RESEARCH-BASED WRITING PRACTICES AND THE COMMON CORE

Meta-analysis and Meta-synthesis

ABSTRACT

In order to meet writing objectives specified in the Common Core State Standards (CCSS), many teachers need to make significant changes in how writing is taught. While CCSS identified what students need to master, it did not provide guidance on how teachers are to meet these writing benchmarks. The current article presents research-supported practices that can be used to meet CCSS writing objectives in kindergarten to grade 8. We identified these practices by conducting a new meta-analysis of writing intervention studies, which included true and quasi-experiments, as well as single-subject design studies. In addition, we conducted a meta-synthesis of qualitative studies examining the practices of exceptional literacy teachers. Studies in 20 previous reviews served as the data source for these analyses. The recommended practices derived from these analyses are presented within a framework that takes into account both the social contextual and cognitive/motivational nature of writing.

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GOOD writing is essential to students' success in school and beyond. Teachers commonly use written tests and assignments to assess students' learning of subject-matter material (National Council of Teachers of English, 2004). E-mailing, blogging, texting, and writing on social networking websites, such as My Space or Twitter, are now part of everyday life (Hillocks, 2006). Writing is pervasive in the world of work. Over 90% of white-collar

workers and 80% of blue-collar workers must write while working (National Commission on Writing in America's Schools and Colleges, 2004, 2005, 2006). We recently heard a police officer comment that he had only drawn his gun once in the last year, but he used a pen every day at work.

While writing is widely used today, many students do not develop strong writing skills. On the most recent National Assessment of Educational Progress (National Center for Education Statistics, 2012), only 30% of grade 8 and grade 12 students performed at or above the "proficient" level (defined as solid academic performance) in writing. The findings are even more discouraging for English language learners and students with disabilities, as just 5% and 1% of these children perform at or above the proficient level, respectively.

Common Core State Standards for Writing

Even though most students are not proficient writers, writing instruction has not been a central feature of recent attempts to reform and improve education in the United States. This changed with the creation of the Common Core State Standards (CCSS, 2010), an effort led by the National Governors Association Center for Best Practices and the Council of Chief State Schools Officers. CCSS provided a set of benchmarks for a wide variety of writing skills and applications students are expected to master at each grade and across grades.

The adoption of CCSS by 46 states now makes writing a central player in efforts to improve learning and education. Students in these states are expected to (1) learn to craft text that skillfully persuades, informs, and narrates imagined or real experiences; (2) use writing as a tool for facilitating reading, classroom learning, and building new knowledge; and (3) move beyond pen and paper to the additional use of digital writing tools. They are also expected to master a variety of foundational writing skills, including handwriting, typing, spelling, conventions, word choice, and grammar. These expectations provide a much more ambitious role for writing than is evident in classrooms today, where students spend little time writing or being taught how to write (Applebee & Langer, 2011; Cutler & Graham, 2008; Gilbert & Graham, 2010; Kiuhara, Graham, & Hawken, 2009). Moreover, the writing objectives in CCSS offer an orderly progression and road map for what students need to acquire at each grade level, place greater emphasis on expository writing, and make writing a central tool for learning across the curriculum.

CCSS is purposefully silent about how the writing benchmarks are to be achieved. This is not a minor issue, though, as writing is a complex and difficult skill to master (Graham, 2006a), and too many teachers indicate that they are not adequately prepared to teach writing (Gilbert & Graham, 2010) or CCSS (Gewertz, 2013). This issue is especially pertinent with younger developing writers, as it is important for them to get off to a good start learning to write, as there is a growing consensus that waiting until later grades to address literacy problems that have their origin in earlier grades is not successful (Slavin, Madden, & Karweit, 1989). We also think that teachers are more likely to adapt and extend CCSS's goals for writing if they possess effective tools for teaching writing (Graham, Gillespie, & McKeown, 2013).

Purpose of the Present Review

The present article tackles these issues directly by identifying effective instructional practices for teaching writing. To identify these practices, we conducted a new meta-analysis of writing intervention studies, which included true and quasi-experiments as well as single-subject design studies. We also conducted a meta-synthesis examining the practices of exceptional literacy teachers. Studies for these analyses were taken from 20 previous systematic reviews of writing intervention research. In keeping with the purpose of the *Elementary School Journal*, we only accessed studies from these reviews that involved children in kindergarten to grade 8.

There are several advantages to drawing on multiple forms of scientific evidence to identify instructional writing practices for addressing CCSS. First, focusing our attention on a broad array of evidence made it possible to draw a more comprehensive set of instructional recommendations than was possible from concentrating just on one form of evidence. Neither experimental, single-subject design, nor qualitative writing intervention research is particularly broad or deep at the present time. Second, we believe that the validity of a recommendation is strengthened if it is supported by multiple forms of evidence. For instance, the likelihood that a specific writing intervention is effective is enhanced if it produced a positive impact in experimental and single-subject design studies and was commonly applied by highly effective teachers.

It must also be noted that the theory or theories of development underlying the creation of CCSS in writing are not readily apparent. This is unfortunate, as teachers are more likely to approach CCSS benchmarks in a flexible and reasonable manner, adjusting the benchmarks so that they are more pertinent to individual students' needs, if they understand how writing develops (Graham, Gillespie, & McKeown, 2013). We addressed this limitation by presenting the research-supported writing practices identified from our analyses within the context of basic concepts drawn from social/contextual as well as cognitive/motivational viewpoints of writing development.

The analyses and subsequent recommendations presented in this article represent an important advancement in identifying effective writing practices for students in kindergarten through grade 8. No previous review has developed recommendations for teaching writing to this particular group of students or considered these recommendations within the context of prominent theories of writing and writing development. In addition, our analysis was more exhaustive than any single prior meta-analysis or meta-synthesis in writing, as we drew upon all of these sources to identify the studies to include in this review. Before presenting the methods for conducting our analyses, we first present the two theories that formed the cornerstones for structuring our results and recommendations.

Theories of Writing Development

Our understanding of how writing develops is not complete, but enough is known to be certain that the road to competence depends on the context in which writing takes place and changes in students' writing skills, strategies, knowledge, and motivation over time (Graham, 2006b). At one level, writing is a social activity involving an implicit or explicit dialogue between writer(s) and reader(s), which takes place in a

broader context where the purposes and meaning of writing are shaped by cultural, societal, institutional, and historical factors (e.g., Nystrand, 2006; Russell, 1997). At another level, writing requires the application of a variety of cognitive and affective processes. It is a goal-directed and self-sustained cognitive activity requiring the skillful management of the writing environment; the constraints imposed by the writing topic; the intentions of the writer(s); and the processes, knowledge, and skills involved in composing (Zimmerman & Reisemberg, 1997), including the skillful use of a variety of writing tools (e.g., paper and pencil, word processing, or mobile communication devices).

During the last 30 to 40 years, two basic viewpoints have dominated much of the discussion about how writing develops. One approach concentrates on how context shapes development, whereas the other focuses mainly on the role of cognition and motivation (Graham & Harris, 2013). To illustrate the contextual view of writing, we draw on the work of Russell (1997). He emphasized two structures in his model of writing in context. This included the concept of the *activity system*, which specifies how actors (a student, pair of students, student and teacher, or class—perceived in social terms and taking into account the history of their involvement in the activity system) use concrete tools, such as paper and pencil or word processing, to accomplish an action leading to an outcome. For example, a desired outcome, such as the collaborative creation of a text explaining the idea of buoyancy, is accomplished in a problem space where the actors use writing tools in an ongoing interaction with others (peers and teachers) to shape the text that is being produced over time in a shared direction.

A second structure in Russell's (1997) model was *genre*. This is a "typified way of purposefully interacting in and among some activity system(s)" (p. 513). These typified ways of interacting become stabilized via regularized use by and among students, creating a generally predictable approach for writing within a classroom (e.g., plan, draft, revise, edit, and publish). Genres were conceived as only temporarily stabilized structures, because they were subject to change depending upon the context. To illustrate, a new student entering a classroom with established and stabilized ways of writing (e.g., get feedback on your draft before revising) will likely appropriate some of the routinized practices of his classmates. The child may, in turn, create changes in his new environment by applying writing routines learned at his old school (e.g., get feedback on your writing plan before starting your draft) and deemed as valuable by his new teacher, classmates, or both.

These two explanatory structures (activity systems and genre) make it clear that writing and its development do not take place in a vacuum, but in a social context where students and the teacher interact with each other as they create texts for various purposes, engaging in generally stabilized routines that shape how they write. While CCSS is notably silent about the role of context, it cannot be ignored. For example, if writing assignments are boring or confusing, or the classroom is viewed as a punitive or unfriendly place, students are less likely to engage fully in learning how to write (Hansen, 1989).

In contrast to the contextual view of writing, the cognitive/motivational approach has concentrated primarily, but not exclusively, on the individual writer and the mental and affective processes involved in composing text. This is illustrated in a model of skilled writing developed by Hayes (1996). He identified the mental moves, cognitive processes, and motivational resources writers draw on as they compose

text. This includes mental processes such as text interpretation, reflection, and text production that writers draw upon to create a representation of the writing task, develop a plan to complete it, draw conclusions about the audience and possible writing content, use cues from the writing plan or text produced so far to retrieve needed information from memory, turn these ideas and information into written sentences, and evaluate plans and text and modify them as needed. It further included long-term memory, which contains a variety of resources, such as topic knowledge and schemas, for carrying out particular writing tasks, as well as working memory, which serves as a temporary place for holding ideas for writing and carrying out mental operations that require the writer's conscious attention. According to Hayes, the application of these mental operations and cognitive processes is influenced by a variety of motivational factors, as writers' goals, predispositions, beliefs, and attitudes shape what they do.

Hayes's (1996) model emphasized that skilled writers are strategic, motivated, and knowledgeable about the craft of writing. Unfortunately, he directed little attention to the skills writers use to transform ideas into sentences and sentences into text (i.e., handwriting, typing, and spelling). Such foundational skills are important to writing development, as they distinguish between stronger and weaker writers, their relative mastery predicts how well students write, and teaching them improves children's overall writing performance (Graham, 2006b).

Together, the social/contextual and cognitive/motivational viewpoints provide needed structure for designing an effective writing program that complements and extends CCSS. First, it is important to create a writing context that is positive and supportive. This includes developing classroom routines that make writing an interesting and enjoyable activity as well as support children's writing efforts. Second, it is equally important to make sure students acquire the skills, strategies, knowledge, and will needed to become skilled writers. The findings and recommendations from our analyses are framed within the context of these two principles.

Method

Sources for Studies of Writing Instruction

The first step in conducting our analyses was to locate pertinent studies of writing instruction. These included true and quasi-experiments, single-subject design studies, and qualitative studies of the writing practices of exceptional teachers of literacy. We located over 20 reviews that included one or more of these types of studies and involved children in kindergarten to grade 8. These reviews are presented in Table 1.

Table 1 provides the reference for each review, a description of the type of studies included in each review, grade or age range of the students in the studies in the review, writing practice(s) tested, outcomes assessed, and type of students.

As can be seen in Table 1, some reviews included only true and quasi-experiments (e.g., Hillocks, 1986) or single-subject design studies (Rogers & Graham, 2008). Other reviews included both of these types of studies (e.g., Graham, Harris, & Mc-Keown, 2013), whereas one review included single-subject design studies as well as qualitative investigations (Graham & Perin, 2007b). It should be noted that some of the reviews included other types of studies, such as group designs where subjects served as their own control (Morphy & Graham, 2012). We were only interested,

Table 1. Prior Meta-analyses and Meta-syntheses

Review	Type of Review	Grades (Ages)	Practices Tested	Outcomes	Type of Students
Andrews et al., 2006	Mixed	(5–16)	Sentence combining, grammar	Multiple	Fr, SW
Bangert-Drowns, 1993	MA-Exp	E to college	Word processing	Quality	Fr, SW
Bangert-Drowns et al., 2004	MA-Exp	E to college	Writing to learn	CL	FR
Gersten & Baker, 2001	MA-Exp	1–9	Multiple teaching procedures	Multiple	SW
Gillespie & Graham, 2014	MA-Exp	2–12	Multiple teaching procedures	Quality	SW
Goldberg et al., 2003	MA-Exp	E–HS	Word processing	Quality, L	Fr, SW
Graham, 2006b	MA-Exp, MA-SSD	2–12	Strategy instruction	Quality, L, E, R	Fr, SW
Graham, Bollinger, et al., 2012	Mixed	K–6	Multiple teaching procedures	Multiple	Fr, SW
Graham & Harris, 2003	MA-Exp, MA-SSD	2–8	SRSD	Quality, L, E	Fr, SW
Graham, Harris, & Hebert, 2011	MA-Exp, SoC	2–12	Formative assessment	Multiple	Fr, SW
Graham, Harris, & McKeown, 2013	MA-Exp, MA-SSD	1–12	SRSD	Quality, L, E	Fr, SW
Graham & Hebert, 2011	MA-Exp	2–12	Writing to read	Reading	Fr, SW
Graham, McKeown, et al., 2012	MA-Exp	1–6	Multiple teaching procedures	Quality	Fr, SW
Graham & Perin, 2007a	MA-Exp	4–12	Multiple teaching procedures	Quality	Fr, SW
Graham & Perin, 2007b	Mixed	E to grade 12	Multiple teaching procedures	Multiple	Fr, SW
Graham & Perin, 2007c	MA-Exp	4–12	Multiple teaching procedures	Quality, CL	Fr, SW
Hillocks, 1986	MA-Exp	3–college	Multiple teaching procedures	Quality	Fr, SW
Morphy & Graham, 2012	MA-Exp, SoC	2–11	Word processing	Multiple	SW
Rogers & Graham, 2008	MA-Exp	1–12	Multiple teaching procedures	Multiple	Fr, SW
Sandmel & Graham, 2011	MA-Exp	1–12	Process approach	Quality	Fr, SW
Santangelo & Graham, 2013	MA-Exp	K–12	handwriting, spelling	Multiple	Fr, SW

Note.—Mixed = a review that used true and quasi-experiments as well as single-subject design, qualitative, or other types of studies for evidence; MA-Exp = meta-analysis of true and quasi-experiments; MA-SSD = meta-analysis of single-subject design studies; SoC = group subject as own control designs; E = elementary; HS = high school; K = kindergarten; CL = content learning; SRSD = Self-Regulated Strategy Development model; L = length; E = structural elements; R = revisions; FR = full range of students in typical classrooms; SW = struggling writers.

however, in investigations from the identified reviews that were true and quasi-experiments, single-subject design studies, and qualitative studies of the writing practices of exceptional literacy teachers.

Many of the reviews examined a single writing treatment, such as word processing (e.g., Bangert-Drowns, 1993) or strategy instruction (e.g., Graham, 2006), whereas others were more comprehensive, examining the effectiveness of multiple writing practices (e.g., Graham, McKeown, Kiuhara, & Harris, 2012). In a few instances, reviews included studies conducted with school-age as well as college students (e.g., Bangert-Drowns, Hurley, & Wilkinson, 2004), but more commonly they involved students in grades 1 to 12 (e.g., Sandmel & Graham, 2011) or an even more restricted range of school-age students (Graham, Bollinger, et al., 2012). As noted earlier, we were only interested in studies conducted with students in kindergarten to grade 8.

Quality of writing was the single outcome of interest in some reviews (e.g., Hillocks, 1986), whereas other reviews looked at the impact of writing interventions on multiple aspects of writing (e.g., Morphy & Graham, 2012). Several reviews (Bangert-Drowns et al., 2004; Graham & Hebert, 2011) looked at the impact of writing on learning or reading comprehension.

There was also considerable variability in the characteristics of the students included in these reviews, as some reviews included studies conducted with a specific group of students, such as children with learning disabilities (e.g., Gillespie & Graham, 2014), whereas other reviews did not place restrictions on type of student (e.g., Graham & Harris, 2003). For the purposes of our analyses, we determined whether studies in the review focused on typically developing students (full range of students in a typical classroom), students who experienced difficulty with writing (struggling writers), or both.

Most of the reviews examined the effectiveness of teaching students how to write (e.g., Andrews et al., 2006), but others examined the effectiveness of using writing as a tool for promoting learning of content material (e.g., Bangert-Drowns et al., 2004) or enhancing reading (Graham & Hebert, 2011). Many of the reviews excluded studies if they did not meet specific criteria, such as reliability of outcome measures (e.g., Graham, McKeown, et al., 2012) or acceptable levels of attrition (e.g., Santangelo & Graham, 2013). The review conducted by What Works Clearinghouse (Graham, Bollinger, et al., 2012) only included studies that met a stringent set of criteria.

Meta-analysis of True and Quasi-experiments

Calculating effect sizes. We first examined each pertinent review in Table 1 to identify true and quasi-experiments conducted with students in kindergarten to grade 8 (we did not examine Graham, Harris, & Hebert, 2011, as it formed the basis for the meta-analyses by Graham, Hebert, & Harris, 2015, in this issue). We limited the studies included in this new meta-analysis to investigations that examined the effect of a writing treatment on overall writing quality, content learning, or reading performance. Our goal was to identify writing practices that impacted more than just a taught skill (e.g., sentence construction). The only exception that we made to this general rule for the meta-analysis of experimental studies was that we also reported the effects of spelling and handwriting instruction on spelling correctness and handwriting fluency and legibility, respectively.

Once a suitable study was identified, we obtained the reported effect size (ES). The basic procedure used to calculate an ES was to subtract the mean score of the writing

treatment group at posttest from the mean score of the control group at posttest and divide this difference by the pooled standard deviation of the two groups. For most of obtained effect sizes, but not all of them, the pretest differences between the writing treatment and control condition in quasi-experiments were first adjusted by subtracting the mean pretest score for each group from their mean posttest score. In some reviews (e.g., Graham, Harris, & McKeown, 2013), such adjustments were also made for true experiments.

The large majority of the prior meta-analyses of true and quasi-experiments were conducted by our research team. Thus, in these reviews, we had direct access to the data used to calculate effect sizes as well as their standard error. Fortunately, our prior meta-analyses contained most of the relevant studies included in earlier reviews conducted by other authors (e.g., Andrews et al., 2006; Bangert-Drowns, 1993; Bangert-Drowns et al., 2004; Gersten & Baker, 2001; Goldberg, Russell, & Cook, 2003; Hillocks, 2006). If a relevant study was not included in one of our reviews, we calculated the standard error for a reported ES using the N's in the original research report. All effect sizes were adjusted for small-sample-size bias (Hedges, 1982).

It was not uncommon for a suitable study to be included in more than one review. When this happened, we privileged effect sizes where pretest differences for the writing treatment and control condition were first adjusted, whether they were true or quasi-experiments. We further privileged effect sizes calculated with a pooled standard deviation rather than ones calculated form the standard deviation from the control condition (see Graham & Harris, 2003). As a result, all effect sizes were calculated using pooled standard deviations. Not all of them, however, were adjusted for pretest differences.

For all quasi-experiments, we adjusted the standard error for ES to account for the problem that a portion of the total variance in such experiments was likely due to grouping or clustering within conditions. We estimated δ_T by adjusting the conventional ES using the intraclass correlation (ICC) estimator procedures recommended by Hedges (2007). Because we did not have the reported ICCs for any study, we imputed effect sizes for reading comprehension using ICC estimates for this construct from national studies conducted by Hedges and Hedberg (2007). For writing quality, we used these same data (Hedges & Hedberg), but further adjusted the ICCs, using writing quality data from a large multistate study of writing that involved a single grade level (Rock, 2007). While we would have preferred using ICCs based on writing data at each grade, such statistics were not available. ICCs based on reading provide a relatively good match to writing, as students' performance on these two skills is strongly related (Fitzgerald & Shanahan, 2000). We were unable to make such adjustments for effect sizes based on content learning outcomes, as we did not have relevant ICC estimates.

Statistical analysis of effect sizes. A weighted random-effects model was employed to calculate an ES for each writing treatment tested. This analysis took into account sample size by multiplying each ES by its inverse variance. The confidence interval, statistical significance of the average weighted ES, and two measures of homogeneity of effects (Q and I^2) were calculated too. If variability in effect sizes for a specific writing treatment was larger than expected based on sampling error alone and there were at least 20 studies, we conducted moderator analyses to determine whether study characteristics (e.g., grade-level) were related to this excess variability.

We only calculate an average weighted ES when there were at least three or more studies that tested a writing practice. It is important to recognize that caution must be exercised for average weighted effect sizes based on a small number of studies. Fi-

nally, only one ES per study was applied when computing an overall ES for a particular writing treatment in order to avoid inflating sample size.

Meta-analysis of Single-Subject Design Studies

We again examined each pertinent review in Table 1 to identify single-subject design studies conducted with students in kindergarten to grade 8. We did not, however, limit the studies identified to investigations that only measured writing quality, content learning, or reading. In most of the available single-subject design studies, these were not the primary outcomes of interest. Even if these measures were assessed, the data needed to calculate an effect for them were not always presented. Thus, the meta-analysis of single-subject design variables included a broader range of outcomes, with some of the measures more narrowly focused on specific writing skills.

All of the previous reviews that assessed writing interventions using single-subject design studies employed an approach for calculating an effect size referred to as percentage of nonoverlapping data points (PND; Scruggs, Mastropieri, & Casto, 1987). PND is the percentage of data points in treatment that represent an improvement over the most positive value obtained during baseline (these data are typically obtained from graphs provided in the article). When there were three or more studies of a writing treatment that included a conceptually similar outcome (e.g., writing quality), we calculated an average PND. PND was interpreted using the following criteria: PND greater than 90% was a large effect, PND between 70.1% and 90% was a moderate effect, PND between 50.1% and 70% was a small effect, and PND 50% or below was classified as not effective.

Meta-synthesis of Writing Practices of Exceptional Literacy Teachers

The only previous review that included qualitative investigations studying the writing practices of exceptional literacy teachers was Graham and Perin (2007b). We reexamined the studies that were conducted with kindergarten to grade 8 students. Each study was read and all of the writing practices observed or described by the participating teacher were recorded. Then we reviewed our notes and developed descriptions (themes) that captured the identified writing practices. Each study was reread again and we identified the writing practices that fell under each theme and identified the source (i.e., investigation). If a theme was evident in a majority of the qualitative investigations, it was included as a writing practice applied by effective teachers.

Results and Recommendations

For each recommendation presented below, we indicated the type(s) of evidence it was based upon as well as the reviews from which the pertinent studies were obtained. Due to space limitations, we did not provide the individual reference in this article for each study used to support each recommendation. Individual references are available in the cited reviews.

Create a Writing Environment That Is Positive and Supportive

CCSS for writing in kindergarten to grade 8 expects students to become progressively better at (1) writing to inform, persuade, and entertain for various purposes and audiences; (2) writing in a planful, thoughtful, reflective, and collaborative man-

ner; (3) using technology as a tool for writing; and (4) writing to support the analysis and learning of reading and content material from multiple sources. These applications are not only demanding mentally, but require working with others in a productive and collaborative manner. This makes it especially important to develop a writing environment that is motivating, pleasant, and nonthreatening, where teachers support students and their writing efforts and students support each other.

Establish Writing Routines That Create a Pleasant and Motivating Writing Environment

The practices of exceptional literacy teachers provided one source of evidence on how to create a pleasant and motivating writing environment. We reexamined five studies conducted with such teachers from the meta-synthesis conducted by Graham and Perin (2007b). The following writing practices and routines were commonly used by these teachers in grades 1 to 8. The teachers (1) established a stimulating mood during writing time (e.g., making their excitement visible to students), and made it clear they enjoyed writing and teaching it; (2) made students' writing visible by having them share it with others, displaying it on the wall, and publishing it in anthologies, books, or other classroom collections; (3) created a positive classroom, where students were encouraged to try hard, believe that the writing skills and strategies they were learning helped them to write well, and attribute success to effort and the tactics they were learning; (4) developed classroom routines, such as sharing writing in progress and completed papers with peers, which promoted positive interactions among students; (5) set high but realistic expectations for students' writing, encouraging them to exceed previous efforts and accomplishments; (6) adapted writing assignments and instruction so that they were appropriate to students' interest and needs; (7) kept students engaged by involving them in thoughtful (e.g., discussing ideas for their papers) versus less thoughtful activities (e.g., completing a worksheet that could be completed quickly, leaving many students disengaged); and (8) encouraged students to act in a self-regulated fashion, doing as much as they could on their own (e.g., instead of spelling a word for a student, the teacher provided hints that helped the student spell the word).

Furthermore, in four single-subject design studies (from Graham & Perin, 2007b; Rogers & Graham, 2008), contingent praise had a positive impact on specific features of the writing of children in grades 3 to 6; average PND = 96% for writing productivity (a large effect). To illustrate, when a positive feature of students' writing, such as good word choice, was reinforced, students were more likely to make such choices in future papers.

Implement a Process Approach to Writing

Process Approach to Writing
Average-weighted ES for writing quality = 0.37 (Confidence Interval = 0.25 to 0.48; $p < .001$). Based on 25 true and quasi-experiments with students in grades 1 to 8 (from Graham, McKeown, et al., 2012; Graham & Perin, 2007a; Hillocks, 1986; Sandmel & Graham, 2011).

Many of the activities commonly applied by exceptional literacy teachers are evident in the process approach to writing. These include creating a pleasant and positive writing environment, promoting high levels of student interactions to support writing, writing for real audiences and authentic purposes, stressing personal responsibility and ownership of writing projects, and encouraging self-reflection and evaluation. The process approach to writing also supports developing writers in at least three additional ways, as it (1) stresses providing students with extended opportunities to write; (2) creates routines in which students are asked to plan, draft, revise, and edit their text; and (3) offers personalized individual assistance and feedback, as well as brief instructional lessons, as needed. This model's emphasis on the writing process, peer and teacher support of these processes, and extended opportunities to compose are consistent with the CCSS focus on developing and strengthening writing via planning, drafting, revising, and editing (with peer and adult support), as well as writing routinely over extended time frames.

Our meta-analysis of true and quasi-experiments testing the effectiveness of the process approach to writing supported the application of this model for teaching writing, as it had a positive and statistically significant effect on the quality of writing produced by students in grades 1 to 8 (see above). While 80% of the studies testing this approach produced a positive ES, variability in effect sizes was statistically greater than sampling error alone ($Q = 51.34$, $p < .001$; I^2 indicated 53% of variance was due to between-study factors). We conducted moderator analysis to determine whether this excessive variability was statistically related to students' grade (elementary vs. middle school). It was not: Q (between) $= 2.22$, $p = .14$.

Create Routines That Ensure Students Write Frequently

Extra Writing
Average-weighted ES for writing quality = 0.24 (Confidence Interval = 0.01 to 0.47; $p = .04$). Based on nine true and quasi-experiments with students in grades 2 to 8 (from Graham, McKeown, et al., 2012; Graham & Perin, 2007a; Hillocks, 1986).
Average-weighted ES for reading comprehension = 0.35 (Confidence Interval = 0.24 to 1.28; $p < .001$). Based on nine true and quasi-experiments with students in grades 1 to 6 (from Graham & Hebert, 2011).

The basic premise underlying this assumption is that students must write frequently if they are to prosper and grow as writers. This allows them to become comfortable with writing and further hone their skills as writers. This practice was common in our analyses of the five qualitative studies of exceptional literacy teachers in Graham and Perin's (2007b) meta-synthesis. Children in these teachers' classrooms wrote often and for many different purposes, including writing to inform, persuade, and entertain others. This is consistent with the emphasis that CCSS places on writing different types of text for a range of purposes.

The process approach to writing also places great emphasis on writing regularly. Data from our meta-analysis of true and quasi-experiments provided fur-

ther support for the emphasis that the process approach and exceptional literacy teachers placed on writing as a catalyst for growth. When teachers increased how frequently students in grades 2 to 8 wrote (about 15 minutes extra writing a day), there was a corresponding improvement in the quality of their writing (see above). Seventy-eight percent of studies testing the impact of extra writing time produced a positive effect, and variability in effects was not greater than sampling error alone ($Q = 12.36$, $p = .13$; I^2 indicated 35% of variance was due to between-study factors).

Increasing how frequently students write had an additional benefit, at least for students in grades 1 to 6, as our meta-analysis found that extra writing made students better readers, too (average ES = 0.24 for reading comprehension; see above). All studies testing extra writing resulted in better comprehension, and all variance in effects was accounted for by sampling error alone ($Q = 4.83$, $p = .64$; I^2 indicated 0% of variance was due to between-study factors).

Design Instructional Routines Where Students Compose Together

Collaborative Writing
Average-weighted ES for writing quality = 0.66 (Confidence Interval = 0.24 to 1.28; $p = .002$). Based on seven true and quasi-experiments with students in grades 2 to 8 (from Graham, McKeown, et al., 2012; Graham & Perin, 2007a).

Having students work together when writing was common among exceptional literacy teachers (see earlier analysis). It was also a basic practice in the process approach, and this practice is emphasized in CCSS with students supporting each other as they strengthen their writing. Our meta-analysis of true and quasi-experiments provided further support for such collaboration, as the quality of papers produced by students in grades 2 to 8 improved when their teachers created instructional routines where children planned, drafted, revised, and/or edited papers together (see above). All of the studies testing this treatment produced positive results, but there was considerable variability in the obtained effects ($Q = 23.46$, $p = .002$; I^2 indicated 74% of variance was due to between-study factors). However, there were too few studies for moderator analysis.

A common characteristic in the studies that tested collaborative writing was that students were provided with specific directions for what to do when working together and then taught how to carry out these guidelines. For example, with the Paired Writing Program (Yarrow & Topping, 2001), teachers used a systematic instructional routine (i.e., exploration, demonstration, clarification, practice, monitoring, coaching, and reinforcement) to teach students how to successfully work with a peer during each phase of the writing process. Students' collaboration was further supported with several procedural supports, such as a "help sheet" that contained questions to guide revising (e.g., "Is the piece of writing suitable for its purpose and for the reader?") and editing (e.g., "Do sentences have capital letters and full stops?") (p. 280).

Establish Goals for Students' Writing

Goal Setting
Average-weighted ES for writing quality = 0.80 (Confidence Interval = 0.49 to 1.09; $p < .001$). Based on eight true and quasi-experiments with students in grades 4 to 8 (from Graham, Bollinger, et al., 2012; Graham, McKeown, et al., 2012; Graham & Perin, 2007a).

One way that exceptional literacy teachers supported their students' writing was by setting high, but realistic expectations (see earlier analysis). Our meta-analysis of true and quasi-experiments provided additional support for this practice, as writing quality was enhanced when teachers told students in grades 4 to 8 what they expected them to do as they wrote (see above). All studies resulted in a positive effect, and variability in effects was not statistically greater than sampling error alone ($Q = 14.06$, $p = .05$; I^2 indicated 50% of variance was due to between-study factors). The positive impact of goal setting was also confirmed in four single-subject design studies (from Rogers & Graham, 2008) with students in grades 2 to 8 (average PND = 89% for writing productivity; this is considered a moderate effect).

Examples of providing students with clear, specific, and reasonably challenging goals for their writing included asking students to (1) add three new ideas to their paper when revising it, and (2) address both sides of an argument, providing three or more reasons to support their point of view and countering at least two reasons supporting the opposing view.

Use Twenty-First-Century Writing Tools

Word Processing
Average-weighted ES for writing quality = 0.47 (Confidence Interval = 0.27 to 0.66; $p < .001$). Based on 30 true and quasi-experiments with students in grades 1 to 8 (from Bangert-Drowns, 1993; Goldberg et al., 2003; Graham, McKeown, et al., 2012; Graham & Perin, 2007a).

Developing a supportive writing environment requires some consideration of the tools students use when writing. Too many schools still use pencil and paper as the primary or only writing medium, instead of more modern tools such as a word processor (Cutler & Graham, 2008; Gilbert & Graham, 2010). Word processors have a number of advantages over writing by hand, as electronic text is legible, and it can easily be deleted, added, rewritten, or moved. Word processors are also bundled with other software, such as spell checkers or speech synthesis, that can support the writer, and they can be connected to the Web and other programs where students can gather material for what they write, as well as share their text with others.

CCSS writing is likely to push schools to increasingly use new technological tools for writing, as it included objectives for acquiring keyboarding skills and using technology to produce and publish writing. Our meta-analysis of true and quasi-experiments provided support for this, at least for the increased use of word processing as a tool for composing, as the quality of writing of students in grades 1 to 8 who used word processing (vs. writing by hand) improved (see above). In 83% of the

available studies, word processing resulted in a positive effect. The positive impact of word processing was further supported in four single-subject design studies (from Rogers & Graham, 2008) with students in grades 1 to 5 (average PND = 70% for writing productivity; this is considered a moderate effect).

It must be noted that there was considerable variability in effect sizes in the 30 true and quasi-experiments we examined ($Q = 92.47$, $p < .001$; I^2 indicated 70% of variance was due to between-study factors). A moderator analysis was conducted to determine whether this excessive variability was statistically related to students' grade (elementary vs. middle school). There was a statistically significant difference by grade, Q (between) = 4.05, $p = .04$, as word processing had a greater impact on middle-schools students' writing (ES = 0.60; Confidence Interval = 0.44 to 0.77; $p < .001$) than on elementary grade students' writing (ES = 0.39; Confidence Interval = 0.26 to 0.51; $p < .001$). It produced a positive and statistically significant effect with students at both grade levels.

Provide Feedback

An integral part of CCSS is the notion of formative assessment. This is also essential to creating a supportive writing environment. When teachers monitor students' progress as writers, they can adjust classroom practices to meet the collective as well as the individual needs of their students. The meta-analysis by Graham, Hebert, et al. (2015) in this special issue supported the use of formative assessment, as teacher, peer, and self-assessment improved children's writing.

Ensure Students Acquire Needed Writing Skills, Knowledge, and Strategies

The objectives in CCSS for writing in kindergarten to grade 8 specified the mastery of a variety of skills (handwriting, typing, spelling, grammar, and usage), knowledge (attributes of specific types of text such as persuasive, informative, and narrative), and strategies (planning, revising, editing, and trying a new approach). The accumulated experimental evidence from our analyses (presented next) supports the idea that teaching such writing skills, knowledge, and strategies makes students better writers (see Graham, 2006a). Moreover, our analysis of the five qualitative studies of exceptional literacy teachers from Graham and Perin's (2007b) meta-synthesis found that such instructors commonly teach their students basic writing skills, as well as how to plan, draft, and revise their compositions.

Teach Foundational Writing Skills

Teach text-transcription skills. Skilled writers rarely think about handwriting,

Teach Handwriting, Typing, and Spelling
Average-weighted ES for writing quality = 0.55 (Confidence Interval = 0.08 to 1.02; $p = .02$). Based on eight true and quasi-experiments with students in grades 1 to 3 (from Graham, Bollinger, et al., 2012; Graham, McKeown, et al., 2012; Graham & Perin, 2007a).

typing, or spelling, executing each skill correctly and with little to no conscious attention. Achieving such mastery is important to writing, as having to devote con-

scious attention to handwriting, typing, or spelling can interfere with other writing processes (Scardamalia & Bereiter, 1986). For example, having to think about how to spell a word while writing can lead the writer to forget ideas or plans held in working memory. Further, readers are more negative about the ideas in a text that contains misspellings and poor handwriting (Graham et al., 2011).

Our meta-analysis of true and quasi-experiments showed that teaching text-transcription skills to grade 1 to 3 students enhanced the overall quality of their writing (see above). Six out of the eight available studies resulted in a positive effect, but there was considerable variability in effects obtained across studies ($Q = 34.64$, $p < .001$; I^2 indicated 80% of variance was due to between-study factors). There were too few studies to conduct moderator analysis.

When we examined studies from the meta-analysis conducted by Santangelo and Graham (2013), we further found that handwriting instruction improved legibility (average weighted ES = 0.53 in 18 studies with children in kindergarten to grade 7; $p < .001$) and fluency (average weighted ES = 0.60 in 12 studies with children in kindergarten to grade 7; $p < .001$), whereas spelling instruction created better spellers (average weighted ES = 0.56 in 22 studies with children in kindergarten to grade 8; $p < .001$). An important bonus of teaching spelling was that it enhanced phonological awareness (average weighted ES = 0.51 in seven studies with children in kindergarten to grade 2; $p < .001$), word-reading skills (average weighted ES = 0.40 in 16 studies with children in kindergarten to grade 3; $p < .001$), and reading fluency (average weighted ES = 0.59 in three studies with children in grades 1 to 5; $p = .01$). All studies produced a positive effect.

Teach sentence-construction skills. Writers invest a considerable amount of en-

Teach Sentence Combining
Average-weighted ES for writing quality = 0.56 (Confidence Interval = 0.28 to 0.84; $p < .001$). Based on three true and quasi-experiments with students in grades 4 to 7 (from Andrews et al., 2006; Graham, McKeown, et al., 2012; Graham & Perin, 2007a; Hillocks, 1986).

ergy in transforming their ideas into the words and syntactic structures that convey their intended meanings (Graham, 2006a). This includes constructing sentences as well as using appropriate grammar, punctuation, capitalization, and so forth. Nevertheless, there are surprisingly few studies testing the effects of teaching sentence construction or the skills that go into creating a correct sentence.

Our meta-analysis of true and quasi-experiments found that teaching sentence construction skills through sentence combining improved the quality of writing produced by children in grades 4 to 7 (see above). The three available studies produced a positive effect, and all variance in effect sizes was accounted for by sampling error alone ($Q = 0.73$, $p = 70$; I^2 indicated 0% of variance was due to between-study factors).

Sentence-combining instruction generally involves the teacher modeling how to combine two or more sentences into a more complex one. Students then practice combining similar types of sentences and are encouraged to apply (and sometimes practice) newly learned sentence skills in their writing and revising.

Unfortunately, traditional grammar instruction was not effective. Our meta-analysis of six studies conducted with children in grades 3 to 7 showed such instruction yielded an average weighted ES of -0.41 for writing quality (Confidence Interval = -0.85 to .03; variance in effect sizes was greater than sampling error alone as $Q =$ 14.49, $p = 010$; I^2 indicated 66% of variance was due to between-study factors (however there were too few studies for moderator analysis).

It must be noted that four single-subject design studies testing grammar and usage instruction (from Rogers & Graham, 2008) produced an average PND of 83% for correct grammar for students in grades 2 to 5 (this is considered a moderate effect). These studies were mostly conducted with students with disabilities and, in contrast to the true and quasi-experiments, teachers modeled how to use the grammar skills taught in these studies.

Increase Students' Knowledge about Writing

Three types of writing knowledge that are important are knowledge about the writing topic, knowledge about genre, and knowledge about the words used to convey meaning. In a recent study (Olinghouse, Graham, & Gillespie, 2012), we found that content and genre knowledge made a unique and statistically significant contribution to predicting the quality of students' text across different genres, whereas Olinghouse and Wilson (2013) found that the words children use when writing predicted writing quality.

Have students gather ideas and information to write about. One possible ap-

Prewriting Activities
Average-weighted ES for writing quality = 0.54 (Confidence Interval = 0.35 to 0.74; $p < .001$). Based on 10 true and quasi-experiments with students in grades 2 to 6 (from Graham, McKeown, et al., 2012; Graham & Perin, 2007a).

proach to helping students acquire information to write about is prewriting activities. Such activities involve locating possible writing content through brainstorming, reading, drawing, the internet, and/or by using graphic organizers.

Our meta-analysis of true and quasi-experiments provided support for teachers' use of prewriting activities, as such interventions improved the quality of writing of students in grades 2 to 6 (see above). All studies testing prewriting activities resulted in a positive effect, and all variance in effect sizes was accounted for by sampling error alone ($Q = 6.97$, $p = .64$; I^2 indicated 0% of variance was due to between-study factors).

Teach students the basic elements of different types of text. The genres of

Teach Students About the Structure of Different Types of Text
Average-weighted ES for writing quality = 0.41 (Confidence Interval = 0.09 to 0.73; $p = .01$). Based on 10 true and quasi-experiments with students in grades 2 to 6 (from Graham, McKeown, et al., 2012; Graham & Perin, 2007a; Hillocks, 1986).

writing that were prominently emphasized in CCSS become progressively more complex from one grade to the next, as new elements or combinations of elements

are added at each grade level. These elements were specific to the genre emphasized (persuasive, informational, and narrative), and it was tacitly assumed that students are familiar with the basic structure or grammar of each of these genres.

Our meta-analysis of true and quasi-experiments found that text-structure instruction had a positive impact on the quality of text produced by grade 2 to 6 students (see above), providing one possible approach for helping children produce more structurally complex text. Ninety percent of studies testing such instruction yielded positive results. While variability in these effects exceeded sampling error alone ($Q = 18.01$, $p = .03$; I^2 indicated 50% of variance was due to between-study factors), there were too few studies to conduct moderator analysis.

Provide students with good models of written text. One of the oldest techniques

Text Models
Average-weighted ES for writing quality = 0.40 (Confidence Interval = 0.24 to 0.56; $p < .001$). Based on four true and quasi-experiments with students in grades 3 to 8 (from Graham, McKeown, et al., 2012; Graham & Perin, 2007a; Hillocks, 1986).

for increasing the complexity of students' text is to provide students with good models of a specific type of text and ask them to emulate it when they write. Our meta-analysis of true and quasi-experiments revealed that such instruction with grade 3 to 8 students improved the quality of what they wrote (see above). All four of the available studies produced a positive effect, and all variance in effect sizes was accounted for by sampling error alone ($Q = 2.31$, $p = .51$; I^2 indicated 0% of variance was due to between-study factors).

Teach students vocabulary that will improve their text. With CCSS, many of the

Vocabulary Instruction
Average-weighted ES for writing quality = 0.78 (Confidence Interval = 0.27 to 1.29; $p = .003$). Based on three true and quasi-experiments with students in grades 3 to 8 (from Graham, McKeown, et al., 2012; Graham & Perin, 2007a).

topics that students will be asked to write about contain specialized vocabulary. When writers use such vocabulary correctly in their writing, they convey their understanding of the topic and express their ideas in a way that is likely to be valued and accepted by their readers, including their teacher (Olinghouse & Wilson, 2013). Likewise, a distinguishing feature of different genres of text is the type of vocabulary used to convey ideas. For instance, words such as "clue" or "red herring" typically appear in only certain types of stories.

Our meta-analysis of true and quasi-experiments found that teaching topic- or genre-specific vocabulary to students in grades 3 to 8 improved writing quality (see above). All three available studies produced a positive effect, and variance in effect sizes was accounted for by sampling error alone ($Q = 3.60$, $p = .17$; I^2 showed 44% of variance was due to between-study factors).

Teach Students Strategies for Planning, Drafting, Revising, and Editing

Strategy Instruction
Average-weighted ES for writing quality = 1.00 (Confidence Interval = 0.76 to 1.24; $p < .001$). Based on 35 true and quasi-experiments with students in grades 2 to 8 (from Graham, 2006b; Graham, Bollinger, et al., 2012; Graham & Harris, 2003; Graham, Harris, & McKeown, 2013; Graham, McKeown, et al., 2012; Graham & Perin, 2007a).

Skilled writers employ a variety of planning, revising, and editing strategies to help them create and improve what they write (Zimmerman & Reisemberg, 1997). The use of such strategies was emphasized in CCSS, and our analysis of the five studies with exceptional literacy teachers in the Graham and Perin (2007b) meta-synthesis found that such instructors encouraged students to treat writing as a strategic process and taught strategies for planning, drafting, revising, and editing text.

Writing strategies range from more general strategies such as brainstorming, semantic webbing, or editing that can be applied across genres to strategies that are designed for specific types of writing. For example, when writing a story, this can include generating possible ideas for writing by thinking about the characters, the setting, the main character's goals, action to achieve those goals, characters' reactions, and how the story ends. Students can also be asked to evaluate each of these elements in their story to determine what revisions they need to make to improve it (see Graham & Harris, 2005; Harris, Graham, Mason, & Friedlander, 2008, for examples).

Our meta-analysis of true and quasi-experiments supported the explicit teaching of these kinds of strategies, as the quality of text produced by students in grades 2 to 8 following such instruction improved considerably (see above). All 35 of the true and quasi-experiments in this analysis produced positive effects. The positive impact of strategy instruction was also supported in single-subject design studies with students in grades 1 to 8 (from Graham, 2006b; Graham, Bollinger, et al., 2012; Graham & Harris, 2003; Graham, Harris, & McKeown, 2013; Rogers & Graham, 2008), as average weighted PND for writing quality was 84% (18 studies), 87% for structural elements (32 studies), and 64% for length of text (14 studies). The first two PNDs are considered moderate effects; the third is a small effect.

In the true and quasi-experiments testing strategy instruction, there was considerable variability in effect sizes ($Q = 208.33$, $p < .001$; I^2 showed 84% of variance was due to between-study factors). Moderator analysis revealed a statistically significant difference between the average weighted effect sizes for strategy studies conducted with elementary and middle-school students; Q (between) $= 30.64$, $p < .001$, favoring elementary students (ES = 1.09; Confidence Interval = 0.78 to 1.40; $p < .001$) over middle-school students (ES = 0.87; Confidence Interval = 0.54 to 1.21; $p < .001$). Effects at both grade levels were statistically significant.

In each of the strategy-instruction studies included in our analysis, teachers explained the purpose and rationale of the strategy, modeled how to use it, and provided students with assistance in applying the strategy with the goal of inde-

pendent and effective use of it. However, strategy-instruction studies applying the Self-Regulated Strategy Development model (SRSD) designed by Karen Harris (see Harris et al., 2008) included additional elements to this basic structure. Most notably, SRSD emphasizes teaching any knowledge or skills needed to effectively use the target writing strategy (typically before the teacher models strategy use), making students aware of their gains and attributing gains to effort and strategy use, and teaching students procedures (e.g., goal setting, self-monitoring, self-instructions, and self-reinforcement) for regulating the use of the strategy, the writing process, and/or students' writing behavior.

As a result, we conducted moderator analysis to determine whether SRSD instruction was related to the variability in effect sizes in our meta-analysis. There was a statistically significant difference between average weighted ES for SRSD and the other strategy-instruction studies combined, Q (between) = 33.13, $p < .001$, favoring SRSD (ES = 1.24; Confidence Interval = 0.90 to 1.58; $p < .001$) over other strategy-instruction approaches combined (ES = 0.53; Confidence Interval = 0.35 to 0.70; $p < .001$). In addition, SRSD instruction statistically increased the number of structural elements in the writing of children in grades 2 to 8 (ES = 2.95; Confidence Interval = 2.15 to 3.74; $p < .001$; 18 studies), as well as the length of their writing (ES = 0.61; Confidence Interval = 0.33 to 0.89; $p < .001$; 14 studies).

One factor that appears to be responsible for SRSD's larger effects is the inclusion of self-regulation procedures such as goal setting and self-monitoring. In six component-analysis studies (from Graham, 2006b; Graham & Harris, 2003; Graham, McKeown, et al., 2012, Graham et al., 2013; Graham & Perin, 2007a), we found that the inclusion of these two procedures in the strategy-instruction routine resulted in an increased average-weighted ES of 0.50 in the quality of text produced by students in grades 2 to 6 (Confidence Interval = 0.16; $p = .003$; $Q = 7.27$, $p = .20$, $I^2 = 0\%$).

Use Writing as a Tool to Support Students' Learning

Writing to Support Learning
Average-weighted ES for content learning = 0.22 (Confidence Interval = 0.03 to 0.40; $p = .02$). Based on 24 true and quasi-experiments with students in grades 2 to 8 (from Bangert-Drowns et al., 2004; Graham & Perin, 2007c).
Average-weighted ES for reading comprehension = 0.65 (Confidence Interval = 0.50 to 0.81; $p < .001$). Based on nine true and quasi-experiments with students in grades 2 to 8 (from Graham & Hebert, 2011).

A major emphasis in CCSS is the use of writing as a tool to support students' learning of content material and understanding of material read. Writing about material read or presented in class is advantageous for multiple reasons (Graham & Hebert, 2011). Writing about such material requires that students decide what ideas are most important and how they are related to one another. The permanence of writing allows students to review, reexamine, critique, and even

construct new understandings of the extracted material. Finally, putting ideas into their own written language can make students think more carefully about what the ideas mean.

Our analysis of the five studies with exceptional literacy teachers from Graham and Perin's (2007b) meta-synthesis found that such instructors commonly had students use writing as a tool for learning. Our meta-analysis of true and quasi-experiments supported this practice, as writing about content presented in class enhanced learning of children in grades 2 to 8 (see above) and writing about material read resulted in improved comprehension of such material with students in grades 2 to 8 (see above). A variety of writing activities were tested in these studies, including writing short answers to questions, taking notes, writing a summary, and writing more extended responses such as explaining how something learned can be applied or related to one's own life.

Seventy-four percent of the writing-to-learn content studies produced a positive effect, whereas all of the writing-to-read studies yielded a positive outcome. There was considerable variability in effect sizes for writing to learn ($Q = 87.31$, $p < .001$, $I^2 = 79\%$), but not for writing to read ($Q = 29.82$, $p = .16$, $I^2 = 23\%$).

Moderator analysis revealed that there was a statistically significant difference between the average weighted ES for elementary and middle-school students for the writing-to-learn studies; Q (between) $= 4.61$, $p = .03$. Writing to learn had a positive impact on elementary students' learning (ES $= 0.34$; Confidence Interval $= 0.10$ to 0.57; $p < .001$), but not on middle-school students' learning (ES $= -0.01$; Confidence Interval $= -0.31$ to 0.28; $p = .21$).

We further found that the impact of writing-to-learn activities was related to subject area; Q (between) $= 29.10$, $p < .001$. Writing to learn had a statistically positive impact on learning in math (ES $= 0.22$; Confidence Interval $= 0.06$ to 0.39; $p = .009$), but not in social studies (ES $= 0.34$; Confidence Interval $= -0.10$ to 0.78; $p = .13$), whereas it had a statistically negative effect on learning science material (ES $= -0.65$; Confidence Interval $= -1.20$ to -1.04; $p = .02$). It must be noted that the ES for social studies was considered practically significant (see Graham, Bollinger, et al., 2012), and the effect size for science was based on only two studies.

English Language Learners and Students with Disabilities

CCSS in writing represents a major challenge for students who are English language learners and students with disabilities, as many of these youngsters do not write at grade level (National Center for Education Statistics, 2012). The types of evidence we drew upon in this article provided no guidance for teaching English language learners, as very few of the studies included in our analysis were conducted with this population. There was, however, enough research with students with disabilities (specifically learning disabilities) to make five recommendations (see below). It must be noted that studies in Morphy and Graham (2012) were not limited just to students with learning disabilities (LD), but all of the studies included children with LD or who were at risk for LD in writing.

Strategy Instruction with Students with LD
Average-weighted ES for writing quality = 0.93 (Confidence Interval = 0.60 to 1.26; $p < .001$). Based on 13 true and quasi-experiments with students in grades 4 to 8 (from Gersten & Baker, 2001; Gillespie & Graham, 2014).
Goal Setting with Students with LD
Average-weighted ES for writing quality = 0.57 (Confidence Interval = 0.14 to 0.99; $p < .01$). Based on four true and quasi-experiments with students in grades 4 to 8 (from Gersten & Baker, 2001; Gillespie & Graham, 2014).
Dictation with Students with LD
Average-weighted ES for writing quality = 0.55 (Confidence Interval = 0.17 to 0.94; $p < .01$). Based on six true and quasi-experiments with students in grades 2 to 8 (from Gersten & Baker, 2001; Gillespie & Graham, 2014).
Process Approach to Writing Instruction with Students with LD
Average-weighted ES for writing quality = 0.43 (Confidence Interval = 0.18 to 0.68; $p < .01$). Based on four true and quasi-experiments with students in grades 2 to 5 (from Gersten & Baker, 2001; Gillespie & Graham, 2014).
Word Processing with Students with/or at Risk for LD (all studies from Morphy & Graham, 2012)
Average-weighted ES for writing quality = 0.35 (Confidence Interval = 0.07 to 0.62; $p = .01$). Based on 20 true and quasi-experiments with students in grades 2 to 8.
Average-weighted ES for decreased errors = 0.42 (Confidence Interval = 0.06 to 0.77; $p < .02$). Based on 12 true and quasi-experiments with students in grades 2 to 8.

It is interesting to note that four of the five writing interventions that were effective with students with LD were also effective with children in general. This included strategy instruction, word processing, goal setting, and the process approach to writing. Dictation was the only effective treatment specific to students with LD. In most dictation studies, students dictated some part of their composition (e.g., plan, draft) into a tape recorder. Collectively, these studies demonstrated that we can improve the writing of students who experience considerable difficulty with writing and learning.

Concluding Comments

CCSS in writing did not specify how teachers and schools should teach writing, but instead provided benchmarks for what students should be able to do at each grade level. This article provides guidance on possible writing practices and interventions that teachers can apply to help their students become better writers and meet CCSS benchmarks. As our analyses demonstrated, research in writing has resulted in the development of a variety of research-supported practices teachers can use to meet both of these objectives.

There are several caveats and limitations to the present analysis that must be noted, however. First, while we drew upon evidence from a variety of different sources (true experiments, quasi-experiments, single-subject design studies, and qualitative studies of exceptional teachers) to develop our recommendations, we did not draw on all forms of evidence (e.g., correlational studies or qualitative studies conducted with teachers other than those identified as exceptional). Our decision to

privilege these specific types of evidence should in no way distract from the important contributions other types of research make to our understanding of writing instruction.

Second, it must be acknowledged that most of the studies we used to compute an average weighted ES, and average PND, or to identify a practice common to an exceptional teacher's class came from meta-analyses or meta-syntheses conducted by Graham and colleagues (see Table 1). This does not mean that the evidence for our recommendations came from a single group of researchers. Rather, each review that we drew upon (including our own) conducted a systematic search of the literature to identify pertinent investigations. Thus, the recommendations presented here involved the combined efforts of hundreds of researchers.

Third, for single-subject design studies, we used PND as our effect size metric. There are other alternatives to PND (e.g., calculating an analog of Cohen's *D*, regression effect size method), but we decided to use PND for two reasons: (1) PND is not bound by the parametric assumptions underlying some of the available alternatives (these assumptions are not commonly met in single-subject design studies), and (2) PND was the common metric in the previous reviews.

Fourth, when calculating an average weighted ES we used both true and quasi-experiments. We did this for two reasons. Previous reviews of writing intervention research using these two types of design (Graham, McKeown, et al., 2012; Graham & Perin, 2007a) did not find a correlation between design and variability in effect sizes. Furthermore, if we calculated a separate average weighted ES for each type of design, it would have reduced the number of recommendations made given that a minimum number of studies were required in order to calculate a summative statistic.

Fifth, some writing practices have been tested sparingly and some not at all. This has two implications. Less confidence can be placed in a practice that was tested sparingly. We are also confident that other effective writing practices exist, but they have not been tested. As a result, we encourage researchers to test an even wider array of writing practices, including ones that are specifically designed to achieve CCSS objectives (e.g., writing a persuasive essay from multiple sources in order to better understand classroom content material).

Finally, it is important to realize that the writing practices identified here as effective are "potentially" effective in a teacher's classroom. Just because a practice was effective in multiple research studies does not guarantee that it will be effective in all other situations, as there is rarely a perfect match between the conditions under which a practice was tested and the conditions in which it is subsequently applied. The safest course of action for teachers is to monitor the effects of the writing practice to be sure it works in their class with their students.

Note

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