

# THE



# READING



# WRITING

# CONNECTION

# THE READING–WRITING CONNECTION

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**R**eading and writing development begin in early childhood and are linked in daily function and in classroom activities from kindergarten or prekindergarten through high school and beyond. They form an integral part of the now widely adopted Common Core State Standards for English Language Arts. Although few would argue that reading and writing are related in important ways, there is little research addressing that relationship, or when and how best to integrate these two critical areas instructionally. A panel of individuals with expertise in reading, writing, instruction, intervention, assessment, and research methods convened under a partnership activity of the International Reading Association and the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) here offers a consensus about some issues to consider in moving the field toward more fully understanding the nature and importance of the reading–writing connection. The document presents the panel’s thinking on instructional issues, technology, the sharing of existing information, and the need for new approaches to assessment. The document ends with a summary of what the panel agreed are important areas for future research for better understanding and instructionally addressing the reading–writing connection.

To simplify the consideration of the connection between reading and writing, **reading** is here defined as the ability to decode written text quickly and accurately and to comprehend what is read. **Writing** is defined as the ability to produce connected text (sentences, paragraphs, and documents), either by handwriting or keyboarding, that communicates an idea or information. Note also that the panel specifically does NOT address the issue of the reading–writing connection in the learning and instruction of students learning English as a second or additional language. Some of the broader statements in the document could apply directly to that population, while others would require significant nuancing, as instruction for second language learners requires specific expertise

and supports, and is a complex issue in its own right. This decision in no way diminishes the importance of reading, writing and their connection in this group, but rather should indicate that the topic deserves separate consideration. (See August & Shanahan, 2008, which addresses reading and writing in second language learners.)

## BACKGROUND

There is general agreement that there is a connection between reading and writing, yet we know surprisingly little about the nature of this connection or the interactions between reading and writing with regard to development and student achievement (Graham & Hebert, 2010, in press; Fitzgerald & Shanahan, 2000). For example, how does learning in one influence or alter learning in the other, and how does the instructional process for reading relate to instruction in writing or the instructional process in writing relate to reading instruction? Does instruction in reading improve performance in writing and is the converse true? As we study the reading–writing trajectory, it will be important to include listening and speaking (i.e., oral language), since all of these skills develop interdependently. How does the relationship among these skills change with age and growth/development over the course of childhood and adolescence, and how might these associations change as features of the text change (e.g., genre, complexity of vocabulary, sentence structure)?

While reading and writing are closely correlated, the correlation is far from perfect. Little research has been done on reading–writing relations across different ability levels in each (Fitzgerald & Shanahan, 2000). Examining the connection between reading and writing should inform us regarding what attributes and aptitudes characterize those who struggle with one of these skills but not the other, and what characterizes those with difficulties in both? Some interesting similarities and differences can be noted between reading and writing. Both

(along with the other language arts skills, listening and speaking) involve knowledge of vocabulary (words, their internal morphology, and their meanings in context) and syntax (sentence structure, complex sentences, and how usage can change the intended message). At their higher levels all of these require reasoning, critical thinking, and analytic ability, and all draw upon background knowledge. Both skilled writing and reading are complex, requiring extensive self-regulation of flexible, goal-directed, problem-solving activities; both require genre knowledge and effective use of strategies (Harris, Graham, Brindle, & Sandmel, 2009).

While the prevalence of reading and writing disabilities have been noted to be similar (Katsusic, Colligan, Weaver, & Barbaresi, 2009), the two do not always co-occur. However, the co-occurrence of writing problems and reading problems is large; the prevalence of second grade students identified with writing disabilities and comorbid reading disabilities is approximately 45% (Hooper, Roberts, Nelson, Zeisel, & Kasambira, 2010). Good readers can have problems writing, but it is reportedly rare to have poor readers who are good writers (Myklebust, 1973; Stotsky, 1983; Tierney & Shanahan, 1991). Whereas students are often aware that they are having trouble reading, many earlier grade students and older struggling writers overestimate their writing abilities (Harris et al., 2009; Harris, Graham, & Mason, 2006). Anecdotally, many people love to read, and read for pleasure and learning, whereas fewer people report a love of writing or that they write for pleasure or to learn. Indeed, many students' attitudes towards writing decline with grade (Harris et al., 2009; Knudson, 1991; 1992, 1995). The National Assessment of Educational Progress data in writing indicate that the majority of 4th, 8th and 12th grade students demonstrate only partial mastery of the writing abilities needed at their grade level (Graham & Perin, 2007).

There is a substantial body of research on the components of reading, and on reading instruction and reading intervention (NICHD, 2000). Although more is known about early reading, inroads are being made into understanding the effect of reading instruction in the middle and higher grades, and while it appears that intervention with struggling adolescent readers is generally less effective than are interventions with children in K–3, there have been some successes with these populations (Edmonds et al., 2009; Vaughn et al., 2011). Work is needed on reading comprehension at all levels, but especially as students engage with more complex texts and are required to use more advanced reasoning and analytic abilities to comprehend.

There is far less research on writing and writing instruction, yet there are some promising new research findings. Recent research syntheses and additional research into writing instruction and remediation have demonstrated aspects of intervention that have positively impacted the quality and quantity of students' written products (Graham & Perin, 2007; Rogers & Graham, 2008; Sandmel & Graham, 2011) as well as indicating the positive impact that instruction on writing can have for improving reading comprehension skills (Fitzgerald & Shanahan, 2000; Graham & Hebert, in press, 2010; Moats, 2005/2006; Neville & Searls, 1991; Tierney & Shanahan, 1991). Research on professional development for teachers has begun to demonstrate how they can become highly effective in teaching strategies for writing and self-regulation of the writing process (Harris et al., 2012; Harris, Lane, et al., 2012). This work has served to heighten awareness of the importance of writing in the development of literacy and the educational process generally.

Despite accumulating evidence in both reading and writing, the field continues to struggle with how best to ensure that students achieve higher levels of reading comprehension and to elucidate optimal trajectories for writing development. When students receiving remediation make important gains, it is not clear what support(s) are needed for them to build on these skills and maintain them. Despite the need for ongoing research, research findings are encouraging enough that teachers can incorporate current research knowledge and use it in their classrooms with their students. A collection of user-friendly documents exists (e.g., companion documents to the Report of the National Reading Panel [NICHD, 2000; Partnership for Reading, 2003a, 2003b]) on early reading instruction, covering grades K–12 but focusing more heavily on elementary school (where there was more research available). The National Early Literacy Panel (NELP; National Institute for Literacy, 2008) synthesized the scientific evidence on early literacy development and home and family influences on that development, covering early childhood with accompanying documents for teachers and child care providers addressing early literacy and language development (National Institute for Literacy, 2009, 2010). More recently, summary documents have been produced on adolescent literacy (addressing both reading and writing) through a partnership between the Alliance for Excellent Education and the Carnegie Corporation of New York (Biancarosa & Snow, 2004; Graham & Hebert, 2011; Graham & Perin, 2007), which are freely available and provide a starting point. A document regarding assessment of writing is also available (Graham, Harris, & Hebert, 2011a). A report on research-based literacy

instruction and the implications for teacher education is also available from the American Association of Colleges for Teacher Education (AACTE, 2002).

In this document, we address the issues of instruction, technology, sharing what we know, and measurement, testing and assessment, as they relate to the reading–writing connection, with a final section on future research needs. The fact that there are not separate sections on intervention and professional development in no way minimizes their importance. On the contrary, we see intervention as critically important, and references throughout on early identification, ongoing assessment, tailoring of instruction and intervention are meant to signal this. Similarly, professional development, both pre-service and inservice, is essential for effective teaching of both reading and writing.

## INSTRUCTIONAL ISSUES

Instruction and how that happens, and whether reading and writing instruction occur together, are integrated, or are treated as separate “subjects” of instruction varies widely. Many teachers integrate the two in their instruction but, at the same time, there is clearly a need to teach some aspects of them separately. Instruction requires some integration of the two but from a solid base of competence in both (AACTE, 2002). There are those who think that if one of these two areas is taught well, the other will follow; the overlap between reading and writing has been discussed earlier, and it seems clear that the relatedness of these two language arts abilities argues that instruction in one would affect the other in various ways. Students, however, have been shown to benefit from focused instruction in each of these areas. Hence, there are several issues that require attention if reading and writing instruction are to be effectively integrated:

- In many classrooms across all grade levels (K–12), very little of the language arts block of instruction is dedicated to writing; this block of time is often used only for reading activities. Writing may be taught as a separate activity, outside the language arts block, or it may not be formally taught at all (Connor et al., 2011). We need to document what actually happens in classrooms and determine which approaches are most effective at what ages in helping students improve in both reading and writing.
- In many elementary classrooms, much of the time students spend writing is focused on story writing; more attention to persuasive and expository writing is needed in terms of both instruction and assessment (Graham et al., 2011b). Again, it will be

important to document what is actually occurring in classrooms, what practices work well, and how teachers might vary types of writing to student advantage.

- Becoming an adequate to excellent writer is a developmental process that takes time and occurs across the K–12 grade levels. Writing development generally requires explicit instruction in strategies, skills, and comprehension, including some instruction that is not done strictly in service of reading or combined with reading instruction (AACTE, 2002). Correlational and experimental evidence indicates that when sufficient time is set aside for writing, students’ writing abilities improve (Fitzgerald & Shanahan, 2000; Graham & Perin, 2007; Harris et al., 2009; Moats, Foorman, & Taylor, 2006).
- It is not clear that teachers have adequate preparation to provide needed instruction in reading and writing, although in recent years greater attention has been given to preparation for reading instruction. A thorough knowledge of language is critical for high quality instruction in reading and writing (AACTE, 2002). For example, an in-depth understanding of written language (syntax and morphology) is important for a teacher to deliver writing instruction, with attention to linguistic components as well as writing genres, as is an ability to integrate these into coherent, functional instruction, and it is not clear that teachers have these skills (Moats, 1994). Further, teachers are likely to teach writing more effectively when they are knowledgeable of about different genres and effective writing in those genres, the writing process, and effective strategies for writing and self-regulation of the writing process, and are able to develop knowledge, strategies, and skills in their students (Gilbert & Graham, 2010; Harris et al., 2012; Harris, Lane, et al., 2012). Such knowledge and abilities can be gained both through preservice and inservice professional development. At many schools, writing instruction resources are scant for either preservice or inservice teacher education; teacher education textbooks often give very limited attention to writing. Many teacher preparation institutions do not prepare future teachers to teach writing, or it is a very small unit within a course on reading/language arts/literacy instruction (Gilbert & Graham, 2010; Harris, Lane, et al., 2012). Use of rubrics or of formative assessments may help teachers to better understand the genres and features in writing; research is needed on how to best prepare teachers to use formative assessments and rubrics to improve instruction.



- There is limited to no research on how teachers might support students' development of depth of skill to effectively and efficiently teach writing and reading. In addition, professional development does not often address the integration of reading and writing; in 2005 it was noted that teachers have not been taught strategies to incorporate writing-to-learn strategies into their classroom writing instruction (Totten, 2005), and there has until recently been no push or enticement to do it; however, the implementation of Common Core State Standards (CCSS) in the Language Arts (National Governors Association Center for Best Practices [NGA Center] & Council of Chief State School Officers [CCSSO], 2010) may change this. The CCSS includes an "integrated model of literacy" which indicates that listening, speaking, reading and writing should be integrated with each other and across the curriculum.
- Instructional efforts in support of the development of reading or writing often use the complementary skill. For example, instructional approaches such as "Author's Chair" or "Reading with a Writer's Eye" involve both reading and writing (cf. Graves & Hansen, 1983; Guth, 1987, 1997). Frequently, writing tasks involve reading source documents to gather information, mobilizing background knowledge, evaluating sources read, thinking about purpose and reviewing what has been written—mainly reading tasks. Similarly, reading often involves writing summaries or constructing written responses to questions. Unfortunately, there is little rigorous research that documents the efficacy (or lack thereof) of many of these approaches, particularly for younger students.

It has been reported that effective instruction in process and genre writing strategies requires genre knowledge (Harris et al., 2009; Harris, Lane, et al., 2012); reading instruction may address genres, but may not do so in ways that adequately guide writing in these different genres. Current approaches to strategy instruction in writing typically involve reading, especially reading of exemplary models in the genre (cf. Harris, Graham, Mason, & Friedlander, 2008; Harris et al., 2009). However, texts that students read in the classroom may often be above their current writing ability levels; often these models are the works of published authors, and therefore are written at a level beyond the average student. Most writing models build on work published in the 1980s (e.g., Flower & Hayes, 1981; Graham, Harris, & Mason, 2005; Hayes & Flower, 1987). However, newer research (e.g., Graham et al., 2005; Graham & Hebert, in press) suggests that more

complex and more predictive models will be and are being developed, which will better inform effective instruction.

- While instruction is an important focus and affects all children, it is likely that increased focus on early identification and intervention for children for whom high quality instruction does not improve their writing skills adequately will be needed. There is accumulating evidence on early predictors of later reading difficulties (Hooper et al., 2011; National Early Literacy Panel, 2008). There is limited understanding of the genetic and neurobiological links between reading and writing, of the individual differences among children who do and do not struggle with writing and how these markers concur or are independent of reading difficulties.
- Under the implementation of Response to Intervention (RTI), allowed under the IDEA reauthorization (IDEA, 2004) as an alternative approach to identifying individuals with learning disabilities, the interface between instruction and intervention has blended. This change raises at least three challenges in light of the discussion here: (1) how to most efficiently and effectively deliver instructional intervention for students in need of more intensive instruction (e.g., Tiers 2 & 3) in reading, writing or both skills in light of what we know about the relationship between reading and writing; (2) when should reading and writing skills be taught separately or be integrated within the language arts block for a student receiving Tier 2 or Tier 3 instructional supports for literacy; and (3) what factors (e.g., cognitive, behavioral) may moderate these RTI efforts?

## TECHNOLOGY

Technology holds great promise, and in terms of modern media, is already ubiquitous in the lives of adolescents and school-aged children. The vast majority of people in the United States have a cell phone, surf the web, and so on. And technology has entered most classrooms, with laptops, smartboards, and other devices increasingly present. Therefore technology should be a major focus of attention in exploring the reading–writing connection.

- Technology can make major contributions to assessment, such as online assessment and machine scoring of various kinds of assessments, including essay scoring (Connor, Goldman, & Fishman, in press; Shermis, 2010; Shermis & Burstein, 2003). However, our understanding is limited regarding the similarities and differences among various algorithms for the machine scoring of online writing

samples, particularly as they facilitate response-to-treatment initiatives and as they reduce teacher time in the classroom.

- Technology can be used to deliver instruction, but caution is required. Simply automating what is effective in live interaction does not guarantee that effectiveness will be retained, nor does automating something that had limited effectiveness mean it will work any better. The specific impacts of technology on instruction should be studied. A recent national evaluation (Campuzano, Dynarski, Agodini, & Rall, 2009) revealed that technology is not more effective than classroom teachers in the service of improving students' reading and writing skills.
- Technology is often used as an accommodation for learners who struggle or have a disability impacting reading and/or writing (Connor et al., in press). Although there is evidence of the potential efficacy of some technologies to support learners' reading and writing skills, research has not kept pace with the rapidly evolving classroom and with student technological supports; there is thus a dearth of evidence on the efficacy or potential efficacy of a range of products in use today beginning with our youngest learners.
- With technology, assessments can become or be combined with interventions, given the types of recursive practice and branching (i.e., moving students to more challenging levels as they succeed and providing more practice where needed) that can be built in to such measures and the capabilities of capturing all responses and rapidly analyzing them (Shermis, 2010; Shermis & Birstein, 2003; Caccamise, Franzke, Eckhoff, Kintsch, & Kintsch, 2007). Research on effectiveness and whether such instruction is done planfully, with care, and with evaluation of the effects as part of any implementation is limited.
- Research indicates that technology can provide an effective means to provide professional development to support more effective reading instruction, particularly in the early grades (Connor, Morrison, Fishman, Schatschneider, & Underwood, 2007; Landry, Antony, Swank, & Monseque-Bailey, 2010; Powell, Diamond, Burchinal, & Koehler, 2010). However, there is only limited evidence for older students and on supporting effective writing instruction.
- Technology is ubiquitous in children's toys, including early learning toys aimed at teaching early reading and letter identification. How these devices

incorporate both early reading and early writing and the influence this may have on school readiness and on instruction in kindergarten and the early grades may be an important area for researchers to address.

## SHARING WHAT WE KNOW

To promote the use of research evidence in the classroom, information sharing is crucial. Although we need additional research on the reading–writing connection, and the interrelationships of reading, writing, listening, and speaking, it is important to share existing information that may be useful to classroom teachers. As noted above, for the separate areas of reading and writing, some such documents exist. Indeed one, *Writing to Read* (Graham & Hebert, 2011) links the two explicitly. In sharing this information, we should also consider what is currently taking place in classrooms in grades 1–12, and in the pre-service arena and institutions of higher education. How and with whom information is shared can influence its usability.

- Thoughtful descriptions of the research evidence will help to make the research more accessible to teachers so that they can implement more effective practices in the classroom.
- Explicating current research regarding the reciprocal supports that writing and reading instruction can provide, as well as what is needed separately for each to develop may motivate teachers to include focused attention on these areas as an important part of language arts and other content area instruction, and to integrate writing and reading. However, research on when it is optimal to instruct skills separately and when to integrate instruction across them is still limited. Information about both completed and ongoing research should be shared with teachers so that they are ready to incorporate research findings into their practice as they emerge.
- New research findings should be shared with curriculum and textbook publishers as well as with teachers and the public, because curriculum programs and textbooks often frame instruction both at the teacher preparation level and at the classroom level.

## MEASUREMENT, TESTS, AND ASSESSMENT

There is general agreement that assessment is crucially important in both reading and writing, and there is a chicken–egg relationship between defining the constructs

and measuring them. That is, assessment models inherently need a framework to define their measurement target regardless of the conceptual clarity in the research or practice literature regarding the construct itself. This process can define, refine, or simply instantiate concepts from other research literatures.

- One reason that we know less about writing than about reading is that there has been less agreement regarding what aspects of writing should be measured as well as how to measure them, especially when trying to move beyond spelling and grammar and into composition and richness of ideas. New automated scoring systems may be useful in improving the efficiency and effectiveness of writing assessment (Connor, et al., in press; Graesser & McNamara, in press), but these systems do not necessarily address the assessment complexities in and of themselves.
- Tests serve as working definitions of our constructs; we can only interpret the scores generated from test items. If test items are scored using a unidimensional rating scale, then score interpretations are constrained to a unidimensional construct, even if that is not the construct of interest. Because writing as a construct is multidimensional (Hooper et al., in press; Berninger, Nagy, & Beers, 2011), scores from our common assessments that fit a unidimensional structure (e.g., spelling, handwriting) may be useful but less informative than scores from tests that support a more complex, multidimensional structure. It is also likely that the complexity, and perhaps the number, of constructs change over the course of development.
- An assessment system whose goal is to generate valid and reliable information about students' writing ability is likely to be more informative if it is adaptive, flexible, and efficient. Adaptive tests, by definition, use student performance on early stages of a test to select the most informative items for each individual student (Petscher & Schatschneider, in press). Though current adaptive systems are based on statistical targets, with sufficient knowledge of the construct of writing and its measurement, the adaptation can be made at a more substantive level. Therefore, efficiency and flexibility should derive from knowledge of the construct, its constituent processes, and the sensitivity of specific tests or task types to measure them. As evidence of a students' abilities is updated based on task performance, subsequent tasks can be selected that are most informative for that child. For example, there may

be prerequisite skills that may provide efficient approaches to assessment: knowing that students have a certain skill may imply that they have mastered certain prerequisites, which therefore do not require testing. Knowing these hierarchical relationships may change the probability from assessment or theory development perspectives. Information gained in this way could help us inform assessment development and the sequence of how instruction might be designed—examining interrelationship prerequisite dependences could be useful. Importantly, however, such probabilities while useful in assessment do not necessarily translate into a sequence for instruction, so care must be taken to separate the purposes for and use of assessments.

- While instruction should be informed by assessment, it is important that it not be constrained by it. Assessments that utilize operational definitions for the construct or subcomponent of the construct in question (e.g., fluency) may be useful, but this definition may or may not represent the full breadth of the skill that we are trying build and therefore should inform but not dictate instruction. To illustrate, teaching of individual components of reading or writing is done in service of the whole—that is, each component skill is not an end in itself but part of the larger ability to read with understanding or write coherently. We need additional evidence about the impact of broader instruction on particular aspects of reading and writing across all grade levels.
- Considerable overlap or confounds exist in assessing reading and writing: most assessments of writing involve writing from source documents, which must be read and understood, and many assessments of reading involve writing constructed responses. In addition, the tasks involved in reading and writing change developmentally as students grow and learn. Task analyses of reading and writing will likely be quite revealing, in that while labels may differ as to the tasks involved, these analyses likely tap some of the same or similar cognitive skills, as well as unique cognitive skills.
- New approaches are needed for formative as well as summative assessment in writing, as are ways to help teachers use the information gained in ways that inform their instruction of individual children (Graham, et al., 2011a, 2011b). Again, technology may be useful (Connor et al., in press). It also would be helpful to teachers if we could advise them about the aspects of instruction that carry the most “bang for the buck,” to help them prioritize instruction for a particular child.

- There continues to be a strong need for novel or existing, but not used, approaches, theories, and models that can enhance construct clarity and provide insights to test the framing of a construct to guide work in this area. More careful consideration of what types of statistical models may be most useful for various purposes, based on what is known about the nature of the constructs of reading and writing (and language arts in general) would be informative. Researchers should examine what statistical models exist, and what types of tasks would be used to assess the adequacy or fit of these, to determine which models are appropriate. How do the properties of potentially appropriate statistical models explain, contradict, or add to what we know or hypothesize about the constructs, and can they account for the complex tasks and sets of tasks that would be involved in assessing reading and writing?

## FUTURE RESEARCH NEEDS

Given all of these issues, it is clear that additional research is needed on an ongoing basis. Overall, there is a need to better understand the reading–writing connection across the developmental trajectory from preschool through high school, and beyond, and indeed to more clearly delineate that developmental trajectory.

Longitudinal and randomized controlled studies will be essential to increase our understanding of the complex developmental trajectory of writing, including how such development is linked with or independent of literacy development. Such research will increase our understanding about how to support the development of students' reading–writing developmental trajectory:

- Attention to the behavioral, neurobiological, and genetic factors related to the reading–writing connection, and their association with each other, may offer important insights regarding underlying causal mechanisms related to the connection. This offers the potential for earlier identification of potential problems, including dyslexia and dysgraphia, and for individualization or personalization of intervention.
- Written language is considered part of early literacy, but it often is engulfed by early reading with little experience in early writing skills or their precursors. If reading and writing are associated, they may be more associated during the preschool years than in later years and may change over time in nonlinear ways. These associations remain unclear at present, and research efforts to address the separate developmental trajectories of reading and writing remain critical to investigate from assessment, intervention, and assessment-intervention perspectives.
- Listening and speaking both developmentally precede reading and writing, and then continue to develop in complexity alongside literacy skills. Reasoning and critical thinking involve listening, speaking, reading and writing. Longitudinal research will be important to understanding the intricacies of the mutual influences of these reciprocal relationships, and to identifying the earliest predictors of potential success in reading and writing.
- Longitudinal and intervention research is needed that can track the joint progression of reading and writing (and other aspects of language arts) across multiple, critical genres. Longitudinal research can delineate the trajectories of typically developing students at risk for reading and writing difficulties and of those students with manifest learning disabilities, as well as how best to support the development of effective readers and writers. How might these trajectories differ for those students who struggle with reading, writing, or both reading and writing?
- In addition to documenting trajectories, longitudinal and intervention research is also needed on how best to instructionally support the development of effective writing and reading across genres from K–12.

Additional research on instruction and intervention, including randomized controlled trials, is needed:

- Research is needed to address how reading and writing can be effectively integrated in interventions for students at various reading/writing levels, and for those who are struggling with reading and/or writing.
- It has not yet been clearly determined what is necessary to have a complete writing program in elementary or middle school, or what constitutes an effective writing program. Further, in reading and writing instruction, it is not clear what needs to be addressed separately for each and what may be most effectively taught if taught in combination.
- The interrelationship among reading, writing, listening and speaking needs to be investigated from the perspective of how early intervention for one or the other affects the remaining areas, and how combinations of these influence student outcomes.
- What are the earliest predictors of later reading and writing success or problems? How early can we intervene in ways that can prevent later difficulties in



reading and writing? Can and should these two areas be addressed integratively or separately?

Additional and ongoing work on technology will be important.

- Ongoing research is needed into how to most effectively use new technologies for assessment implementation, scoring, and analysis; instruction delivery, monitoring and planning; intervention delivery and modification to address individual difficulties; and for teacher training and professional development.
- It would be interesting to determine whether the development of simpler writing scoring methods for teachers might encourage more of them (especially content area teachers) to have their students write more often. Computer scored approaches are attractive given the relative speed and standardization they offer, but rubrics are useful because they keep teachers more familiar with and may even teach them more about the writing tasks; this may enable/encourage them to focus on more than just story writing. Comparisons of these approaches and their overall utility for teachers and effect on student reading and writing outcomes could be helpful.
- Use of technology is pervasive and increasing in our society. Work on other forms of writing, such as writing work plans, e-mails, and texting and research on how best to develop these evolving skills to facilitate communication should be considered. In addition, the impact of these various forms on both student writing and on approaches to writing instruction should be examined.

Work employing assessment theory and modeling is needed:

- Better testing of theories using sophisticated statistical modeling techniques might be useful to guide both assessment and instruction.
- Novel approaches to assessment are needed, for both research and instructional purposes. Simultaneous consideration of statistical models, the development of task types (e.g., variations in writing prompts—pictures, questions, or titles; or variations in assessing argumentation—students might either generate an argument after reading a text or critique an argument made by a hypothetical student), and constructs of reading and writing will be important as we move forward. These can be accomplished with an evidence-centered design approach to assessment, not just focused on tasks or the model, but

reasoning from evidence that will help shape our understanding of the constructs as well as inform instruction. To move forward with developments on only the statistical modeling front uninformed by changing construct definitions, innovative item design, instructional opportunities, and developmental principles is improvident.

- Measures are needed that assess the constructs rather than letting constructs be defined by existing (or new unidimensional) assessments. Carefully designed randomized controlled trials to generate data are needed to fully explicate the strong correlation of reading and writing skills development, their underlying constructs, and the reciprocal causal effects instruction/growth in one may have on the other.
- Both formative and summative assessments of these skills and underlying constructs are needed to assist with diagnostic/identification and instructional purposes. Research is also needed on the most effective ways to assist teachers in using the results of such assessments to improve and tailor instruction.

As the models of effective writing instruction are tested and confirmed, then teacher education and professional development will be needed so that assessment, identification, instruction, and individualized intervention in writing can be used effectively at home, in the classroom, and in the community. Models will likely include neurological, biological, genetic, and behavioral (academic and socioemotional) factors. How both reading and writing instructional strategies are responsive to and implemented within the Common Core Standards for Language Arts, how they are addressed within response-to-intervention approaches in the classroom and in special education more generally, and the results of these changes, are current issues that require further scientific inquiry, as do ways to get what is known into the home and classroom. This includes early parenting support and early identification of potential problems. It also includes guiding teachers in assessing (or seeking services for assessment), interpreting the results, and delivering writing instruction/intervention. This is likely to require teachers to integrate writing with reading/language arts instruction, and to have students read and write more, and to involve varied types of documents. Taken together, new knowledge informing new actions should lead to stronger student reading and writing achievement. The reading-writing connection is a dynamic issue that can offer exciting areas for study that have the potential to inform how we help today's students become better readers and writers. Education and learning science, however, needs to continue to develop the empirical basis for the varied

facets of this connection. These efforts undoubtedly will drive evidence-based assessment, instruction, and intervention, and push educational public policy that will support the advancement of reading and writing for all students.

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