

# Using Context as an Assist in Word Solving: The Contributions of 25 Years of Research on the Interactive Strategies Approach

**Donna M. Scanlon**

*University at Albany, State University of New York, USA*

**Kimberly L. Anderson**

*East Carolina University, Greenville, North Carolina, USA*

## ABSTRACT

Recently, there has been growing concern about how to most effectively support the literacy development of beginning and struggling readers with regard to helping them learn to effortlessly identify the huge number of words that proficient readers ultimately learn to read with automaticity. Some, noting the critical importance of phonics instruction in learning to read in an alphabetic writing system, take the position that students should attend only to alphabetic information in word-solving attempts. However, long-standing theories of the development of word-reading skills support the value of teaching students to use both alphabetic and contextual information in word solving in interactive and confirmatory ways. The authors summarize 25 years of research in which beginning and struggling readers were taught to use both code- and meaning/context-based strategies for word solving and were provided with explicit, responsive instruction focused on the alphabetic code. The authors present brief summaries of theoretical explanations of the word-learning process. Then, the authors summarize six experimental studies that, together, included students in kindergarten through fourth grade and involved the implementation of the Interactive Strategies Approach in the primary grades and an extension of the approach with middle elementary students with reading difficulties. The studies resulted in substantially improved reading outcomes among treatment versus business-as-usual groups. The authors contend that using both phonics- and context-based information facilitates the ability to build sight vocabulary, which in turn enables readers to turn their attention to the most important goal of literacy learning: meaning construction.

In this article, we take up a particularly concerning tenet of the current reading wars: the caution to avoid teaching developing readers to use context as an assist in identifying unfamiliar words in text. This caution has been shared widely in the popular press (e.g., Hanford, 2019; Schwartz & Sparks, 2019) and is typically associated with the practice of cueing when students encounter an unfamiliar word. According to Hanford (2019), “cueing may actually prevent kids from focusing on words in the way they need to become skilled word readers” (para. 82). Instead, systematic phonics instruction has been advocated as the only way to be sure that students learn how to read words (Schwartz & Sparks, 2019). This position is taken despite the absence of research evidence indicating that teaching learners to use context as an assist in word solving, in addition to helping them develop skills with the alphabetic code, is counterproductive.

One particular target in the current reading wars is what has come to be known as the three-cueing system, which appears to have originated

with Goodman's (1967) theory that reading is a psycholinguistic guessing game. Goodman explained that readers use multiple sources of information (semantic information, syntactic clues, and alphabetic information—the three cues) to identify unknown words encountered while reading. It has been argued (e.g., Adams, 1998) that the theory and its instructional implications have been interpreted to privilege semantic and syntactic sources of information in the process of attempting to identify unfamiliar words, encouraging only a sampling of the phonological/orthographic information. The current controversy regarding the three-cueing system highlights a long-standing tension in the field: whether students should be encouraged to use context in their attempts to solve unfamiliar words. Indeed, some research has suggested that the use of context, or what has been referred to as contextual guessing (Share, 1995), might hinder word learning (e.g., Landi, Perfetti, Bolger, Dunlap, & Foorman, 2006), at least in experimental contexts, which would not seem to generalize well to the usual contexts of learning to read.

Although there is widespread consensus that learning and using effective decoding skills is critical for readers learning to read in an alphabetic orthography (for an extensive review, see Castles, Rastle, & Nation, 2018), we argue that the use of contextual information is also critical, particularly when learners do not yet have fully developed, alphabetically based, word-solving skills (Ehri, 2014; Vellutino & Scanlon, 2002). This position does not equate, however, to prioritizing contextual information or encouraging contextual guessing. If learners do not thoroughly attend to the alphabetic information in a word, they are unlikely to store the word, once solved, in their long-term memory with enough detail that it will be more accessible on subsequent encounters. In other words, without careful attention to the code, even if readers correctly identify individual words, they may not have progressed toward adding them to their sight vocabularies (words that can be read effortlessly).

We do not view the use of context and decoding within an either/or framework, but rather encourage the interactive and confirmatory use of both code- and meaning-based strategies during word solving, within an instructional approach that is also responsive to the needs of students as they develop skill with the alphabetic code. We include a focus on meaning-based strategies to encourage learners, right from the beginning, to understand that reading involves meaning construction. Also, because the English orthography is not entirely reliable, the decoding skills that students are taught often result in only approximate pronunciations of some words. If those pronunciations are not checked against context for goodness of fit, inaccurate pronunciations will go uncorrected, and word learning will be impaired (Share, 2008). Similarly, use of contextual information can serve as an assist in word solving even for regularly spelled words,

especially those containing decoding elements that readers do not yet know, thus allowing developing readers to engage in independent reading sooner than they might otherwise be able to do. In this way, students' exposure to words grows more rapidly, helping them build word-reading fluency, and likely expands their familiarity with decoding elements, both of which are critical in the transition from novice to expert readers (Castles et al., 2018).

In what follows, we argue that for emergent readers, contextual information (e.g., pictures, repetitive patterns) is highly useful for enabling the development of early insight into the conventions of print, such as left-to-right directionality and particularly concept of word. Without concept of word development, phonological skills instruction will make limited sense to students, and they will have difficulty in applying their knowledge of letters and sounds when reading (Mesmer & Williams, 2015). Of course, as students develop their phonics skills, there needs to be a shift to greater reliance on decoding skills for word solving because, to develop an extensive sight vocabulary, students need to fully attend to the alphabetic/phonics components in unfamiliar words encountered while reading. Under these circumstances, use of contextual information helps determine the accuracy of initial attempts at word solving, and when initial attempts fail to yield a real word that fits the context, contextual information supports subsequent attempts, in a recursive fashion, thus raising the likelihood that the correct word will be identified. This process supports orthographic mapping (Ehri, 2014) and helps students build their sight vocabularies. This is consistent with Share's (1995) self-teaching hypothesis with its reliance on both partial decoding and the reader's set for variability (Venezky, 1999).

In a subsequent section, we describe a series of intervention studies conducted by our research group in efforts to support the literacy development of students who were at risk for or were experiencing reading difficulties. Our review is limited to studies employing the Interactive Strategies Approach (ISA; Vellutino & Scanlon, 2002), all of which included explicit instruction in the use of both code- and meaning-based strategies for identifying unfamiliar words.

## Skilled Word Identification Is Critically Important

To comprehend a written text, the reader needs (among many other things) to be able to read the individual words with relative ease. The number of words is huge. Nagy and Anderson (1984) estimated that the print students encounter in school consists of approximately 85,000 distinct word families. A critical question in the current debate over reading instruction is how individuals acquire the ability to quickly and accurately read the huge number of words that

a proficient reader can read effortlessly. This question is critical because unless an individual can quickly and accurately read most words in a text, cognitive effort needs to be devoted to word solving rather than meaning construction (LaBerge & Samuels, 1974; Perfetti, 1985). The ongoing debate around how readers learn to read words, although typically framed around decoding, actually centers on how to help readers build the extensive sight vocabulary they need to become proficient readers. Decoding, of course, plays a critical but not exclusive role.

Theory and research related to literacy acquisition have demonstrated, for decades, the value of helping learners develop skill with phonological/phonemic analysis and phonics skills (e.g., National Early Literacy Panel, 2008; National Institute of Child Health and Human Development, 2000) and have described the use of contextual information to direct and check their initial decoding attempts (e.g., Ehri, 2005, 2014; Share, 1995). Accurate word identification enables the orthographic mapping that enables word learning (Ehri, 2014) and occurs as readers form connections between written and spoken units in the course of reading words. These connections are bonded with the meanings of the specific words in memory and enable readers to recognize the words at sight—accurately and automatically, in isolation or in context.

Although orthographic mapping is enabled by both phonemic awareness and knowledge of letter–sound associations, learning to read words in the English writing system also requires flexibility and a set for variability (Ehri, 2014; Venezky, 1999). Set for variability (Venezky, 1999) assumes a need for processing beyond decoding when reading irregularly spelled words. For example, readers who decode the word *glove* pronounced like *clove* or the word *kind* pronounced like *pinned* (Tunmer & Chapman, 2012) will need to be flexible, trying other pronunciations to determine the word that fits the context. A broader conception of set for variability applies it to all words, both regularly and irregularly spelled (Savage, Georgiou, Parrila, & Maiorino, 2018). Readers with emerging decoding skills and a set for variability can leverage their partial decodings and knowledge of word meanings to accurately identify individual words (Tunmer & Chapman, 2012). This is consistent with the word-reading strategy of prediction described by Ehri (2014), which details a process whereby readers use initial letters plus context to anticipate what a word might be. Ideally, readers go the next step and verify that the remaining letters fit with their hypothesis, increasing the likelihood that the word will be more accessible on subsequent encounters.

The role of context in learning to read, especially when decoding is only partial, is consistent with Share's (1995) self-teaching hypothesis. Most sight words, according to Share, are not explicitly taught. Rather, they are learned

across multiple encounters with individual words in context, as the reader successfully applies an analytic approach to identifying words. By providing support for successful word reading, especially when decoding is only partial, contextual information supports orthographic mapping and facilitates self-teaching by building up stronger associations between the sound and meaning of the word, along with its spelling (Share, 1995; Wang, Castles, Nickels, & Nation, 2011). Far from involving a psycholinguistic guessing game, the use of partial decoding, along with context to check decoding attempts and a set for variability, increases the proportion of words that are accurately identified while reading, thus enabling the orthographic mapping that is necessary for word learning to occur and potentially increasing readers' familiarity with phonics elements that have not been explicitly taught.

## The Interactive Strategies Approach

### *Instruction to Prevent and Remediate Reading Difficulties*

More than 30 years ago Vellutino, Scanlon, and colleagues embarked on a series of studies aimed at understanding the differences between students who experienced literacy-learning difficulties and those who did not. That work contributed to the current understanding that difficulties with phonological processing are a primary correlate and likely cause of literacy-learning difficulties. In the late 1980s, Frank Vellutino received a letter from Marie Clay, along with a copy of her now seminal article, "Learning to Be Learning Disabled" (Clay, 1987). In that letter, Clay challenged the work of Vellutino and colleagues, noting that the research failed to control for students' instructional and experiential histories (Vellutino, 2010). In essence, Clay put forth the notion that the learning disabled students being studied might be, in effect, instructionally disabled. That thought, and a desire to better understand the challenges faced by students who experience reading difficulties and how to address those, inspired the 25 years of intervention research summarized in this article.

All of the studies to be described contributed to and/or evolved from the development of the ISA, which is a responsive approach to early literacy instruction and intervention (Vellutino & Scanlon, 2002). The ISA involves extensive attention to the development of phonological/phonemic awareness and phonics skills and the application of those skills in combination with the development of strategic word-solving skills in context. In the ISA, substantial emphasis is placed on the interactive and mutually supportive roles of contextual and alphabetic information in the process of word solving. It

involves explicit instruction and guidance in the use of word-solving strategies and in the underlying skills and understandings that enable the use of those strategies (Anderson, 2009; Scanlon, Anderson, & Sweeney, 2017).

The first two ISA studies (Scanlon, Vellutino, Small, Fanuele, & Sweeney, 2005; Vellutino et al., 1996) were particularly important for refining and establishing the effectiveness of the approach and have had long-lasting impact on the field of early literacy instruction and intervention. The article by Vellutino et al. (1996) and a follow-up analysis by Vellutino, Scanlon, and Lyon (2000) are considered to have been highly influential in the development of Response to Intervention as an alternative to the IQ-achievement discrepancy approach for identifying reading disabilities (Kilpatrick, 2020). Findings from Scanlon et al.'s (2005) study contributed substantially to recommendations for improving instruction in foundational reading skills set forth in the 2016 What Works Clearinghouse practice guide (Foorman et al., 2016). Both ISA studies, and the four that followed, included explicit instruction and guidance in the conjoint use of both code- and meaning-based strategies to solve unfamiliar words while reading. Where research on the ISA has been cited, however, most of the attention was devoted to the emphasis on explicit phonemic awareness and phonics instruction. Relatively little attention has been paid to word solving in context, which is perhaps the most unique aspect of the approach.

According to the theoretical model that underlies the ISA, students at the early stages of learning to read need to understand the communicative purposes and conventions of print, develop facility and fluency with the alphabetic code, learn to use both code- and meaning-based word-solving strategies in interactive and confirmatory ways, and be provided with supportive opportunities to orchestrate these understandings in both structured tasks and authentic reading contexts (Vellutino & Scanlon, 2002). The studies discussed herein attended to each of these needs as appropriate to the particular students and goals of the study. In all of the studies, an emphasis was placed on developing teacher knowledge related to linguistic aspects of the English writing system to assist teachers in effectively planning for and delivering responsive instruction (consistent with findings of Piasta, Connor, Fishman, & Morrison, 2009). One of the commonalities across all of the studies was explicit instruction designed to assist students in the word-learning process. To that end, all of the studies involved the teaching of word-solving strategies that involved the use of both code-based and contextual information (this teaching, discussed in greater detail below, became more explicit as the studies progressed). The first three studies, all of which focused on early primary students (kindergartners and first graders), included the following lesson components: rereading one or more texts from a previous lesson; phonological skills, including

phonological/phonemic awareness and phonics, depending on student needs; reading new text(s); instruction, guidance, feedback, and reflection on the use of strategies to support word solving in context; high-frequency word practice; and writing.

At the primary level, the phonological skills component sensitized students to the relations between the phonemes in spoken words and the letters in printed words and taught and provided practice with a decoding element(s) that would be useful in the new book(s) to be read in the lesson. Previously taught skills, especially those not yet mastered, were also reviewed. In general, instruction related to the alphabetic code involved a three-part process: word building, wherein the students used letter tiles to make words dictated by the teacher, using a limited set of tiles to make the process easier; word reading, wherein the students read words formed by the teacher using the letter tiles; and written spelling, wherein the students wrote words dictated by the teacher. New high-frequency words to be encountered in the new book(s) were introduced and practiced in preparation for reading the book(s), especially if the students did not yet have the decoding skills needed to solve the words and/or if the words were irregular. In a separate segment of the lesson, previously taught high-frequency words were practiced using a variety of game-like activities. The writing segment involved writing one or more sentences, which were often dictated by the teacher and were designed to provide additional practice with the application of the foundational skills (i.e., concepts of print, high-frequency words, phonemic awareness, phonics) that the students were learning.

For the studies involving older students (third and fourth graders), isolated phonemic awareness instruction was typically not included, but the development of phonemic awareness was addressed through the phonics component, in which needed phonics skills were taught and practiced through the three-part process of word building, word reading, and written spelling, much like for the younger students. Throughout, for both the older and younger students, when vowel sounds were taught, both common sounds for an individual vowel were taught simultaneously on the logic that if the students knew the letters' names, they already knew the long sound of the vowel. Thus, instruction could focus on teaching and practicing the short sound and helping the students understand that vowels have two common sounds, one of which is the same as the letter's name. In decoding efforts, students were taught how to be flexible with the vowels, trying alternate sounds for the vowel if their first decoding attempt did not result in a word that fit the context. This flexibility allowed students to be more independent in figuring out words such as *have* and *find* and helped them puzzle through many words with vowel digraphs, such as *break*, *beak*, and *head*, as students were taught that

when two vowels are together in a word, word solving may require trying both sounds for each vowel to identify the word that fits the context. Ultimately, this same flexibility could be applied for solving multisyllabic words, such as *robin* and *robot*.

In general, by grades 3 and 4, students with limited reading accuracy had spotty knowledge of phonics skills. Therefore, phonics skills that were explicitly taught and practiced were selected based on assessment of individuals' current abilities. For students whose literacy skills were very delayed, the phonics component of the lesson was much like that for the younger learners, and for part of the lesson, the particular books read provided practice with that skill. For students with stronger skills, common decoding elements that they did not know (e.g., the two sounds for *ow*) were explicitly taught and practiced, but the books read generally were not selected specifically to provide practice with that skill. The assumption was that these students would encounter the targeted elements as they read the more advanced texts they were capable of handling.

Intervention for the older students involved them in reading thematic units related to their grade-level science and social studies topics, on the logic that by grades 3 and 4, learners are expected to be developing content knowledge through reading and that this expectation is particularly challenging for readers who struggle. Units began with easy texts intended to build related background knowledge and vocabulary, and subsequent texts gradually increased in level of challenge. Each unit typically culminated in a text that was more grade appropriate (see Gelzheiser, Hallgren-Flynn, Connors, & Scanlon, 2014).

### A Focus on Word-Solving Skills

Because one of our major goals in this article is to provide evidence in support of teaching students to use contextual information as an assist in word solving, we focus here on the strategic word-solving element of the ISA. As noted, as the studies progressed, the teaching of word-solving strategies became more explicit, and we began to use a common resource for students to reference as needed. Figure 1 presents the graphic that was used to help students remember the things they could do, as needed, in attempts to solve unfamiliar words encountered while reading. The graphic consists of four code-based strategies and four meaning-based strategies.

For learners who were just beginning to learn to read, we employed patterned/predictable books and encouraged students to rely on the pattern, the picture, and the beginning letter of the word that changed from one page to the next, thus encouraging them to employ all of the sources of information to which they had access. As

**FIGURE 1**  
Word Identification Strategy List



Note. From "Using the Interactive Strategies Approach to Prevent Reading Difficulties in an RTI Context" (p. 49), by D.M. Scanlon and K.L. Anderson, 2010, in M.Y. Lipson and K.K. Wixson (Eds.), *Successful Approaches to RTI: Collaborative Practices for Improving K-12 Literacy*, Newark, DE: International Reading Association. Copyright 2010 by the International Reading Association. Reprinted with permission.

readers progressed, their attention was gradually shifted to more and more of the alphabetic and orthographic information in unknown words and to the use of context to direct and check their decoding attempts. A key message was that the strategies should be used in interactive and confirmatory ways. We did not want students to just decode the words, but rather to make sure that their attempt resulted in real words that fit the context. Just as importantly, we did not want students to guess at words, relying too heavily on context and not attending to the alphabetic information (a common tactic among readers who struggle), as that has the clear potential to interfere with the word-learning goal.

Teachers were encouraged to explicitly teach the application of each strategy (generally one at a time), provide guided practice, and then gradually release responsibility (Pearson & Gallagher, 1983) for strategic word solving to students (Anderson, 2019; Scanlon et al., 2017). The balance of expectations and encouragement for the use of code- versus meaning-based strategies changed as students' skill with the alphabetic code grew. For example,

students who were first learning the sounds of individual letters and reading emergent-level texts were taught to use the “think about the sounds of the letters” strategy to focus on just the beginning letter, check the picture, and make use of the predictable pattern (context). Once students were fairly reliable in attending to/using beginning letters, teachers encouraged them to attend to the beginning and ending sounds.

Once readers had the needed phonics skills (which were taught, as needed, early in the lesson), they were expected to begin their word-solving attempts by relying on letters and their sounds and/or larger orthographic units, applying one or more of the code-based strategies. These strategies were introduced and practiced in coordination with students’ developing phonics skills. For example, students who had already learned to think about the sounds of the letters when they were learning the sounds for single consonants were encouraged to use that strategy when learning consonant digraphs and other phonic/orthographic elements. Students learning about vowel digraphs that have two (or more) common sounds were encouraged to “try different sounds for some of the letters, especially the vowels”; students learning about phonograms and/or prefixes and suffixes were encouraged to “look for parts you know”; and students learning to solve multisyllabic words were encouraged to “break the words into smaller parts.” As particular code- and meaning-based strategies were taught, students were frequently engaged in discussion/review of and reflection on the utility of the strategies they were learning.

As an example, students who were learning about vowel sounds in the phonics component of the lesson were generally reading books in which the pictures did not necessarily provide strong clues for word identification, although other contextual information was typically available. In this situation, students were encouraged to look all the way through the word and to come up with at least an approximation of what the printed word might sound like. Once they had a hypothesis, they were encouraged to check to make sure that they had identified a real word that made sense in the context. This might call for them to “go back to the beginning (of the sentence) and start again” to recall what they may have forgotten while puzzling over the unfamiliar word. If their hypothesized word did not make sense, they might be encouraged to “try different pronunciations/sounds for some of the letters, especially the vowels,” and so forth.

The point is that students were taught to use code- and meaning-based sources of information in interactive and confirmatory ways, checking one source of information against another. The ultimate goal was for students to internalize the thinking that the strategies entailed and to apply them effectively, without reference to the printed list, when they encountered unfamiliar words in context. Once

readers had a handle on how to deploy the various strategies, exactly how the orchestration of the various strategies occurred was variable and dependent on the familiarity and strength of the available sources of information. The approach was described in detail by Scanlon et al. (2017) and Anderson (2019). For the older students, the approach was described in detail by Gelzheiser, Scanlon, Hallgren-Flynn, and Connors (2019).

Although we have described the process of word solving in a bit of a lockstep manner, it is important to note that when engaged in problem solving—be it word solving, skiing, or driving—successful learners quite naturally use all that they know and shift strategies as needed, especially when they understand the end goal. These students do not problem solve in a lockstep manner, but rather use strategies and skills in interactive and confirmatory ways. Indeed, several theorists have described such flexible approaches to problem solving in general (e.g., Siegler, 2006) and in literacy learning specifically (e.g., Clay, 2001; McGee, Kim, Nelson, & Fried, 2015).

In what follows, we briefly describe each of the ISA-based studies in chronological order, providing the goal, the design, key findings, and the questions derived from each set of findings.

## Studies Involving the Interactive Strategies Approach

### *Vellutino and Colleagues (1996)*

This study was motivated partly by Clay’s prompt and largely by the goal of understanding what might differentiate students who responded well to early and intensive reading/literacy intervention from those who did not. This longitudinal study involved screening approximately 1,400 students in middle- to upper middle-class schools. Students were assessed in the fall of kindergarten on a variety of measures of early literacy skills, other cognitive skills, and attention. Classroom instruction was periodically observed to evaluate relations between characteristics of classroom instruction and progress in the development of literacy skills during the kindergarten year (see Scanlon & Vellutino, 1996). The approximately 1,300 students who remained available in first grade were assessed again in November, and their classroom teachers were asked to identify students’ reading progress using a 5-point scale. Those receiving the lowest rating (1) were assessed on measures of early literacy skills (e.g., word-reading accuracy, decoding). Those scoring below the 15th percentile on either the Word Identification or Word Attack subtests of the Woodcock Reading Mastery Tests–Revised (Woodcock, 1987) were selected as target students ( $n = 118$ ) and were randomly assigned, within schools, to either the tutoring condition ( $n = 76$ ) or to a business-as-usual condition. An average

reader group (those rated as 3 or 4) was selected from the same classrooms as target group members.

Intervention began in January and continued for 15 weeks. It was provided in a one-to-one context five days a week for 30 minutes per session. Interventionists, project staff who were certified teachers, were prepared through a 30-hour workshop prior to the beginning of intervention and thereafter participated in biweekly group discussions concerning the intervention process and how to respond to students' individual needs. The quality and responsiveness of instruction was reviewed biweekly via a random sampling of recordings of teachers' sessions followed by collaborative feedback. At the end of the 15-week period, students who had made limited progress were offered an additional 10 weeks of intervention in the fall of second grade. Because students in the poor reader comparison group experienced many different instructional approaches, we focused analyses on the students who responded differentially to the intensive intervention, as that was the main reason for conducting the study.

We also analyzed the performance of students in the average reader comparison group. For both the tutored group and the average reader group, we assessed growth rate on the Basic Skills Cluster of the Woodcock Reading Mastery Tests–Revised (Woodcock, 1987) from the fall of kindergarten to the fall of second grade (before and after first-grade tutoring for those in the intervention group). We used linear regression to create a regression line for each reader, with time of test as the independent variable and the Basic Skills Cluster as the dependent variable. We divided the average readers into high- and average-IQ subgroups. We rank ordered the tutored group by growth rate, divided the entire group into four subgroups by rank, and labeled the groups as very limited growth, limited growth, good growth, and very good growth. Thereafter, we followed students' growth in basic literacy skills through the end of fourth grade (Vellutino et al., 2000). Figures 2 and 3 display the growth patterns for the Word Identification and Word Attack subtests, respectively, of the Basic Skills Cluster for each group.

Several important insights were gleaned from the analysis. First, it is evident that the growth patterns for the high- and average-IQ average readers were, essentially, identical. It is also evident that all four tutored groups showed limited growth from kindergarten entry until the middle of first grade when the intervention began. During the intervention semester, differential growth was evident among the intervention groups, as would be expected based on the process used for group formation. However, all intervention groups showed greater gains than the average reader groups during this period. Further, it is evident that all four tutored groups maintained their relative status through the end of fourth grade. Across the four groups, there were clear differences on measures of phonologically based skills but not on other measures of

language skills, and there was very little difference in IQ. The absence of IQ differences among the tutored groups was one of the seminal contributors to the notion that IQ–achievement discrepancy, which was the typical means of identifying students as learning disabled at the time, had no validity. Instead, limited response to intervention appeared to have greater validity.

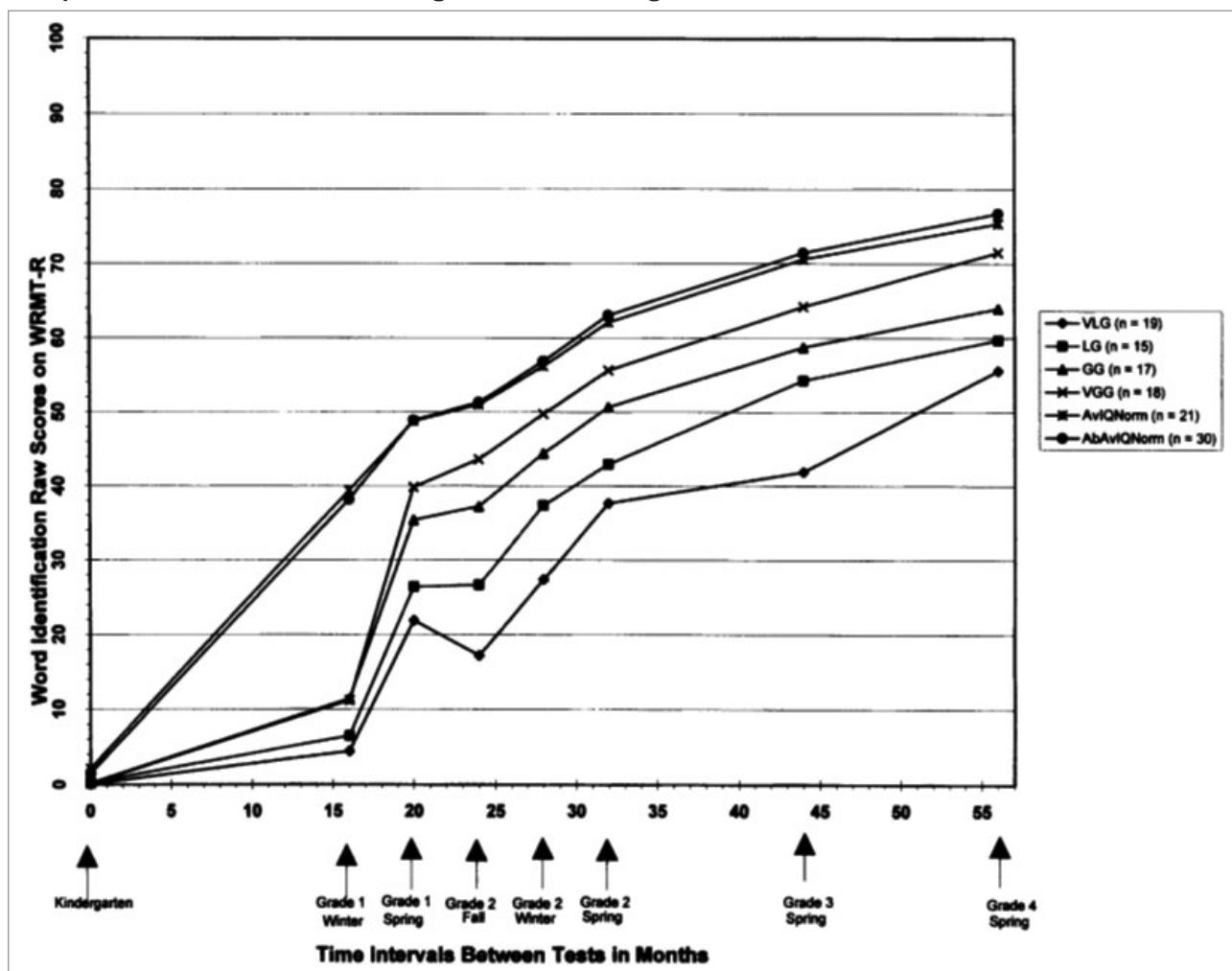
Although intensive one-to-one tutoring appeared to be quite effective in improving outcomes for readers who appeared to be at risk for long-term reading difficulties, we recognized that such an approach was not feasible on a broad scale. Therefore, our next research goal was to determine whether providing small-group intervention for at-risk kindergartners would reduce the number of students who qualified for intensive intervention in first grade. We also wished to evaluate the relative efficacy of an intervention approach for first graders that was more heavily phonics focused versus one that involved more supported reading of text.

### **Scanlon and Colleagues (2005)**

Students for this study were drawn from five lower middle- to middle-class school districts. At the beginning of kindergarten, all students with parental permission ( $n = 1,373$ ) were screened on measures of letter name knowledge and phonological awareness (rhyme and alliteration). Students scoring at or below the 30th percentile in letter name knowledge were identified as being at risk ( $n = 462$ ). For each participating classroom, the at-risk students were randomly assigned to either the treatment condition or the comparison group. Intervention lessons were provided in small groups of three and occurred twice a week from October to early June. All students in a group came from the same classroom, which allowed the interventionist to support the students in their classroom program.<sup>1</sup> The comparison group received whatever services their school offered, which often included early literacy support beyond the classroom and, in some cases, was more than what was offered through the study.

In early first grade, students who had been identified as being at risk at the beginning of kindergarten were assessed again using a variety of measures of early literacy skills. The scores on the assessments (some of which were not standardized) were converted to  $z$  scores based on the performance of all of the students identified as being at risk at the beginning of kindergarten. The  $z$  scores were summed to form a composite, and the composite scores for students in the kindergarten intervention group were split at the midpoint. Those falling below the midpoint were considered to be at continued risk. The same cut score was applied to the students in the kindergarten comparison group. Based on these procedures, 50% of the students in the intervention group qualified as being at continued risk, whereas nearly 60% of the students in the comparison group did so. Those

**FIGURE 2**  
**Growth Curves on the Word Identification Subtest of the Woodcock Reading Mastery Tests—Revised<sup>a</sup> for Tutored Groups and Normal Readers With Average and Above-Average IQs**



Note. GG = good growth; LG = limited growth; VGG = very good growth; VLG = very limited growth. From “Differentiating Between Difficult-to-Remediate and Readily Remediated Poor Readers: More Evidence Against the IQ–Achievement Discrepancy Definition of Reading Disability,” by F.R. Vellutino, D.M. Scanlon, and G.R. Lyon, 2000, *Journal of Learning Disabilities*, 33(3), p. 229. Copyright 2000 by Sage. Reprinted with permission.  
<sup>a</sup>Woodcock (1987).

at continued risk from both kindergarten groups were randomly assigned in first grade to one of two one-to-one intervention conditions (text emphasis or phonological skills emphasis) or a comparison (no study-based intervention) condition. At the beginning of first grade, all six groups had similar performance levels on the Basic Skills Cluster of the Woodcock Reading Mastery Tests—Revised, as all mean standard scores were between 65 and 68.

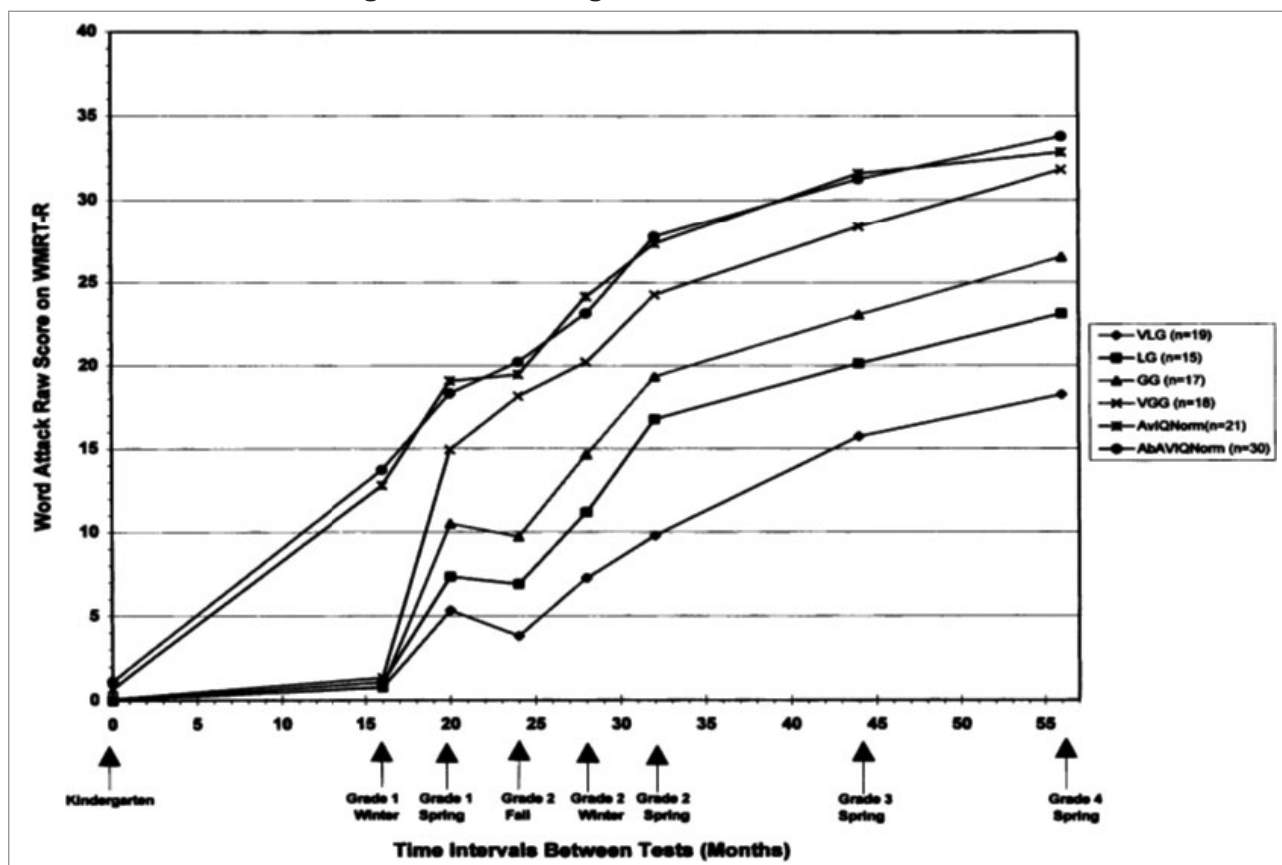
The two first-grade intervention conditions varied in terms of the amount of time that was devoted to engagement in reading connected text and engagement in the development of phonological skills. In the text emphasis condition, the greatest amount of intervention time was devoted to reading books and to the development of code- and meaning-based strategic word-solving skills, whereas in the phonological skills emphasis condition,

the greatest amount of time was devoted to the development of phonological skills. Students in the phonological skills emphasis condition were also taught and coached in the use of the word identification strategies, but by design, less time was devoted to this aspect of instruction. (See Table 1 for time allocations.)

As described earlier, each session consisted of overlapping lesson components designed to support phonological skill development and application/transfer to reading and writing. Letter-level instruction focused on skills that could be applied in the new book(s) to be read during the lesson. Students were explicitly taught/coached in the application of one or more of the word-solving strategies that they were prepared to apply (given their knowledge of the alphabetic code and reading skills more generally). Although not an explicit focus of the intervention, teachers



**FIGURE 3**  
**Growth Curves on the Word Attack Subtest of the Woodcock Reading Mastery Tests—Revised<sup>a</sup> for Tutored Groups and Normal Readers With Average and Above-Average IQs**



Note. GG = good growth; LG = limited growth; VGG = very good growth; VLG = very limited growth. From “Differentiating Between Difficult-to-Remediate and Readily Remediated Poor Readers: More Evidence Against the IQ–Achievement Discrepancy Definition of Reading Disability,” by F.R. Vellutino, D.M. Scanlon, and G.R. Lyon, 2000, *Journal of Learning Disabilities*, 33(3), p. 230. Copyright 2000 by Sage. Reprinted with permission.  
<sup>a</sup>Woodcock (1987).

**TABLE 1**  
**Time Allocation Differences Between the First-Grade Treatment Conditions**

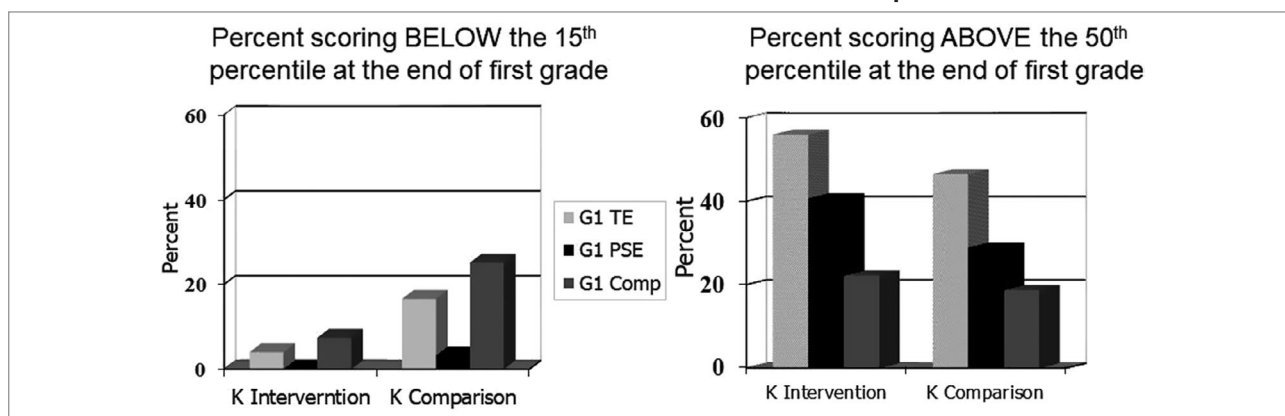
Components of the lesson	Text emphasis condition	Phonological skills emphasis condition
Reading and rereading	15 minutes	5 minutes
Phonological skills	5 minutes	15 minutes
High-frequency words	5 minutes	5 minutes
Writing	5 minutes	5 minutes

were also encouraged to be mindful of developing vocabulary and oral language skills throughout.

End-of-first-grade results on the Basic Skills Cluster for the six groups are depicted in Figure 4. Due to space constraints, we depict only the percentage of students scoring below the 15th percentile (a level in the severely impaired range) and the percentage scoring at or above

the 50th percentile (average or better performance). As is evident, the phonological skills emphasis condition produced a far smaller percentage of students scoring below the 15th percentile than the other conditions, both for students in the kindergarten intervention condition and for those in the comparison group. In fact, for students in the kindergarten intervention condition and the phonological skills emphasis condition in first grade, none scored below the 15th percentile. Students who had school-based intervention in first grade were substantially more likely to score below the 15th percentile, but the effect of the kindergarten intervention program was evident. This pattern suggests that a combination of kindergarten intervention and first-grade phonological skills emphasis intervention is very effective in reducing the number of students scoring in the severely impaired range at the end of first grade. With regard to students scoring at the 50th percentile and above, it is evident that this was most likely to occur for students who participated in kindergarten intervention coupled with the text emphasis intervention in first grade. The text emphasis intervention yielded more students

**FIGURE 4**  
**End-of-First-Grade Performance Levels for Students in Various Treatment Groups**



Note. Comp = comparison group; K = kindergarten; PSE = phonological skills emphasis condition; TE = text emphasis condition. The students who had intervention in kindergarten and still qualified for intervention in first grade might be considered harder to remediate. Nevertheless, as a group, they performed better than the kindergarten comparison groups at the end of first grade.

above the 50th percentile for students who were in the kindergarten comparison group as well.

With regard to effect sizes, although they were not reported in the original published study, based on the data provided in Table 4 of Scanlon et al. (2005), we calculated the effect size for comparisons within the kindergarten intervention groups between the grade 1 text emphasis condition and the grade 1 comparison group on the Basic Skills Cluster as  $d = 0.58$  and between the phonological skills emphasis condition and the grade 1 comparison group as  $d = 0.64$ . Effect sizes computed for comparisons between the group that received no study-provided intervention in kindergarten or first grade and the groups that participated in intervention in both kindergarten and first grade yielded  $d = 0.70$  in the comparison with the grade 1 text emphasis condition and  $d = 0.76$  in the comparison with the grade 1 phonological skills emphasis condition.

Although the effect sizes for the groups that received intervention in both kindergarten and first grade in comparison with the group that received no intervention may seem relatively small, it is important to note that approximately 15–20% of the students in the groups that did not receive intervention in kindergarten, in all likelihood, would not have qualified as poor readers in first grade had they received kindergarten intervention. Conclusions that might be drawn from this set of results are that the effects of kindergarten intervention, which in this case was fairly inexpensive (a total of 25–30 hours), is effective in both reducing the number of students who qualify for intervention in first grade and increasing the success of first-grade intervention for those who qualify. With regard to the impact of the two types of intervention instituted in first grade, it appears that the phonological skills emphasis condition was more effective at reducing the number of students who scored in the severely impaired range but less effective in moving students into the

average range or above. Therefore, it might be argued that once students have some basic phonics skills, the balance of instructional focus needs to change, such that they are engaged in a lot of reading.

As a follow-up to these findings, we were interested in whether it would be possible to help kindergarten classroom teachers learn to implement the elements of the kindergarten intervention in their classrooms so they would become instrumental in reducing the number of students who qualified for intervention in first grade. This question led to our next study.

### **Scanlon, Gelzheiser, Vellutino, Schatschneider, and Sweeney (2008)**

The goal of this study was to compare the effectiveness of three different approaches to reducing the incidence of early literacy learning difficulties using the ISA as a point of departure. The conditions consisted of professional development (PD) for kindergarten classroom teachers only (PDO), small-group intervention for at-risk learners only (IO), and a combination of PD for classroom teachers and small-group intervention for students (PD+I). This was a three-year study that involved baseline, implementation, and maintenance years; participating teachers ( $n = 28$ ) from 15 schools taught three cohorts of kindergartners (15–18 students per class). Each year, we used a detailed classroom observation tool (Classroom Language Arts Systematic Sampling and Instructional Coding; Scanlon, Gelzheiser, Fanuele, Sweeney, & Newcomer, 2003) to document aspects of instruction. The literacy skills of students in participating classrooms were also assessed using the kindergarten version of the Phonological Awareness and Literacy Screening battery (Invernizzi, Meir, Swank, & Juel, 1999) at the beginning and end of the school year.

During the baseline year, we conducted classroom observations and assessed participating students. During the second year (implementation), teachers in the PDO and PD+I conditions engaged in PD during the summer before they taught the implementation cohort; in-class coaching occurred at least five times across the ensuing school year. A school-based early literacy leader (usually a reading teacher already on staff) participated in all PD sessions and taught at least one intervention group to prepare for a leadership role in the maintenance year. As in the 2005 study, kindergarten intervention was provided twice a week for 30 minutes by certified teachers hired by the project. Their PD was similar to that of the classroom teachers and included individual coaching and group meetings focused on intervention efforts. The maintenance year goals were to determine whether the PD provided for classroom teachers impacted their instruction after the project coaches left and to determine whether that PD would have the same advantages for students as direct interventions by project staff. Early literacy leaders continued to support classroom teachers during this year.

Based on the outcomes of the 2005 study, we emphasized the need to develop decoding skills until the students had a reasonable sense of the alphabetic nature of written language (although not a full command of all of the intricacies), and then involve them in as much reading of connected text as possible. Classroom teachers in the PD and PD+I conditions, in general, spent a portion of their day working with small groups in their classrooms. Children in the IO condition received intervention services as in the implementation year.

The main contrasts considered in this study were between the baseline and maintenance cohorts because, during the implementation year, coaches and coaching may have played a large role in outcomes. With regard to student outcomes, one index used by the Phonological Awareness and Literacy Screening–Kindergarten battery is the number of students considered to be at risk for reading difficulties. In general, from pretest to posttest, within a condition, there were much larger reductions in the number of students qualifying as at risk in the maintenance year than in the baseline year, and there was very little difference between the implementation and maintenance years. In other words, teachers were more successful (in some cases, much more successful) in reducing the number of students who qualified as at risk in the implementation and maintenance cohorts. For example, for the PDO condition, across all three cohorts, approximately 50% of the students scored in the at-risk range at kindergarten entry, whereas at the end of kindergarten, approximately 35%, 19%, and 17% of the students scored in this range in the baseline, implementation, and maintenance cohorts, respectively. Thus, the PD appears to have had a lasting effect.

Comparisons between baseline and maintenance years revealed several statistically significant changes in instruction for the teachers in the PD conditions. Teachers spent more time on active language arts instruction ( $d = 0.75$ ), teaching small ability-based groups ( $d = 0.96$ ), phonemic analysis ( $d = 0.83$ ), teaching about letters and their sounds ( $d = 0.83$ ), engaging students in reading ( $d = 0.59$ ), and listening to read-alouds ( $d = 1.00$ ).

When taken together, the changes in teacher engagement and activities and the improved student outcomes suggest that the year of PD (based on the ISA) had lasting and beneficial effects on student outcomes in the following year. However, the ISA consists of a number of elements, the two most prominent being the attention given to development of phonological skills and the attention to strategic word solving, and the PD addressed all elements. Although it is possible that the two work together in a synergistic way, it seemed worthwhile to attempt to unpack this complex instructional approach. This was taken up in the next study.

### **Anderson (2009)**

Anderson's (2009) study differed from the aforementioned studies in multiple ways. As a dissertation study, it was smaller in scope and shorter in duration. More important to our concerns here, however, it was the one study that did not investigate the overall impact of all aspects of the ISA on student outcomes. Rather, this study investigated the differential effects of two PD conditions—alphabetic knowledge and strategic word learning—on teacher knowledge, teacher practices, and student learning. In the interest of space, we focus on only student learning here. As described for the above studies, the ISA has always included both explicit teaching about the alphabetic code and explicit instruction in the interactive and confirmatory use of code- and meaning-based strategies for word solving. As a step toward better understanding their relative contributions to student success, Anderson sought to compare the impact of PD that emphasized either alphabetic decoding or the conjoint use of alphabetic decoding and contextual cues for word solving.

From 11 schools, participants were 23 reading intervention teachers and 52 of their first-grade students who were receiving supplementary reading instruction. The schools were drawn from districts with low to average ratios of need to resources. Student measures included both general reading and condition-sensitive assessments, as listed in Figure 5. All measures were administered to all students in both January and June with the exception of the Multi-level Passage Assessment (Scanlon, n.d.-a), which was thought to be too difficult for struggling readers at the midpoint of first grade.

Teachers were randomly assigned to the alphabetic knowledge and strategic word-learning conditions by

**FIGURE 5**  
**Measures Used in Anderson's (2009) Study**

General reading measures	Alphabetic knowledge	Strategic word identification
Fountas & Pinnell Benchmark Assessment <sup>a</sup>	Primary Decoding Test <sup>b</sup>	Strategic Reading Inventory-Primary <sup>c</sup>
Multi-Level Passage Assessment <sup>d</sup> : Word List and Text Reading	Primary Spelling Test <sup>e</sup>	
	Phonics Inventory <sup>f</sup>	

<sup>a</sup>Fountas and Pinnell (2007). <sup>b</sup>Gunning (2008). <sup>c</sup>Anderson, Gelzheiser, and Scanlon (2007). <sup>d</sup>Scanlon (n.d.-a). <sup>e</sup>Bear, Invernizzi, Templeton, and Johnston (2004). <sup>f</sup>Scanlon (n.d.-b).

school and participated in separate one-day workshops. Workshops followed a similar structure and used many of the same PD resources used by Scanlon et al. (2008). Following the workshop, extended engagement materials that encouraged revisiting of the workshop content were provided to the teachers at approximately one-month intervals. Materials included new videos to view, assessments and suggestions for documenting progress, and instructional activities designed to promote proficiency within the two areas. Teachers were not expected to limit their instruction to the approach emphasized in their PD condition but were encouraged to integrate their new learning into their lesson routines.

Comparison of means on the student measures conducted at pretest revealed no group differences on either the condition-sensitive measures or on the Fountas & Pinnell Benchmark Assessment. Further analysis using two different regression models demonstrated that both the phonics assessments and the strategy measure accounted for substantial and similar portions of unique variance on the benchmark assessment pretest, suggesting that phonics skills and strategy knowledge both account for variability in reading connected text, at least for beginning readers.

At posttest, results for the condition-sensitive measures indicated that students' outcomes changed in accord with their teachers' PD condition. That is, students of teachers in the alphabetic knowledge condition made greater progress on the decoding and encoding measures, whereas students of teachers in the strategic word-learning condition made better progress on the strategy measure. Matched-pairs *t*-tests revealed that students of strategic word-learning teachers outperformed students of alphabetic knowledge teachers on two of the three general reading measures (the Word List and Text Reading measures of the Multi-Level Passage Assessment). When students in the two treatment conditions were matched on a composite of phonics scores at pretest, it was evident that those whose

teachers were in the strategic word-learning condition outperformed students in the alphabetic knowledge condition at posttest on the Word List ( $d = 0.36$ ) and Text Reading ( $d = 0.54$ ) measures at posttest. There were no differences in outcomes on the benchmark assessment. These results lend support to the hypothesis that an approach to word solving that encourages both code- and meaning-based strategies promotes greater accuracy in word identification and word learning and, ultimately, improvements in reading connected text. Although the expected outcome of improved reading on the benchmark assessment was not borne out (for discussion, see Anderson, 2009), there were no indications that an instructional approach emphasizing the use of both code- and meaning-based strategies was in any way counterproductive.

### **Gelzheiser, Scanlon, Vellutino, Hallgren-Flynn, and Schatschneider (2011)**

Having extensively explored the effects of the ISA among primary-level students, our next question became whether older students who struggle could be assisted by some of the same approaches used with younger students. Based on previous research and clinical work with older struggling readers, we knew that many students continued to experience difficulties with oral reading accuracy and fluency, leading to difficulty with reading comprehension, whereas other struggling readers were accurate and fluent but had limited comprehension.

In this study, we set out to explore whether it would be possible to accelerate the word-reading accuracy, fluency, and comprehension of fourth graders who had a long history of reading struggles. We recruited fourth-grade struggling readers from schools serving middle- to low-income communities. This is a group that misses many learning opportunities because they cannot comprehend the texts that they are expected to read. We recognized that these students needed to build the knowledge base on which reading comprehension depends, so we made heavy use of thematically related texts that were related to their grade-level social studies curricula. In addition to reading thematically related books, instruction in the Interactive Strategies Approach-Extended involved targeted phonics instruction and instruction in and practice with high-frequency words; both areas of instruction were based on individual student need.

Students received one-to-one intervention for a period of one semester provided by certified teachers hired through grant funds. Forty-eight students participated, approximately half in the fall semester and half in the spring semester. Intervention involved 50–65 daily sessions (40 minutes each) across one semester. Students in the spring intervention group served as a waitlist

comparison group and received the instructional support that they normally received in school in the fall. Intervention students were provided with targeted phonics instruction based on assessments done at the beginning of the intervention period. Because the intervention was one-to-one, teachers were able to be very responsive to individual needs and to carefully guide students' word-solving efforts in context using the same set of code- and meaning-based strategies taught in the previous studies. Needed phonics instruction was provided in much the same way as for the younger students. Pre-post comparisons, collapsing across the intervention semesters, revealed statistically significant improvement on measures of reading accuracy ( $d = 1.68$ ) and reading comprehension ( $d = 1.28$ ) on the fourth edition of the Qualitative Reading Inventory (QRI-4, Leslie & Caldwell, 2006) and less of an improvement on the Basic Reading Skills Cluster ( $d = 0.37$ ) of the Woodcock-Johnson III (Woodcock, McGrew, & Mather, 2001). There were no statistically significant pre-post differences on the Basic Reading Skills Cluster in the nonintervention semesters ( $d = 0.07$ ) and no effects on reading fluency in either intervention or nonintervention semesters. Notably, standard score gains observed for the fall intervention group did not diminish during the spring (nonintervention) semester.

This study demonstrated that substantial improvements in students' reading accuracy and comprehension are possible for older struggling readers when instruction is responsive to individual student needs and, we believe, when students develop effective word-solving skills that enable them to build their sight vocabularies through reading. However, as one-to-one intervention is resource intensive and hard to sustain on a broad scale, we sought to determine whether a similarly focused small-group intervention would also be effective.

### **Gelzheiser, Scanlon, Vellutino, Deane, and Wang (2020)**

The final study in the series is a small-group version of Gelzheiser et al.'s (2011) study that involved both third and fourth graders who demonstrated reading difficulties. For current purposes, we focus on students whose primary area of difficulty was reading accuracy (which generally contributed to comprehension difficulties, of course). A total of 122 students in schools serving moderate-to high-needs populations qualified for the study based on reading accuracy criteria. As in the 2011 study, half of the students received intervention in the fall semester. The waitlist comparison group participated in intervention in the spring. All participants were receiving remedial reading or had Individualized Education Plans with reading goals. During the intervention semester, the Interactive Strategies Approach-Extended intervention

replaced the students' remedial reading instruction. Students in intervention participated in approximately 50 intervention sessions of approximately 40 minutes each.

Teachers in this study were school district employees who were bought out of their normal teaching responsibilities by grant funds. Teachers were prepared to deliver the intervention through an eight-day workshop at the beginning of the school year and thereafter met as a group with the study designers on a biweekly basis. They also received in-school coaching on a variable schedule depending on need, most commonly biweekly.

As for the 2011 study, most texts read were organized into thematic units, with text levels gradually increasing across each unit. Both science and social studies themes were developed for this project. Instruction related to decoding skills was similar to that employed in the 2011 study. Students' decoding skills were assessed individually using an inventory developed for the project. In general, students had limited skill in negotiating the more complex aspects of the alphabetic code, including vowel patterns and some consonant digraphs. Students also had limited morphological awareness and difficulty in identifying unfamiliar multisyllabic words. Instruction to address these difficulties occurred both in the context of isolated word work and in the context of reading connected text with instruction and guidance in the application of word-solving strategies. When students within a group had similar instructional needs, instruction related to decoding skills and word solving in context were generally provided in a group format. Otherwise, as needed, teachers provided individualized instruction during group time while other members in the group engaged in silent or buddy reading or other practice activities.

Compared with the waitlist group, statistically significant but modest treatment effects were obtained for students in the fall intervention group. They made statistically significantly greater gains on the QRI-5 (Leslie & Caldwell, 2010) measure of reading comprehension ( $d = 0.43$ ) and on the Basic Reading Skills Cluster ( $d = 0.41$ ). Accuracy gains on the QRI-5 approached significance ( $d = 0.26$ ). Very little effect was observed on measures of oral reading fluency.

Gains in this study were more limited than in the 2011 study. We hypothesize that this is likely due to the small-group context employed that, of necessity, limited the amount of individually targeted instruction that students received. Also, the limited number of intervention sessions likely contributed to the limited gains. As one-to-one intervention is generally not feasible in schools on a broad scale, logical next steps in this line of research would be to implement the intervention for a full academic year and to compare the efficacy of small-group intervention with one-to-one intervention in the same study delivered by the same teachers.

## Summary and Conclusions

Our motivation for writing this article was largely due to a current and growing movement to adopt a code-only approach to helping readers learn to read words (Hanford, 2019; Schwartz & Sparks, 2019). At odds with this position is a finding provided by Hammill and Swanson (2006), who reported, in an analysis of the National Reading Panel's (National Institute of Child Health and Human Development, 2000) findings on phonics instruction, that a large amount of the variance in reading outcomes was not accounted for by phonics instruction and that other factors need to be considered. We hypothesize that one reason for this lack of explanatory power is that phonics instruction often does not include (much) attention to application of decoding skills in the context of word solving while reading authentic texts.

In contrast to a code-only approach, the approach to word learning that we have developed, refined, and studied across a 25-year research program involves both explicitly and directly teaching alphabetically and orthographically based decoding skills and teaching students to strategically use contextual information to direct and check their decoding attempts. This aligns well with the findings of Swanson's (2001) meta-analysis, indicating that such a combination is generally more effective for students identified as learning disabled across a range of learning targets than either explicit instruction or strategy instruction alone. The approach we have taken also aligns with theories of how word learning proceeds as articulated by Ehri (2005, 2014), Perfetti (1985), Share (1995, 2008), Vellutino and Scanlon (2002), and Venezky (1999) and the understanding that students learn to read by reading (Castles et al., 2018; Stanovich, 1986).

The research on the ISA has been widely recognized for its contribution to reading science. Across the studies summarized, we have illustrated that students who were at risk for and those who were experiencing literacy-learning difficulties, on average, made substantial gains in word identification, oral reading accuracy, and at least in the case of middle elementary students, greater gains in reading comprehension relative to students in comparison groups. Comprehension, of course, involves a great deal more than facility with word identification. However, the absence of such automaticity clearly impairs the ability to comprehend texts, as cognitive resources must be devoted to word solving rather than meaning construction.

Our purpose in this discussion is not to question the importance of proficiency with the alphabetic code for learning to read words, nor is it to suggest that a reliance on context can compensate for a lack of such proficiency over the long term. We are also not suggesting that a strategic approach to word identification is the end goal for reading words. As Seidenberg and Borkenhagen (2020) noted, conscious, strategy-based word solving is slower

and requires greater effort than automatic word recognition. "Skilled word reading is like a reflex.... The goal is to find ways for children to gain this skill" (pp. 9–10). Indeed, we agree that it is vital for readers to develop automaticity in word identification. The key issue is how students develop the vast sight vocabulary that is characteristic of proficient readers.

The thrust of our argument is that the use of context can be a valuable assist for word solving both when a student's knowledge of the code is still developing and when inconsistencies in English orthography result in only an approximate pronunciation of a word. In either situation, successful word solving that includes a careful interrogation of the letters in the word supports the orthographic mapping required for skilled word learning. Additionally, the word-solving process itself becomes generative as it helps to familiarize the student with new letter-sound correspondences and orthographic patterns that can then be applied in decoding even more new words, thus expanding the power of the self-teaching mechanism (Share, 1995).

We recognize that the six studies summarized represent a small percentage of the thousands of studies that have contributed to the science of reading. It was not our purpose to review this vast literature. Rather, we chose to share a body of research that has spoken directly to a very specific and concerning tension with regard to literacy instruction. Literacy researchers and practitioners are united by the goal of improving literacy learning for individuals who struggle. In pursuit of this goal, we argue that it is important to consider the broad scientific literature and the theoretical foundations that speak to this goal.

We end with the hope that future research will more fully investigate the impact of instructional approaches that limit word-solving instruction to application of the alphabetic code versus instruction that promotes the conjoint use of code- and meaning-based approaches to word solving. To that end, we encourage others to pursue replication and/or extensions of our work and can gladly provide access to the PD resources that have been developed across the course of our studies.<sup>2</sup>

## NOTES

This work was supported by three grants (P50HD25806, 1R01HD42350, and 1R01HO34598) from the National Institute of Child Health and Human Development, National Institutes of Health, U.S. Department of Health and Human Services; and two grants (R324A07223 and R324A110053) from the Institute of Education Sciences, U.S. Department of Education.

<sup>1</sup>Supporting the classroom program involved such things as using the same keywords to teach letter-sound correspondence and prioritizing the teaching of the high-frequency words that students were expected to know at the end of kindergarten.

<sup>2</sup>In the years following the completion of the 2008 study, we developed, with our colleagues Virginia Goatley and Lynn Gelzheiser and a group of teacher educators from across New York State, online resources that

illustrate the ISA. This work was supported by grants from the Institute of Education Sciences and the Fund for the Improvement of Post-secondary Education, both of which fund research through the auspices of the U.S. Department of Education. These resources have been used extensively in our literacy specialist programs for several years. As of 2020, we are making the resources available for use by teacher educators beyond our university (see the Early Literacy Teacher Education Project website: <https://www.eltep.org/>).

## REFERENCES

- Adams, M.J. (1998). The three-cueing system. In J. Osborn & F. Lehr (Eds.), *Literacy for all: Issues in teaching and learning* (pp. 73–99). New York, NY: Guilford.
- Anderson, K.L. (2009). *The effects of professional development on early reading skills: A comparison of two approaches* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (ATT 3365837)
- Anderson, K.L. (2019). Explicit instruction for word solving: Scaffolding developing readers' use of code-based and meaning-based strategies. *Preventing School Failure: Alternative Education for Children and Youth*, 63(2), 175–183. <https://doi.org/10.1080/1045988X.2018.1542585>
- Anderson, K.L., Gelzheiser, L., & Scanlon, D.M. (2007). Strategic Reading Inventory—primary. Unpublished instrument.
- Bear, D.R., Invernizzi, M., Templeton, S., & Johnston, F. (2004). *Words their way: Word study for phonics, vocabulary, and spelling instruction*. Upper Saddle River, NJ: Prentice Hall.
- Castles, A., Rastle, K., & Nation, K. (2018). Ending the reading wars: Reading acquisition from novice to expert. *Psychological Science in the Public Interest*, 19(1), 5–51. <https://doi.org/10.1177/1529100618772271>
- Clay, M.M. (1987). Learning to be learning disabled. *New Zealand Journal of Educational Studies*, 22(2), 155–173.
- Clay, M.M. (2001). *Change over time in children's literacy development*. Chicago, IL: Heinemann.
- Ehri, L.C. (2005). Learning to read words: Theory, findings, and issues. *Scientific Studies of Reading*, 9(2), 167–188. [https://doi.org/10.1207/s1532799xssr0902\\_4](https://doi.org/10.1207/s1532799xssr0902_4)
- Ehri, L.C. (2014). Orthographic mapping in the acquisition of sight word reading, spelling memory, and vocabulary learning. *Scientific Studies of Reading*, 18(1), 5–21. <https://doi.org/10.1080/10888438.2013.819356>
- Foorman, B., Beyler, N., Borradaile, K., Coyne, M., Denton, C.A., Dimino, J., ... Wissel, S. (2016). *Foundational skills to support reading for understanding in kindergarten through 3rd grade* (NCEE 2016-4008). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.
- Fountas, I.C., & Pinnell, G.S. (2007). *Fountas & Pinnell Benchmark Assessment System-1: Grades K-2, levels A-N*. Portsmouth, NH: Heinemann.
- Gelzheiser, L.M., Hallgren-Flynn, L., Connors, M., & Scanlon, D.M. (2014). Reading thematically related texts to develop knowledge and comprehension. *The Reading Teacher*, 68(1), 53–63. <https://doi.org/10.1002/trtr.1271>
- Gelzheiser, L.M., Scanlon, D.M., Hallgren-Flynn, L., & Connors, M. (2019). *Comprehensive reading intervention in grades 3–8: Fostering word learning, comprehension, and motivation*. New York, NY: Guilford.
- Gelzheiser, L.M., Scanlon, D.M., Vellutino, F.R., Deane, G., & Wang, S. (2020). *Effects of the Interactive Strategies Approach—extended on the reading achievement of intermediate-grade struggling readers with limited reading accuracy*. Manuscript in preparation.
- Gelzheiser, L.M., Scanlon, D.M., Vellutino, F.R., Hallgren-Flynn, L., & Schatschneider, C. (2011). Effects of the Interactive Strategies Approach—extended: A responsive and comprehensive intervention for intermediate grade struggling readers. *The Elementary School Journal*, 112(2), 280–306. <https://doi.org/10.1086/661525>
- Goodman, K.S. (1967). Reading: A psycholinguistic guessing game. *Journal of the Reading Specialist*, 6(4), 126–135. <https://doi.org/10.1080/19388076709556976>
- Gunning, T. (2008). *Teacher's guide for word building* (2nd ed.). Honesdale, PA: Phoenix Learning Resources.
- Hammill, D.D., & Swanson, H.L. (2006). The National Reading Panel's analysis of phonics instruction: Another point of view. *The Elementary School Journal*, 107(1), 17–26. <https://doi.org/10.1086/509524>
- Hanford, E. (2019, August 22). *At a loss for words: How a flawed idea is teaching millions of kids to be poor readers* [Audio podcast]. Retrieved from <https://www.apmreports.org/story/2019/08/22/whats-wrong-how-schools-teach-reading>
- Invernizzi, M., Meier, J., Swank, L., & Juel, C. (1999). *PALS-K: Phonological Awareness Literacy Screening—kindergarten*. Charlottesville: University of Virginia.
- Kilpatrick, D. (2020). The study that prompted Tier 2 of RTI: Why aren't our Tier 2 results as good? *The Reading League Journal*, 1(1), 28–31.
- LaBerge, D., & Samuels, S.J. (1974). Toward a theory of automatic information processing in reading. *Cognitive Psychology*, 6(2), 293–323. [https://doi.org/10.1016/0010-0285\(74\)90015-2](https://doi.org/10.1016/0010-0285(74)90015-2)
- Landi, N., Perfetti, C.A., Bolger, D.J., Dunlap, S., & Foorman, B.R. (2006). The role of discourse context in developing word form representations: A paradoxical relation between reading and learning. *Journal of Experimental Child Psychology*, 94(2), 114–133. <https://doi.org/10.1016/j.jecp.2005.12.004>
- Leslie, L., & Caldwell, J. (2006). *Qualitative Reading Inventory-4*. Boston, MA: Pearson.
- Leslie, L., & Caldwell, J.S. (2010). *Qualitative Reading Inventory-5*. Boston, MA: Pearson.
- McGee, L.M., Kim, H., Nelson, K.S., & Fried, M.D. (2015). Change over time in first graders' strategic use of information at point of difficulty in reading. *Reading Research Quarterly*, 50(3), 263–291. <https://doi.org/10.1002/rrq.98>
- Mesmer, H.A., & Williams, T.O. (2015). Examining the role of syllable awareness in a model of concept of word: Findings from preschoolers. *Reading Research Quarterly*, 50(4), 483–497. <https://doi.org/10.1002/rrq.111>
- Nagy, W.E., & Anderson, R.C. (1984). How many words are there in printed school English? *Reading Research Quarterly*, 19(3), 304–330. <https://doi.org/10.2307/747823>
- National Early Literacy Panel. (2008). *Developing early literacy: Report of the National Early Literacy Panel*. Washington, DC: National Institute for Literacy.
- National Institute of Child Health and Human Development. (2000). *Report of the National Reading Panel. Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction* (NIH Publication No. 00-4769). Washington, DC: U.S. Government Printing Office.
- Pearson, P.D., & Gallagher, M. (1983). The instruction of reading comprehension. *Contemporary Educational Psychology*, 8(3), 317–344. [https://doi.org/10.1016/0361-476X\(83\)90019-X](https://doi.org/10.1016/0361-476X(83)90019-X)
- Perfetti, C.A. (1985). *Reading ability*. New York, NY: Oxford University Press.
- Piasta, S.B., Connor, C.M., Fishman, B.J., & Morrison, F.J. (2009). Teachers' knowledge of literacy concepts, classroom practices, and student reading growth. *Scientific Studies of Reading*, 13(3), 224–248. <https://doi.org/10.1080/10888430902851364>
- Savage, R., Georgiou, G., Parrila, R., & Maiorino, K. (2018). Preventative reading interventions teaching direct mapping of graphemes in texts

- and set-for-variability aid at-risk learners. *Scientific Studies of Reading*, 22(3), 225–247. <https://doi.org/10.1080/10888438.2018.1427753>
- Scanlon, D.M. (n.d.-a). Multi-Level Passage Assessment. Unpublished instrument.
- Scanlon, D.M. (n.d.-b). The Primary Decoding Test. Unpublished instrument.
- Scanlon, D.M., & Anderson, K.L. (2010). Using the Interactive Strategies Approach to prevent reading difficulties in an RTI context. In M.Y. Lipson & K.K. Wixson (Eds.), *Successful approaches to RTI: Collaborative practices for improving K–12 literacy* (pp. 20–65). Newark, DE: International Reading Association.
- Scanlon, D.M., Anderson, K.L., & Sweeney, J.M. (2017). *Early intervention for reading difficulties: The Interactive Strategies Approach* (2nd ed.). New York, NY: Guilford.
- Scanlon, D.M., Gelzheiser, L., Fanuele, D., Sweeney, J., & Newcomer, L. (2003). *Classroom Language Arts Systematic Sampling and Instructional Coding (CLASSIC)*. Unpublished manuscript, Child Research and Study Center, University at Albany, State University of New York.
- Scanlon, D.M., Gelzheiser, L.M., Vellutino, F.R., Schatschneider, C., & Sweeney, J.M. (2008). Reducing the incidence of early reading difficulties: Professional development for classroom teachers vs. direct interventions for children. *Learning and Individual Differences*, 18(3), 346–359. <https://doi.org/10.1016/j.lindif.2008.05.002>
- Scanlon, D.M., & Vellutino, F.R. (1996). Prerequisite skills, early instruction, and success in first-grade reading: Selected results from a longitudinal study. *Mental Retardation and Developmental Disabilities Research Reviews*, 2(1), 54–63. [https://doi.org/10.1002/\(SICI\)1098-2779\(1996\)2:1<54:AID-MRDD9>3.0.CO;2-X](https://doi.org/10.1002/(SICI)1098-2779(1996)2:1<54:AID-MRDD9>3.0.CO;2-X)
- Scanlon, D.M., Vellutino, F.R., Small, S.G., Fanuele, D.P., & Sweeney, J.M. (2005). Severe reading difficulties—can they be prevented? A comparison of prevention and intervention approaches. *Exceptionality*, 13(4), 209–227. [https://doi.org/10.1207/s15327035ex1304\\_3](https://doi.org/10.1207/s15327035ex1304_3)
- Schwartz, S., & Sparks, S.D. (2019, October 2). How do kids learn to read? What the science says. *Education Week*. Retrieved from <https://www.edweek.org/ew/issues/how-do-kids-learn-to-read.html>
- Seidenberg, M.S., & Borkenhagen, M.C. (2020). Reading science and educational practice: Some tenets for teachers. *The Reading League Journal*, 1(1), 7–11.
- Share, D.L. (1995). Phonological recoding and self-teaching: *Sine qua non* of reading acquisition. *Cognition*, 55(2), 151–218. [https://doi.org/10.1016/0010-0277\(94\)00645-2](https://doi.org/10.1016/0010-0277(94)00645-2)
- Share, D.L. (2008). Orthographic learning, phonological recoding, and the self-teaching hypothesis. *Advances in Child Development and Behavior*, 36, 31–82. [https://doi.org/10.1016/S0065-2407\(08\)00002-5](https://doi.org/10.1016/S0065-2407(08)00002-5)
- Siegler, R.S. (2006). Microgenetic analyses of learning. In D. Kuhn & R.S. Siegler (Eds.), *Handbook of child psychology: Vol. 2. Cognition, perception, and language* (6th ed., pp. 464–510). Hoboken, NJ: John Wiley & Sons.
- Stanovich, K.E. (1986). Mathew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly*, 21(4), 360–407. <https://doi.org/10.1598/RRQ.21.4.1>
- Swanson, H.L. (2001). Searching for the best model of instructing students with learning disabilities. *Focus on Exceptional Children*, 34(2), 1–15.
- Tunmer, W.E., & Chapman, J.W. (2012). Does set for variability mediate the influence of vocabulary knowledge on the development of word recognition skills? *Scientific Studies of Reading*, 16(2), 122–140. <https://doi.org/10.1080/10888438.2010.542527>
- Vellutino, F.R. (2010). “Learning to be learning disabled”: Marie Clay’s seminal contribution to the Response to Intervention approach to identifying specific reading disability. *The Journal of Reading Recovery*, 10(1), 5–23.
- Vellutino, F.R., & Scanlon, D.M. (2002). The Interactive Strategies Approach to reading intervention. *Contemporary Educational Psychology*, 27(4), 573–635. [https://doi.org/10.1016/S0361-476X\(02\)00002-4](https://doi.org/10.1016/S0361-476X(02)00002-4)
- Vellutino, F.R., Scanlon, D.M., & Lyon, G.R. (2000). Differentiating between difficult-to-remediate and readily remediated poor readers: More evidence against the IQ–achievement discrepancy definition of reading disability. *Journal of Learning Disabilities*, 33(3), 223–238. <https://doi.org/10.1177/002221940003300302>
- Vellutino, F.R., Scanlon, D.M., Sipay, E.R., Small, S.G., Pratt, A., Chen, R., & Denckla, M.B. (1996). Cognitive profiles of difficult-to-remediate and readily remediated poor readers: Early intervention as a vehicle for distinguishing between cognitive and experiential deficits as basic causes of specific reading disability. *Journal of Educational Psychology*, 88(4), 601–638. <https://doi.org/10.1037/0022-0663.88.4.601>
- Venezky, R.L. (1999). *The American way of spelling: The structure and origins of American English orthography*. New York, NY: Guilford.
- Wang, H.-C., Castles, A., Nickels, L., & Nation, K. (2011). Context effects on orthographic learning of regular and irregular words. *Journal of Experimental Child Psychology*, 109(1), 39–57. <https://doi.org/10.1016/j.jecp.2010.11.005>
- Woodcock, R.W. (1987). *Woodcock Reading Mastery Tests—revised*. Circle Pines, MN: American Guidance Services.
- Woodcock, R.W., McGrew, K.S., & Mather, N. (2001). *Woodcock-Johnson III*. Circle Pines, MN: American Guidance Services.

Submitted May 6, 2020

Final revision received June 1, 2020

Accepted June 2, 2020

**DONNA M. SCANLON** (corresponding author) is a professor in the Department of Literacy Teaching and Learning at the University at Albany, State University of New York, USA; email [dscanlon@albany.edu](mailto:dscanlon@albany.edu). Her research focuses on the causes and correlates of reading difficulties and on ways to intervene on behalf of students who experience difficulty.

**KIMBERLY L. ANDERSON** is an associate professor in the Department of Literacy Studies, English Education, and History Education at East Carolina University, Greenville, North Carolina, USA; email [andersonki14@ecu.edu](mailto:andersonki14@ecu.edu). Her research focuses on improving literacy instruction in primary-grade settings and on expanding opportunities for early literacy learning through community engagement.