, Boston, MA.	6	Full range	Traditional grammar instruction versus peers working on elaborative thinking and vocabulary enrichment activities	-0.54
Thibodeau, A. L. (1964). <i>A study of the effects of elaborative thinking and vocabulary enrichment exercises on written composition</i> . Unpublished doctoral dissertation, Boston University School of Education, Boston, MA.	6	Full range	Traditional grammar instruction versus individual students working on self-directing, elaborative thinking, and vocabulary enrichment activities	-0.41
Howie, S. M. H. (1979). <i>A study: The effects of sentence combining practice on the writing ability and reading level of ninth grade students</i> . Unpublished doctoral dissertation, University of Colorado, Boulder.	9	Full range	Traditional grammar instruction versus sentence-combining	-0.21
Hayes, B. L. (1984). <i>The effects of implementing process writing into a seventh grade English curriculum</i> . Unpublished doctoral dissertation, Delta State University, Cleveland, MS.	7	Full range	Traditional grammar instruction versus process writing approach	-0.22

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Kanellas, R., Carifio, J., & Dagostino, L. (1998). <i>Improving the expository writing skills of adolescents</i> . Oxford University Press, New York.	9	Average	Traditional grammar instruction versus sentence-combining	-0.61
Fearn, L., & Farnan, N. (2005, April). <i>An investigation of the influence of teaching grammar in writing to accomplish an influence on writing</i> . Paper presented at the annual meeting of the American Educational Research Association, Montreal, Canada.	10	Full range	Traditional grammar instruction versus grammar instruction in context	1.07
Elley, W. B., Barham, I. H., Lamb, H., & Wyllie, M. (1975). The role of grammar in a secondary school English curriculum. <i>New Zealand Journal of Educational Studies, 10</i> , 26–42.	11	Average	Transformational grammar instruction versus reading and writing	0.00
Elley, W. B., Barham, I. H., Lamb, H., & Wyllie, M. (1975). The role of grammar in a secondary school English curriculum. <i>New Zealand Journal of Educational Studies, 10</i> , 26–42.	11	Average	Traditional grammar instruction versus reading and writing	0.03

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