Woodcock-Johnson® III
Assessment Service Bulletin Number 8

Educational Interventions Related to the
Woodcock-Johnson III Tests of Achievement

Barbara J. Wendling
Fredrick A. Schrank
Ara J. Schmitt

This bulletin relates the Woodcock-Johnson III Tests of Achievement (WJ III ACH)
to a number of evidence-based educational interventions. The Cattell-Horn-Carroll
(CHC) narrow abilities and a description of the cognitive processes required for
performance on each test provides the conceptual basis for the links between the
WJ III ACH and the suggested educational interventions.

Riverside Publishing
A HOUGHTON MIFFLIN COMPANY

Reference Citation

- To cite this document, use:

    Wendling, B. J., Schrank, F. A., & Schmitt, A. J. (2007). *Educational Interventions Related to the Woodcock-Johnson III Tests of Achievement* (Assessment Service Bulletin No. 8). Rolling Meadows, IL: Riverside Publishing.

For technical information, please call 800.323.9540 or visit our website at www.woodcock-johnson.com.

Educational Interventions Related to the *Woodcock-Johnson III Tests of Achievement*

The *Woodcock-Johnson III Tests of Achievement* (WJ III ACH) (Woodcock, McGrew, & Mather, 2001; 2007) includes 22 tests for measuring skills in reading, mathematics, and writing, as well as important oral language abilities and academic knowledge. Two parallel forms (Form A and Form B) contain all 22 tests. The *Woodcock-Johnson III Tests of Achievement*, *Form C/Brief Battery* (Brief Battery) (Woodcock, Schrank, McGrew, & Mather, 2007) includes a third form of nine of the most frequently used reading, mathematics, and writing tests.

The WJ III ACH and Brief Battery provide norm-referenced measures of academic abilities. Each of the tests measures one or more narrow, or specific, psychometrically defined abilities as informed by the independent research efforts of Horn (1965, 1988, 1989, 1991), Horn and Stankov (1982), Cattell (1941, 1943, 1950), Carroll (1987, 1990, 1993, 2003), and Woodcock (1998). This body of research has been interpreted conjointly as CHC theory (McGrew, 2005).

Each of the WJ III ACH tests also can be interpreted as measuring one or more dynamic cognitive processes (McGrew, Schrank, & Woodcock, 2007; Schrank, 2006). The cognitive processes required for performance on each of the tests can provide cues to interventions that may enhance performance on academic tasks that are similar to those measured by the tests. "An implication, borne out in research, is that student performance should improve when teachers structure instruction and academic work to cue effective processing" (Wong, Harris, Butler, & Graham, 2003, p. 392).

Information gleaned from performance on the WJ III ACH can be useful for developing instructional interventions, particularly when limited proficiency is identified in a narrow ability and/or associated with a specific cognitive process. To provide a link between WJ III ACH test performance and academic interventions, this bulletin includes an outline of the narrow abilities defined by CHC theory and brief descriptions of the cognitive processes required for performance in each of the tests; suggested educational interventions that are conceptually related to the narrow abilities and cognitive processes are included (see Table 1). The bulletin is organized according to key areas of reading, writing, math, and oral language instruction and includes a discussion of evidence-based interventions in each area. As examples, some interventions are described in this bulletin. References to research evidence for each suggested intervention are provided for further information.

Table 1.

WJ III ACH Tests, CHC Narrow Abilities (within primary curricular area), Cognitive Processes, and Related Educational Interventions

Test	Area/Narrow Abilities	Cognitive Process(es)	Related Educational Interventions
Test 1: Letter-Word Identification	Reading *Reading decoding*	Feature detection and analysis (for letters) and recognition of visual word forms and/or phonological access to pronunciations associated with visual word forms (i.e., words may or may not be familiar)	Explicit, systematic; synthetic phonics instruction; word-recognition strategies (word walls, flow lists, word banks, flash cards); repeated readings, teaching high-frequency words, spelling-based decoding strategies; Fernald method
Test 2: Reading Fluency	Reading *Reading speed* *Semantic processing speed*	Speeded (automatic) semantic decision making requiring reading ability and generic knowledge	Repeated reading; passage previewing; assisted reading; practicing words in isolation
Test 3: Story Recall	Oral Expression *Meaningful memory* *Listening ability*	Construction of propositional representations and recoding	Opportunities to hear and practice language; direct instruction in semantics, syntax, and pragmatics; role-playing; games; compensatory skills; use of strategies
Test 4: Understanding Directions	Listening Comprehension *Working memory* *Listening ability*	Construction of a mental structure in immediate awareness and modification of the mental structure via mapping	Opportunities to practice listening and following directions; echo activities; auditory skill tapes; modifying the listening environment
Test 5: Calculation	Mathematics *Math achievement*	Access to and application of knowledge of numbers and calculation procedures; verbal associations between numbers represented as strings of words	Use of manipulatives; sequential direct instruction; development of number sense; cover-copy-compare method; demonstration with verbalization; mnemonic strategies; peer-assisted tutoring; concrete-representational-abstract teaching techniques; computer-assisted instruction
Test 6: Math Fluency	Mathematics *Math achievement* *Numerical facility*	Speeded (automatic) access to and application of digit-symbol arithmetic procedures (verbal associations between numbers represented as strings of words)	Development of number sense; math facts charts; explicit timings; computer-assisted instruction
Test 7: Spelling	Spelling *Spelling ability*	Access to and application of knowledge of orthography of word forms by mapping whole-word phonology onto whole-word orthography, by translating phonological segments into graphemic units, or by activating spellings of words from the semantic lexicon	Use of multisensory techniques; explicit, systematic phonics instruction; direct instruction in spelling rules; providing frequent practice; teaching common irregular words; encouraging independent reading to increase exposure to words in print; Write-Say method; Add-A-Word spelling program; group contingencies
Test 8: Writing Fluency	Writing *Writing ability* *Writing speed*	Speeded (automatic) formation of constituent sentence structures requiring fluent access to semantic and syntactic knowledge	Explicit instruction in the mechanics of writing; word, phrase, and sentence fluency-building activities; frequent practice; use of technology
Test 9: Passage Comprehension	Reading *Reading comprehension* *Cloze ability*	Construction of propositional representations; integration of syntactic and semantic properties of printed words and sentences into a representation of the whole passage; inferential bridging	Vocabulary enrichment; activating prior knowledge; use of graphic organizers; self-monitoring strategies; memory and imagery strategies; *Multipass*
Test 10: Applied Problems	Mathematics *Quantitative reasoning* *Math achievement* *Math knowledge*	Construction of mental mathematics models via language comprehension, application of math knowledge, calculation skills, and/or quantitative reasoning; formation of insight	Use of pictures and diagrams; direct instruction; use of data-tables; strategy instruction
Test 11: Writing Samples	Writing *Writing ability*	Retrieval of word meanings via semantic access; application of psycholinguistic rules of case, grammar, and syntax; planning and construction of bridging inferences in immediate awareness (auditory and/or visual buffer)	Creating a literate, motivating, risk-free classroom environment; daily practice in writing; direct instruction in an expressive writing program; explicit instruction in the three key phases of the writing process; writing strategy instruction; use of dictation
Test 12: Story Recall–Delayed	Oral Expression *Meaningful memory*	Reconstructive memory after a time delay; content accuracy; preservation of discourse structure	Active learning; rehearsal; overlearning; mnemonics; elaboration; visual representation

Test	Area/Narrow Abilities	Cognitive Process(es)	Related Educational Interventions
Test 13: Word Attack	Reading *Reading decoding* *Phonetic coding*	Grapheme-to-phoneme translation and accessing pronunciations of visual word forms not contained in the mental lexicon	Explicit, systematic, synthetic phonics instruction
Test 14: Picture Vocabulary	Oral Expression *Language development* *Lexical knowledge*	Object recognition; lexical access and retrieval	Creating a language- and experience-rich environment; frequent exposure to and practice with words; reading aloud to a child; text talks; semantic feature analysis; semantic maps; increased time spent reading; reading for different purposes; intentional, explicit word instruction; direct instruction in morphology; development of word consciousness; use of computerized programs
Test 15: Oral Comprehension	Listening Comprehension *Listening ability*	Construction of propositional representations through syntactic and semantic integration of orally presented passages in real time; inferential bridging	Early exposure to language, particularly reading aloud to a child; direct instruction in vocabulary; directed vocabulary-building activities; outline of key points in lectures or oral instruction
Test 16: Editing	Writing Skills *English usage*	Access and application of lexical and syntactic information about details of word forms and writing conventions	Strategies for proofreading; explicit instruction in the proofreading phase of the editing process; peer editing; use of technology
Test 17: Reading Vocabulary	Reading *Lexical knowledge* *Reading comprehension*	Recognition of visual word forms; lexical activation and semantic access; semantic matching and verbal analogical reasoning	Semantic feature analysis; semantic maps; text talks; directed vocabulary-building activities; increased time spent reading; reading for different purposes; intentional explicit word instruction, independent word-learning strategies, development of word consciousness; use of computerized programs
Test 18: Quantitative Concepts	Mathematics *Math knowledge* *Quantitative reasoning*	Symbol recognition; access to and retrieval of category-specific representations; manipulation of points on a mental number line	Use of manipulatives; direct instruction in math concepts, symbols, and vocabulary; sense of number line
Test 19: Academic Knowledge	General *General information* *Science information* *Cultural information* *Geography achievement*	Implicit, declarative category-specific memory	Creating a language- and experience-rich environment; frequent exposure to and practice with words used in science, social studies, and the humanities; reading aloud to a young child; text talks, particularly those that are academically related; semantic feature analysis; semantic maps; increased time spent reading; reading in the content area; intentional, explicit word instruction; direct instruction in morphology; development of word consciousness; use of computerized programs
Test 20: Spelling of Sounds	Spelling *Spelling ability* *Phonetic coding*	Translating spoken elements of nonwords into graphemic units; phonologically mediated mapping of orthography	Explicit, systematic instruction in phonics, orthography, and morphology; use of multisensory techniques; providing frequent practice; encouraging independent reading; teaching use of the spell-checker
Test 21: Sound Awareness	Reading *Phonetic coding* *Working memory*	Access, retrieval, and application of the rules of English phonology	Early exposure to sounds, music, rhythms, and language; reading aloud to a child; providing opportunities that encourage exploration and manipulation of sounds, words, and language; instruction in rhyming, segmentation, and sound blending; manipulation and deletion of phonemes; daily practice
Test 22: Punctuation & Capitalization	Writing *English usage*	Access to and application of lexical information and details of word forms	Punctuation review exercises; self-directed attention to each punctuation mark

Interventions Associated with the WJ III Reading and Reading-Related Tests

Effective reading instruction covers five key areas: phonemic awareness, the alphabetic principle, accuracy and fluency, vocabulary, and comprehension (National Reading Panel, 2000). The WJ III ACH provides tests to evaluate each of these areas of reading.

Key Areas of Reading	WJ III ACH Tests
Phonemic Awareness	Sound Awareness
Alphabetic Principle	Letter-Word Identification Word Attack Spelling of Sounds *Spelling*
Accuracy and Fluency	Reading Fluency
Vocabulary	Reading Vocabulary *Picture Vocabulary* *Academic Knowledge*
Comprehension	Passage Comprehension Reading Vocabulary

Note: Tests in italics are discussed in the written language or oral language sections.

Phonemic Awareness

Phonemic awareness, the ability to hear and manipulate sounds, is critical for the development of reading and spelling skills (Adams, 1990). It is the best predictor of reading difficulties in kindergarten or first grade (Lyon, 1995); that is why it is important to assess phonemic awareness early and then to provide appropriate interventions when necessary.

The WJ III Sound Awareness test measures the CHC narrow ability of phonetic coding; this test also requires working memory. Access, retrieval, and application of the rules of permissible English sound combinations (phonology) are among the cognitive processes involved in performance on this test. For young children, possible interventions include early exposure to sounds, music, rhythms, and language (Strickland, 1991; Glazer, 1989); reading aloud to the child (Adams, 1990; Anderson, Hiebert, Scott, & Wilkinson, 1985); providing opportunities that encourage exploration and manipulation of sounds, words, and language (Adams, 1990); and daily practice with language (Bridge, Winograd, & Haley, 1983).

One early development intervention for phonemic awareness is to teach the child to add, delete, substitute, and rearrange sounds using manipulatives. For example, the teacher represents sounds with concrete objects, such as blocks, tiles, or felt squares. After the child correctly manipulates sounds with these types of objects, the teacher transitions to using letters or letter tiles to represent the sounds. For school-aged children and some adolescents with limited phonemic awareness, interventions include explicit, systematic instruction in phonics (National Reading Panel, 2000); use of decodable texts for daily practice (Meyer & Felton, 1999); and books on tape to increase exposure to the sounds of language (Carbo, 1989).

The Alphabetic Principle

A firm grasp of the alphabetic principle, the ability to associate sounds with letters, is necessary to be a successful reader (Stanovich, 1986; Juel, 1991). The WJ III Word Attack test measures grapheme-to-phoneme translation of pseudo words not contained in the lexicon. The ability to translate nonwords, such as "nat" or "ib," into sounds indicates the presence of a unique process for recognizing printed forms—that is, assembling the pronunciation of a letter string by applying knowledge of typical correspondences between grapheme units and sounds.

Use of explicit, systematic, and synthetic phonics programs has produced gains for readers with poor decoding skills (National Reading Panel, 2000; Snow, Burns, & Griffin, 1998). These programs begin instruction at the phoneme level and then introduce graphemes. Students are taught explicitly the relationship between sounds (phonemes) and letters (graphemes) and then how to blend the sounds to make words. Examples of such programs include the *Lindamood® Phoneme Sequencing Program for Reading, Spelling, and Speech* (LiPS) (Lindamood & Lindamood, 1998), *Wilson Reading System®* (Wilson, 1988), and *Read 180®* (Hasselbring, Kinsella, & Feldman, 1996).

The WJ III Spelling of Sounds test measures knowledge of the sound patterns of word forms, specifically phonologically mediated spelling, because the correct orthographic segment(s) is based directly on the spoken elements that comprise the stimulus. Related interventions include explicit, systematic instruction in phonics (National Reading Panel, 2000; Ehri, 1991); orthography (Moats, 2005; Templeton & Bear, 1992); and morphology (Carlisle & Stone, 2005). They also include using multisensory techniques (Carreker, 2005; Fernald, 1943); providing frequent practice (Bridge et al., 1983); encouraging independent reading to increase exposure to words (Taylor, Frye, & Maruyama, 1990; Anderson et al., 1985); and teaching the use of a computerized spell-checker (MacArthur, Graham, Haynes, & De La Paz, 1996).

For example, teaching a student how to analyze the syllables within words (i.e., graphosyllabic instruction) may result in improved reading and spelling performance (Bhattacharya & Ehri, 2004). While providing corrective feedback, this method of instruction requires the student to analyze the graphosyllabic makeup of words through a five-step process. First, the student reads target words aloud, is supplied with the word if incorrect, and then repeats the word again. Next, the student provides the meaning of the target word and receives corrective feedback as needed. Third, the student is instructed to divide a word's pronunciation into its syllables by raising a finger with each beat and then announcing the number of beats (e.g., "ta-ble has two beats"). Correct responses are modeled by the teacher and practiced by the student if incorrect. In the next step, sound segments of words (e.g., syllables) are provided, and the student indicates the correct segment of the printed word by framing the segment with the thumbs. Corrective feedback is provided. Finally, the student decodes words by blending syllables. If incorrect, the word is provided, and the student repeats the pronunciation of the word.

The WJ III Letter-Word Identification test measures reading decoding. In reading decoding, recognized letters and words are accessed from the mental lexicon (i.e., the store of word knowledge) and recoded phonologically. Some interventions to increase the lexicon include use of an explicit, systematic, synthetic phonics program (National Reading Panel, 2000; Torgesen, 1997; Stanovich, 1994); word-recognition strategies (Moats, 1999; Pressley, 1998; Adams, 1990); repeated readings (Armbruster, Lehr, & Osborn, 2001); knowledge of high-frequency words (Ehri, 1998); and spelling-based decoding strategies (Moats, 2005; Uhry & Shepherd, 1993; Adams, 1990).

Word-recognition strategies, such as word walls (Brabham & Villaume, 2001), flow lists (McCoy & Prehm, 1987), word banks, flash cards, and games, help develop the student's ability to recognize and decode words quickly. For example, a word wall might present five high-frequency words the student needs to learn. The teacher engages the student in activities, both planned and unplanned, which use the words on the wall. This strategy helps build word recognition, word-analysis skills, and vocabulary and serves as a spelling reference.

Oral production of letters and words, such as performed in the Letter-Word Identification test, requires not only accessing words from the lexicon but also activating and outputting representations of the sound patterns of the words, based on phonology. This is an aspect of reading fluency (see Accuracy and Fluency).

Accuracy and Fluency

A fluent reader is described as having automatic decoding processes, requiring little or no conscious attention (Juel, 1991; LaBerge & Samuels, 1974). He or she translates letters to sounds and sounds to words fluently and effortlessly. The WJ III Reading Fluency test measures reading speed. However, this test also requires a store of general information to be able to confirm the accuracy of a statement that is read. Consequently, this test measures automaticity of access to words and their meanings in the mental lexicon as well as comprehension of simple sentences.

Fluency-building interventions include repeated reading (Begeny & Martens, 2006; O'Shea, Sindelar, & O'Shea, 1985; Rashotte & Torgeson, 1985), passage previewing, assisted reading (Shany & Biemiller, 1995), and practicing words in isolation (Levy, Abello, & Lysynchuk, 1997). These interventions may be beneficial for use with students individually or as part of a small group instructional program. For example, in repeated reading, the student reads a short passage several times until he or she can read at an appropriate fluency level (or reading rate). In assisted reading, the student reads aloud while an accomplished reader follows along silently. If the student makes an error, the helping reader corrects it. Allowing the student to orally practice new words in isolation before reading the words in connected text also may increase reading fluency.

Reading Vocabulary

All language-based learning is dependent on vocabulary knowledge (Baker, Simmons, Kame'enui, 1998). The WJ III Reading Vocabulary test measures the narrow abilities of verbal (printed) language comprehension and lexical, or vocabulary, knowledge. These abilities are functions of the mental lexicon, particularly semantic memory. Typically, comprehension is achieved when the visual form of the word is connected to a concept by means of semantic access and activation.

Interventions to increase reading vocabulary include semantic feature analysis (Pittelman, Heimlich, Berglund, & French, 1991; Anders & Bos, 1986); semantic maps (Sinatra, Berg, & Dunn, 1985; Johnson & Pearson, 1984); text talks (Beck & McKeown, 2001); increased time spent reading (Mastropieri, Leinart, & Scruggs, 1999; Cunningham & Stanovich, 1991; Anderson, Wilson, & Fielding, 1988); reading for different purposes (National Reading Panel, 2000; Stahl, 1999; Anderson, 1996); intentional explicit word instruction (teaching synonyms, antonyms, multiple-meaning words) (Graves, Juel, & Graves, 2004; Beck, McKeown, & Kucan, 2002; National Reading Panel, 2000); independent word-learning strategies (identification and use of context clues, use of

dictionary and other reference tools, direct instruction in morphology) (Carlisle, 2004; Baumann, Edwards, Boland, Olejnik, & Kame'enui, 2003; Baumann, Kame'enui, & Ash, 2003; Blachowicz & Fisher, 2000; Graves, 2000; National Reading Panel, 2000; Anglin, 1993); development of word consciousness (Graves & Watts-Taffe, 2002; Nagy & Scott, 2000; Anderson & Nagy, 1992); and use of related computerized programs (Davidson, Elcock, & Noyes, 1996).

Many vocabulary words are learned incidentally through the development of oral language abilities or through reading. Incidental word learning through wide reading depends on the amount of time a student spends reading. Reading for different purposes and at different levels of difficulty exposes the student to new words that would never be encountered in oral language alone and helps create connections between words.

Vocabulary also can be developed through explicit interventions. Intentional, explicit teaching of specific words and word-learning strategies will improve vocabulary as well as increase comprehension of passages including those words. This type of instruction is designed to develop in-depth knowledge of important words. Text talks are teacher-led discussions that engage the student in a dialog about the story that was read and the vocabulary used. Semantic feature analysis helps a student analyze the meanings of specific words while integrating the meanings of new words into his or her vocabulary. Teaching a student a variety of independent word-learning strategies will help him or her become a better and more independent word learner and reader. Using a directed vocabulary thinking activity will help a student learn how to use context to infer meaning of words he or she does not know (Graves, 2000).

Reading Comprehension

Reading comprehension is a complex cognitive process that requires intentional interaction between the reader and the text to construct meaning (Durkin, 1993). Gersten, Fuchs, Williams, & Baker (2001) found that many students do not understand what they read because they have difficulty producing a mental representation of the information that is provided by the text.

The WJ III Passage Comprehension test is a complex, conceptually driven processing task that measures the ability to produce the mental representations provided by the text during the process of reading. As the examinee reads, the meaning of the passage is derived through constructing mental representations based on concepts from stored knowledge. This requires verbal (printed) language comprehension. Meaning is placed in immediate awareness as the passage is read and understood. As more elements are added to the passage, they are added to (or alter) the representation held in immediate awareness. The task is solved when the reader determines the referents of words and ideas that were read, draws connections between concepts, and derives or infers a conclusion from the passage.

Various interventions to increase reading comprehension include activating the reader's prior knowledge (National Reading Panel, 2000; Ogle, 1986); use of graphic organizers (Marzano, Pickering, & Pollock, 2001; Gardill & Jitendra, 1999; Berkowitz, 1986); self-monitoring strategies (National Reading Panel, 2000; Klinger & Vaughn, 1998; Brown & Palincsar, 1985; Babbs, 1984); and use of memory and imagery strategies (Mastropieri & Scruggs, 1998; Gambrell & Jawitz, 1993; Peters & Levin, 1986).

For example, linking new facts to prior knowledge about the topic increases inferential comprehension. Using a series of questions, the teacher can activate the

student's prior knowledge and then can model making predictions using a "think aloud" approach. Also, teaching the student to use graphic organizers will allow him or her to identify and analyze significant components of a text by mapping them out. Incorporating self-monitoring strategies will help the student recognize and resolve any comprehension errors as they arise. Various memory strategies that implement mental imagery are recommended for enhancing comprehension. One strategy requires the student to summarize the central idea of a passage as a "keyword" and then to make a mental picture of that keyword (Levin, Levin, Glasman, & Nordwall, 1992). The student also uses mental imagery to connect related ideas to the keyword.

Cognitive strategy instruction has been demonstrated to increase reading comprehension. Such strategies encourage active, self-regulated, and intentional reading (Trabasso & Bouchard, 2002). One example of a self-monitoring strategy is the five-step self-questioning technique that may be directly taught to students across multiple days to improve the comprehension of what is read (Wong & Jones, 1982). The five questions/self-statements apply to chunks of text, may be placed on a notecard for use as a prompt, and include the following:

1) Why are you studying this passage?

2) What is the main idea(s) in the paragraph? Underline it/them.

3) Think of a question about the main idea you have underlined. (Remember what a good question should be like.)

4) What is the answer to your question?

5) Always look back at the questions and the answers to see how each successive question and answer provide you with more information.

During the intervention, responses to these questions/statements would be written and reviewed with corrective feedback by a teacher.

Another example of a reading-comprehension intervention is *Multipass*, a meta-cognitive approach that a student can learn to use to better comprehend textbook content (Schumaker, Deshler, Alley, Warner, & Denton, 1982). Typically used with older students (in sixth grade or higher), this intervention is implemented in 10 steps, including a test to determine current learning habits; description of the new learning strategy; modeling of the strategy; verbal rehearsal of the strategy; practice in controlled, reading-level materials; corrective feedback; a test to measure progress; practice using grade-level materials; more corrective feedback; and an outcome test. The three strategies, or "passes," included within *Multipass* include Survey, Size-Up, and Sort-Out.

The first pass is Survey Pass and requires the student to 1) read the chapter title; 2) read the first paragraph; 3) review the table of contents and consider the current chapter's relationship to other chapters; 4) read the subtitles of the chapter and note the chapter's organization; 5) look at the illustrations and read the captions; 6) read the summary paragraph; and then 7) paraphrase all information obtained within this pass.

During the Size-Up Pass, the student 1) looks for cues within the text (e.g., bold face, italics, use of color, etc.); 2) makes the cue into a question (e.g., if *The Revolutionary War* is in italics, a question might be "Why was the Revolutionary War fought?"); 3) skims through the related text to find the answer to the question; and 4) paraphrases the answer to him- or herself without looking at the text.

Finally, the Sort-Out Pass requires the student to complete the questions at the end of the chapter, and if the question can be answered immediately, a check is placed next to the question. If the student is unable to immediately answer a question, but he or she can obtain the answer by thinking of the appropriate section in which to look and skimming through it or by thinking of and skimming through another relevant section if the answer is not found in the initial location, the student also places a checkmark next to the question. This procedure is followed until all questions are correctly answered.

A reading-comprehension intervention that combines strategy instruction and cooperative learning is reciprocal teaching (Palincsar & Brown, 1984). Reciprocal teaching helps develop critical thinking skills through reading, including setting a purpose for reading, reading for meaning, and self-monitoring of understanding. Specific skills that are taught include generating questions, summarizing, requesting clarification, and predicting upcoming information. A teacher models these steps.

Interventions Associated with the WJ III Writing Tests

There appears to be a reciprocal relationship between reading and writing (Ehri, 2000). Each helps to develop skills in the other. Research indicates that achievement is enhanced in both areas when reading and writing are taught together (Tierney & Shanahan, 1991). Additionally, problems in both reading and writing may stem from a common underlying linguistic deficit (Johnson, 1993). For these reasons, it may be important to consider interventions in both academic areas when planning an instructional program.

The WJ III ACH provides six tests that measure different aspects of writing ability. These underlying component abilities are necessary for performance in the broad area of written expression. Effective instruction stems from accurate assessment of the various component abilities.

Key Areas of Writing	WJ III ACH Tests
Spelling of real words	Spelling
Automaticity with writing	Writing Fluency
Expression of ideas in writing	Writing Samples
Identification and correction of errors	Editing
Application of phoneme-grapheme knowledge (pseudo words)	*Spelling of Sounds*
Knowledge of punctuation and capitalization rules	Punctuation and Capitalization

Note: Test in italics is discussed in The Alphabetic Principle section of reading.

Spelling

The WJ III Spelling test measures knowledge of the details of word forms contained in the mental lexicon. It often involves mapping phonology to orthographic representations of words. Some interventions for spelling include use of multisensory techniques (Carreker, 2005); use of explicit, systematic phonics instruction (National Reading Panel, 2000; Ehri, 1998); direct instruction (Edwards, 2003; Gordon, Vaughn, & Schumm, 1993; Graham, 1983); providing frequent practice (Berninger, Vaughn, Abbott, Brooks,

Abbot, Rogan, Reed, & Graham, 1998; Moats, 1995); teaching common irregular words (Moats, 2005); encouraging independent reading to increase the number and variety of words seen in print (Taylor et al., 1990; Anderson et al., 1985); the Write-Say method (Kearney & Drabman, 2001); and the Add-A-Word spelling program (McLaughlin, Reiter, Mabee, & Byram, 1991; Schermerhorn & McLaughlin, 1997).

For example, the Write-Say intervention requires the student to study a spelling list on his or her own on a Monday and then to participate in a verbally administered spelling test on the next day, Tuesday. The teacher provides verbal feedback, and the student both says aloud and writes the correct spelling of missed words, letter by letter, five times. The same procedure is followed on Wednesday and Thursday; however, incorrect spellings are practiced 10 times and 15 times, respectively. The summative spelling test is administered on Friday of that week.

Finally, group contingencies have been demonstrated to be useful for the development of spelling skills (Pokin & Skinner, 2003; Shapiro & Goldberg, 1986; Truchlicka, McLaughlin, & Swain, 1998). The following three approaches to group reinforcement have empirical support: 1) reinforcement of an individual student based on the individual meeting a teacher set criterion, 2) reinforcement of the group as a whole based on the overall performance of the group, and 3) reinforcement of all within the group for improvement in performance of a selected student(s).

Automaticity

The WJ III Writing Fluency test measures fluency of combining words into phrases. Automaticity of writing performance is likely to be aided by translating semantics directly to orthography rather than through phonology to orthography.

Some interventions related to limited performance on Writing Fluency include explicit instruction in the mechanics of writing (Graham, Berninger, Abbott, Abbott, & Whitaker, 1997); word, phrase, and sentence fluency-building activities (Hillocks, 1987); frequent practice (Moats, 1999; Graves, 1991; Gudschinsky, 1973); and use of technology (MacArthur, Graham, & Schwarz, 1993). For example, word, phrase, and sentence fluency-building activities help develop the ability to transfer speech to the written word, visualize spoken words as they are heard, and write chunks of speech rather than letter-by-letter or syllable-by-syllable. One activity is to have a student practice writing an entire sentence without stopping. The teacher might present a sentence orally. Once the student knows the sentence, he or she attempts to write it without stopping. After the sentence has been written, errors in spelling or grammar can be corrected. The teacher should demonstrate fluent writing so that the student has a model to follow.

Written Expression

The WJ III Writing Samples test measures the ability to convey meaning at the discourse level of language. It requires retrieval of word meanings and syntactic information (i.e., knowledge of how words are combined into sentences) in the mental lexicon. Generation of acceptable sentences involves ideational fluency and the application of the psycholinguistic rules of grammar, particularly phrase structure. In several items, the examinee must use working memory to integrate the initial and final sentences into a well-formed passage. These items require planning.

Interventions for limited proficiency on Writing Samples include creating a literate, motivating, risk-free classroom environment (Gunn, Simmons, & Kame'enui, 1995;

Morrow, 1989); daily practice in writing (Sulzby, 1992; Graves, 1983); direct instruction in an expressive writing program (Walker, Shippen, Alberto, Houchins, & Cihak, 2005; De La Paz, 1999; Englert, Raphael, Anderson, Anthony, & Stevens, 1991); explicit instruction in the three key phases of the writing process (Gersten, Baker, & Edwards, 1999); and writing strategy instruction (Chalk, Hagan-Burke, & Burke, 2005; Graham & Harris, 1989, 2003; De La Paz & Graham, 1997a, 1997b).

An example intervention for expressive writing is self-regulated strategy development (SRSD) training. This model of writing intervention involves explicit teaching of strategies, interactive learning between the teacher and the student, individualized instruction based on the student's needs, movement through stages based on mastery of criterion, and a dynamic approach whereby new strategies and targets are introduced as needed.

There are six basic instructional stages common among SRSD interventions. The goal of the first stage is for students to develop the requisite skills to use the target and self-regulated strategies. The second stage involves a discussion between the teacher and student regarding current writing performance and the introduction of target strategies. Teacher modeling of strategies and self-regulation of learning takes place in stage three. Stage four requires the memorization of strategies through the use of mnemonics. Example mnemonics include:

TREE ("develop a **T**opic sentence, note **R**easons to provide support, **E**xamine the quality of each reason, and note an **E**nding for the writing");

STOP ("**S**uspend judgment, **T**ake a side, **O**rganize ideas, and **P**lan more as you write"); and

DARE ("**D**evelop your topic sentence, **A**dd supporting ideas, **R**eject possible arguments for the other side, and **E**nd with a conclusion").

In stage five, teacher and peer support to practice target strategies and self-regulated techniques is undertaken, followed by independent student use of the program as the final stage.

Identification and Correction of Errors

The WJ III Editing test requires knowledge of the lexical details of word forms and knowledge of writing conventions (English usage); these are functions of the mental lexicon. Possible interventions for low proficiency in editing include strategies for proofreading (Lanham, 1992); explicit instruction in the proofreading phase of the editing process (Hillocks & Smith, 1991); peer editing (Stoddard & MacArthur, 1993); and use of technology (MacArthur, Ferretti, Okolo, & Cavalier, 2001). For example, proofreading strategies include taking a break after completing the writing before proofreading, reading the work aloud, reading through the work slowly, reading line-by-line while covering the other text with a hand or a card, and looking for only one type of error at a time.

The WJ III Punctuation and Capitalization test requires accessing and applying lexical information and details of word forms. An example intervention for limited proficiency in Punctuation and Capitalization is to have the student circle every punctuation mark in a passage. This forces the student to look at each punctuation mark and evaluate whether it is correct (Lane & Lange, 1993).

Interventions Associated with the WJ III Math Tests

The primary CHC narrow abilities that pertain to all of the WJ III mathematics tests are mathematics knowledge and mathematics achievement. There are four tests included in the WJ III that can be useful in determining if the instructional focus should be on computation, automaticity of basic facts, or application of math concepts and knowledge to problem-solving tasks.

Key Areas of Math	WJ III ACH Math Tests
Computation	Calculation
Automaticity with math facts	Math Fluency
Problem-solving	Applied Problems
Vocabulary, concepts, and reasoning	Quantitative Concepts

Computation

The WJ III Calculation test requires access to and application of mathematical calculation knowledge. Some possible interventions for the development of calculation skills include sequential direct instruction (Kroesbergen & Van Luit, 2003; Maccini & Gagnon, 2000); developing number sense (Griffin, 1998; Ginsburg, 1997); use of manipulatives (Butler, Miller, Crehan, Babbitt, & Pierce, 2003; Cass, Cates, Smith & Jackson, 2003; Siegler, 1988); the cover-copy-compare technique (Hayden & McLaughlin, 2004; Lee & Tingstrom, 1994; Skinner, Turco, Beatty, & Rasavage, 1989); teacher-directed demonstration with verbalization (Rivera & Deutsch Smith, 1988); mnemonic strategies (Maccini & Hughes, 2000; Greene, 1999); peer-assisted tutoring (Calhoon & Fuchs, 2003; Greenwood & Terry, 1993); concrete-representational-abstract teaching techniques (Morin & Miller, 1998); and computer-assisted instruction (Hasselbring, Goin, & Bransford, 1988; Howell, Sidorenko, & Jurica, 1987).

For example, the cover-copy-compare intervention can be used to improve a student's ability to make math calculations. In this intervention, students are provided with training sheets (specially formatted pages of math problems) and prompted to read a math problem on the left side of the page where the correct answer is provided. The student covers the problem and solution (on the left-hand side) and is asked to write the math problem and answer from memory on the right-hand side of the training sheet. When finished, the student uncovers the problem on the left side and compares the answers. The student completes the problem when he or she arrives at the correct answer. (If incorrect, the student may require additional guidance before repeating the item.) When correct, the student moves on to the next problem on the left side of the training sheet. New training sheets are provided after the student reaches mastery of a page of problems. This intervention may be implemented individually or within a small-group setting. Of note, the benefits of cover, copy, and compare may be bolstered by additional flash-card drill with a peer.

Automaticity

Limited fluency with basic facts may interfere with the development of higher-level math skills and hinder later achievement (Hasselbring et al., 1988). Therefore, it is an

important area to assess and, when performance is limited, to intervene. The WJ III Math Fluency test requires the rapid application of basic addition, subtraction, and multiplication procedures, which together comprise numerical facility. Simple addition and subtraction rules involve numbers coded as quantities on the number line; multiplication and division rules are based on a set of associations between numbers represented as strings of words (e.g., multiplication tables). Related interventions for low performance on math fluency include development of number sense (Griffin, 1998; Case, 1998; Berch, 1998; Bruer, 1997); practice with math fact charts (Pellegrino & Goldman, 1987); explicit timings (Rathovan, 1999; Van Houten & Thompson, 1976); and use of computer-assisted instruction (Cummings & Elkins, 1999; Hasselbring et al., 1988).

For example, explicit timings are a proven way to build fluency with math facts while maintaining accuracy. Using math worksheets of 100 basic math facts, the teacher explains that the session will be timed as a means to help students improve their performance, and one-minute timings will be conducted throughout the session. The teacher begins each one-minute timing by saying, "Pencils up, ready, begin." At the end of the one-minute interval, the teacher says "Stop." The students are directed to draw a line after the last problem answered. This procedure is repeated throughout the math period. The students' accuracy and fluency are evaluated using the number of correct problems per one-minute interval. It is recommended that this information be graphed or charted as this may be a motivating factor for many students.

Concepts and Problem-Solving

The WJ III Applied Problems and Quantitative Concepts tests require quantitative reasoning in addition to mathematics knowledge. For example, some of the more difficult items on the Number Series subtest in Quantitative Concepts require mental manipulation of points on the number line. Applied Problems requires the construction of mental models to solve problems through the application of insight or quantitative reasoning. Solutions to these problems require access to complex cognitive processes and the calculation abilities that depend on them. Many Applied Problems items involve language comprehension (i.e., either listening ability or reading comprehension), and tasks are sometimes performed mentally using the visual working memory process.

Interventions related to low performance on Applied Problems and Quantitative Concepts include direct instruction (Kroesbergen & Van Luit, 2003; Swanson, 2001; Maccini & Gagnon, 2000; Tarver, 1992); use of data tables (Sellke, Behr, & Voelker, 1991); and strategy instruction (Lenz, Ellis, & Scanlon, 1996; Hutchinson, 1993; Montague, 1992; Montague & Candace, 1986).

For example, one strategy involves teaching the student to 1) read the problem, 2) reread the problem to identify what information is given and to decide what he or she is trying to find out, 3) use objects to solve the problem and identify the operation to use, 4) write the problem, and 5) work the problem. (Even after teaching the steps to the strategy, it might be helpful to provide a cue card.) Another effective problem-solving strategy involves teaching the student to make a picture or diagram of the problem before trying to set up the quantitative problem and solution. Also, use of data tables that visually link concepts with problem-solving strategies may be an effective intervention. Data tables can be used to visually represent the relationships between concepts, use teacher-directed strategies to determine necessary algorithms, and then write the equation necessary to complete the story problem.

Interventions Associated with the WJ III Oral Language and Knowledge Tests

The oral language experiences of young children (Glazer, 1989; Strickland & Feeley, 1991) serve as the foundation for reading and writing skills and are positively related to subsequent success in reading and writing (Stanovich, 1986; Wiig & Semel, 1984). Therefore, it is critical to understand the individual's oral language abilities in order to determine an appropriate instructional plan. The WJ III provides six measures of oral language and academic knowledge.

Key Areas of Oral Language	WJ III ACH Tests
Oral expression: Vocabulary	Picture Vocabulary
Oral expression: Meaningful memory	Story Recall
Listening comprehension: Working memory	Understanding Directions
Listening comprehension	Oral Comprehension
Recall of meaningful information	Story Recall-Delayed
Acquired knowledge: General information	Academic Knowledge

Vocabulary and Background Knowledge

Research indicates a significant relationship between both a person's level of vocabulary (Baumann & Kame'enui, 1991) and background knowledge (Anderson & Pearson, 1984) and his or her reading ability. The WJ III Picture Vocabulary and Academic Knowledge tests provide measures of these important constructs. Picture Vocabulary requires the cognitive processes of object recognition, lexical access, and lexical retrieval. The cognitive processes begin with object recognition. If the object is recognized, lexical access results when a representation of the object is activated and spreads to semantic attributes of words. Retrieval results when the name of the object is located in the store of lexical knowledge. The Academic Knowledge test is similar to Picture Vocabulary, but items are concentrated in the academic areas of science, social studies, and humanities.

For young children, suggested interventions include creating a language- and experience-rich environment (Hart & Risley, 2003; Gunn et al., 1995); frequent exposure and practice with words (Hart & Risley, 2003; Gunn et al., 1995); reading aloud to the child (Adams, 1990); and text talks (Beck & McKeown, 2001). For older children and adolescents, possible interventions include text talks (Beck & McKeown, 2001); increased time spent reading (Cunningham & Stanovich, 1991; Herman, Anderson, Pearson, & Nagy, 1987); reading for different purposes (National Reading Panel, 2000; Stahl, 1999; Anderson, 1996); intentional explicit word instruction (teaching synonyms, antonyms, multiple-meaning words) (Graves et al., 2004; Beck et al., 2002; National Reading Panel, 2000); direct instruction in morphology (Carlisle, 2004; Baumann, Edwards, Boland, Olejnik, & Kame'enui, 2003; Baumann, Kame'enui, & Ash, 2003; Blachowicz & Fisher, 2000; Graves, 2000; National Reading Panel, 2000; Anglin, 1993); development of word consciousness (Graves & Watts-Taffe, 2002; Nagy & Scott, 2000; Anderson & Nagy, 1992); and use of related computerized programs (Davidson et al., 1996).

Two other examples include semantic feature analysis (Pittelman et al., 1991; Anders & Bos, 1986) and semantic maps (Sinatra et al., 1985; Johnson & Pearson, 1984). Both methods provide a visual representation of the information to be studied.

Semantic feature analysis can be used to help a student increase his or her vocabulary by exploring similarities, differences, and connections between words and concepts. In this intervention, a teacher selects a topic to be studied and then identifies keywords, or typical examples, related to the topic. For example, if the topic being studied is "animals," then classes of animals might be identified as keywords (e.g., mammals, reptiles, and amphibians). Next, the teacher creates a chart, or grid, for the topic and lists the keywords on the left side. Features or characteristics of some of the keywords are identified and written as headers for each column in the chart. For example, some features for the animal grid might include warm-blooded, cold-blooded, has hair, or lays eggs. The teacher then asks the student to evaluate each keyword with each feature and place a + or – in each cell of the grid, depending on whether the word has the feature listed. Finally, similarities, differences, connections, and patterns among the keywords are discussed.

A semantic map, or web, is a graphic organizer that can be used to help the student understand the relationships among a major topic and the supporting ideas. In this intervention, the teacher asks the student to brainstorm words and phrases that are associated with a major concept that is being studied. After the list of words is compiled, the words are grouped by category and each category is labeled. Help may be required to identify which words and phrases go together in some way. The teacher then maps the information by placing the main topic in the center of the map. Categories related to the topic are written next and connected to the main topic with lines. The details, or individual items within each category, are then written and connected to the relevant category. This intervention also can be used to enhance reading comprehension. The semantic map can be created as a way to preview or summarize information to be studied.

Oral Expression

Oral language tasks involve the integration of complex cognitive processes such as semantic memory and reasoning. The WJ III Story Recall test requires comprehending and remembering the principal components of a story by constructing a mental representation and recoding or rephrasing the story. Example interventions related to limited performance on Story Recall include opportunities to hear and practice language (Moats, 2001; Hart & Risley, 1995); direct instruction in semantics, syntax, and pragmatics; strategies (National Reading Panel, 2000; Tomeson & Aarnoutse, 1998); role-playing games; and compensatory skills. For adolescents and adults, use of strategies can be helpful in organizing thinking before speaking. For example, the Store the Story strategy provides a framework for organizing the key elements of a story in sequential order. STORE is an acronym for:

S=Setting,

T=Trouble,

O=Order of events,

R=Resolution, and

E=End.

The teacher introduces and explains the acronym cue, models how to use the cue, provides guided practice and then independent practice. Graphic organizers can be helpful in illustrating ways that oral information may be presented for different purposes.

Recall of Meaningful Information

The WJ III Story Recall-Delayed test requires reconstructing the meaningful content of the material. Because the storage and recall of meaningful information is an important aspect of academic competence, active learning, rehearsal, elaboration, mnemonics, and visual representations may all be useful interventions.

Active learning (Marzano, Pickering, & Pollock, 2001), attending to and thinking about the material, is required to acquire new knowledge or to benefit from any memory strategy. The learner must be involved in the learning process rather than passively receive information.

Rehearsal (Squire & Schacter, 2003) is an important factor in learning. Memories consolidate across time. Students with difficulties reconstructing information learned may benefit from shorter sessions at repeated intervals rather than one long session. For example, when first learning, a student may require multiple rehearsals each day, then each week, then each month, and so on. This cycle of rehearse and review deepens the memory and facilitates recall of the information. Varying the learning tasks, incorporating emotions and novelty, and fostering creativity are ways to enhance acquisition of knowledge. Overlearning improves storage and recall. Overlearning occurs when a student continues to review and rehearse information he or she already knows. Even one additional review can increase recall significantly.

Mnemonics (Wolfe, 2001) can be especially helpful in learning rules, patterns, and word lists. Rhymes or songs, such as learning the alphabet to the tune "Twinkle, Twinkle, Little Star," can be useful memory aides. Other mnemonic strategies include using acronyms and acrostics. For example, the acrostic "a rat in the house may eat the ice cream" may help individuals who are learning to spell "arithmetic."

Elaboration (Wolfe, 2001) is a method to improve encoding ability that in turn facilitates storage and recall. When presenting new information, it is important to associate the key points to prior knowledge or personal experiences. When rehearsal is combined with elaboration, it is more likely that the information will be successfully encoded, stored, and available for recall. Elaborative rehearsal goes beyond simple recitation of information by focusing on meaning and association of the new information with other knowledge. As the learner interacts with the material by thinking about it, associating it with prior knowledge, or reflecting on it, this creates a deeper processing of the information.

Visual representation (Greenleaf & Wells-Papanek, 2005) is another means of improving the learning and retrieval process. Using actual objects or pictures for new words being learned, providing graphic organizers, or having the student illustrate what is being studied are just a few ways to capitalize on the mind's ability to process and learn from visual information.

Listening Comprehension

The WJ III Understanding Directions test requires listening to a series of sequential directions and maintaining the sequence in immediate awareness, an aspect of working memory. Possible interventions for limited listening comprehension include opportunities to practice listening and following directions (Galda & Cullinan, 1991; Leung & Pikulski, 1990); echo activities (Clay, 1991); use of auditory skill tapes; and modifying the listening environment (Hardiman, 2003). For a young child, games, such as Simon Says or Follow the Leader, are enjoyable ways to develop listening abilities and employ

related cognitive processes. These games are particularly useful because they require a motor response that demonstrates whether the child is following the directions.

The WJ III Oral Comprehension test requires formation of mental representations based on word meaning and case roles within sentences as well as across sentences in connected discourse. Complex cognitive processing is required to determine the right sense or meaning of the target word in the context of the discourse. Early interventions to help develop this skill include exposure to language (Moats, 2001; Hart & Risley, 1995), particularly reading aloud to a child (Adams, 1990; Anderson et al., 1985). Direct instruction in vocabulary (Beck & McKeown, 2001) and use of directed vocabulary thinking activities (Graves, 2000) also help develop listening-comprehension skills. School-aged children who have difficulties following the teacher's oral discourse in the classroom may benefit from an outline of key points (Wallach & Butler, 1994) on the board or overhead projector before the beginning of each instructional unit.

For example, use of a directed vocabulary thinking activity (Graves, 2000) can help students learn how to use context to infer meaning of words that are not known. In this intervention, the teacher selects a few key words from a reading selection that are likely to be unfamiliar to the student, presents the list of words without definitions, and asks the student to guess the definition for each word. Then the teacher may write the words in a sentence that incorporates a specific type of context cue (e.g., direct explanation, contrast, synonym, or restatement). Following the sentence activity, the teacher might have the student guess the definitions again or engage the student in a discussion of how the words in each sentence helped him or her determine a definition. Finally, the teacher may ask the student to look up each word in a dictionary or to provide a paraphrased definition appropriate for the student's language-comprehension level.

Summary

The 22 tests included in the WJ III ACH and the nine tests included in the Brief Battery provide measures of several narrow abilities as defined by CHC theory. Performance on each test requires different forms of cognitive processing. This bulletin describes how an understanding of the narrow cognitive abilities measured by (and cognitive processes required for performance on) each of the WJ III ACH tests is useful for developing educational interventions. That is, the narrow abilities and cognitive processes that are required for task performance provide cues to related interventions for improving performance in key areas of academic learning.

References

Adams, M. J. (1990). *Beginning to read: Thinking and learning about print.* Cambridge, MA: MIT Press.

Anders, P., & Bos, C. (1986). Semantic feature analysis: An interactive strategy for vocabulary development and text comprehension. *Journal of Reading*, *9*(7), 610–616.

Anderson, R. C. (1996). Research foundations to support wide reading. In V. Greaney (Ed.), *Promoting reading in developing countries* (pp. 55–77). Newark, DE: International Reading Association.

Anderson, R. C., Hiebert, E. H., Scott, J. A., & Wilkinson, I. A. G. (1985). *Becoming a nation of readers: The report of the Commission on Reading.* Washington, DC: The National Institute of Education.

Anderson, R. C., & Nagy, W. E. (1992). The vocabulary conundrum. *American Educator*, *16*, 14–18, 44–47.

Anderson, R. C., & Pearson, P. D. (1984). A schema-theoretic view of basic processes in reading. In P. D. Pearson, R. Barr, M. L. Kamil, & P. Mosenthal (Eds.), *Handbook of reading research.* White Plains, NY: Longman.

Anderson, R. C., Wilson, P. T., & Fielding, L. G. (1988). Growth in reading and how children spend their time outside of school. *Reading Research Quarterly*, *23*, 285–303.

Anglin, J. M. (1993). Vocabulary development: A morphological analysis. *Monographs of the Society for Research in Child Development*, Serial No. 238, *58*(10).

Armbruster, B. B., Lehr, F., & Osborn, J. (2001). *Put reading first: The research building blocks for teaching children to read.* Jessup, MD: National Institute for Literacy.

Babbs, P. J. (1984). Monitoring cards help improve comprehension. *The Reading Teacher*, *38*(2), 200–204.

Baker, S., Simmons, D. C., & Kame'enui, E. J. (1998). Vocabulary acquisition: Research bases. In D. C. Simmons & E. J. Kame'enui (Eds.), *What reading research tells us about children with diverse learning needs: Bases and basics.* Mahwah, NJ: Erlbaum.

Baumann, J. F., Edwards, E. C., Boland, E. M., Olejnik, S., & Kame'enui, E. J. (2003). Vocabulary tricks: Effects of instruction in morphology and context on fifth-grade students' ability to derive and infer word meanings. *American Educational Research Journal, 40*(2), 447–494.

Baumann, J. F., & Kame'enui, E. J. (1991). Research on vocabulary instruction. In J. Flood, J. M. Jensen, D. Lapp, & J. R. Squire (Eds.), *Handbook of research on teaching the English language arts.* New York: Macmillan Publishing Company.

Baumann, J. F., Kame'enui, E. J., & Ash, G. E. (2003). Research on vocabulary instruction: Voltaire redux. In J. Flood, D. Lapp, J. R. Squire, & J. M. Jensen (Eds.), *Handbook of research on teaching the English language arts* (2nd ed.) (pp. 752–785). Mahwah, NJ: Erlbaum.

Beck, I. L., & McKeown, M. G. (2001). Text talk: Capturing the benefits of read-aloud experiences for young children. *The Reading Teacher*, *55*, 10–20.

Beck, I. L., McKeown, M. G., & Kucan, L. (2002). *Bringing words to life: Robust vocabulary instruction*. New York: Guilford.

Begeny, J. C., & Martens, B. K. (2006). Assisting low-performing readers with group-based reading fluency instruction. *School Psychology Review*, *35*(1), 91–107.

Berch, D. B. (Ed.). (1998, April). Mathematical cognition: From numerical thinking to mathematics education. Conference presented by the National Institute of Child Health.

Berkowitz, S. J. (1986). Effects of instruction in text organization on sixth-grade students' memory for expository reading. *Reading Research Quarterly*, *21*, 161–178.

Berninger, V., Vaughn, K., Abbott, R., Brooks, A., Abbott, S., Rogan, L., Reed, E., & Graham, S. (1998). Early intervention for spelling problems: Teaching functional spelling units of varying size with a multiple-connections framework. *Journal of Educational Psychology*, *90*, 587–605.

Bhattacharya, A., & Ehri, L. (2004). Grapho-syllabic analysis helps adolescent struggling readers read and spell words. *Journal of Learning Disabilities*, *37*, 331–348.

Blachowicz, C., & Fisher, P. (2000). Vocabulary instruction. In M. Kamil, P. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of Reading Research* (Vol. 3, pp. 503–523). Mahwah, NJ: Erlbaum.

Brabham, E. G., & Villaume, S. K. (2001). Building walls of words. *Reading Teacher*, *54*(7), 700–702.

Bridge, C. A., Winograd, P. N., & Haley, D. (1983). Using predictable materials vs. preprimers to teach beginning sight words. *The Reading Teacher*, *36*(9), 884–891.

Brown, A. L., & Palincsar, A. S. (1985). Reciprocal teaching of comprehension strategies: A natural history of one program to enhance learning (Tech. Rep. No. 334). Champaign: University of Illinois at Urbana-Champaign, Center for the Study of Reading.

Bruer, J. T. (1997). Education and the brain: A bridge too far. *Educational Researcher*, *26*(8), 4–16.

Butler, F. M., Miller, S. P., Crehan, K., Babbitt, B., & Pierce, T. (2003). Fraction instruction for students with mathematics disabilities: Comparing two teaching sequences. *Learning Disabilities Research & Practice*, *18*(2), 99–111.

Calhoon, M. B., & Fuchs, L. S. (2003). The effects of peer-assisted learning strategies and curriculum-based measurement on the mathematics performance of secondary students with disabilities. *Remedial and Special Education*, *24*, 235–245.

Carbo, M. (1989). *How to record books for maximum reading gains*. Roslyn Heights, NY: National Reading Styles Institute.

Carlisle, J. F. (2004). Morphological processes influencing literacy learning. In C. A. Stone, E. R. Silliman, B. J. Ehren, & K. Apel (Eds.), *Handbook on language and literacy: Development and disorders*, (pp. 318–339). New York: Guilford.

Carlisle, J. F. and Stone, C.A. (2005). Exploring the role of morphemes in word reading. *Reading Research Quarterly*, *40*(4), 428–449.

Carreker, S. (2005). Teaching spelling. In J. Birsh (Ed.), *Multisensory teaching of basic language skills* (2nd ed.), (pp. 257–295). Baltimore, MD: Paul Brookes.

Carroll, J. B. (1987). New perspectives in the analysis of abilities. In R. R. Ronning, J. A. Glover, J. C. Conoley, & J. C. Witt (Eds.), *The influence of cognitive psychology on testing* (pp. 267–284). Hillsdale. NJ: Erlbaum.

Carroll, J. B. (1990). Estimating item and ability parameters in homogeneous tests with the person characteristic function. *Applied Psychological Measurement*, *14*(2), 109–125.

Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor-analytic studies.* New York: Cambridge University Press.

Carroll, J. B. (1997). The three-stratum theory of cognitive abilities. In D. P. Flanagan, J. L. Genshaft, & P. L. Harrison (Eds.), *Contemporary intellectual assessment: Theories, tests and issues* (pp. 122–130). New York: Guilford Press.

Carroll, J. B. (2003). The higher stratum structure of cognitive abilities: Current evidence supports g and about ten broad factors. In H. Nyborg (Ed.), *The scientific study of general intelligence: Tribute to Arthur R. Jensen.* New York: Pergamon.

Case, R. (1998, April). A psychological model of number sense and its development. Paper presented at the annual meeting of the American Educational Research Association, San Diego.

Cass, M., Cates, D., Smith, M., & Jackson, C. (2003). Effects of manipulative instruction on solving area and perimeter problems by students with learning disabilities. *Learning Disabilities Research & Practice*, *18*(2), 112–120.

Cattell, R. B. (1941). Some theoretical issues in adult intelligence testing. *Psychological Bulletin*, *38*, 592.

Cattell, R. B. (1943). The measurement of adult intelligence. *Psychological Bulletin*, *40*, 153–193.

Cattell, R. B. (1950). *Personality: A systematic theoretical and factoral study.* New York: McGraw-Hill.

Chalk, J. C., Hagan-Burke, S., & Burke, M. D. (2005). The effects of self-regulated strategy development on the writing process for high school students with learning disabilities. *Learning Disability Quarterly*, *28*, 75–87.

Clay, M. M. (1991). *Becoming literate: The construction of inner control.* Portsmouth, NH: Heinemann.

Cummings, J. J., & Elkins, J. (1999). Lack of automaticity in the basic addition facts as a characteristic of arithmetic learning problems and instructional needs. *Mathematical Cognition*, *5*(2), 149–180.

Cunningham, A. E., & Stanovich, K. E. (1991). Tracking the unique effects of print. *Journal of Educational Psychology*, *83*, 264–274.

Davidson, J., Elcock, J., & Noyes, P. (1996). A preliminary study of the effect of computer-assisted practice on reading attainment. *Journal of Research in Reading*, *19*(2), 102–110.

De La Paz, S. (1999). Self-regulated strategy instruction in regular education settings: Improving outcomes for students with and without learning disabilities. *Learning Disabilities Research and Practice*, *14*(2), 92–106.

De La Paz, S., & Graham, S. (1997a). Effects of dictation and advanced planning instruction on the composing of students with writing and learning problems. *Journal of Educational Psychology*, *89*, 203–222.

De La Paz, S., & Graham, S. (1997b). Strategy Instruction in Planning: Effects on the writing performance and behavior of students with learning disabilities. *Exceptional Children*, *63*, 167–181.

Durkin, D. (1993). *Teaching them to read* (6th ed.). Boston, MA: Allyn & Bacon.

Edwards, L. (2003). Writing instruction in kindergarten: Examining an emerging area of research for children with writing and reading difficulties. *Journal of Learning Disabilities*, *36*(2), 136–148.

Ehri, L. C. (1991). Development of the ability to read words. In R. Barr, M. Kamil, P. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research* (Vol. 2) (pp. 383–417). New York: Longman.

Ehri, L. C. (1998). Learning to read and learning to spell are one and the same, almost. In C. Perfetti, L. Rieben, & M. Fayol (Eds.), *Learning to spell: Research, theory and practice across languages* (pp. 237–269). Mahwah, NJ: Erlbaum.

Ehri, L. C. (2000). Learning to read and learning to spell: Two sides of a coin. *Topics in Language Disorders, 20*(3), 19–36.

Englert, C. S., Raphael, T. E., Anderson, L. M., Anthony, H. M., & Stevens, D. D. (1991). Making writing strategies and self-talk visible: Cognitive strategy instruction in regular and special education classrooms. *American Educational Research Journal*, *28*, 337–372.

Fernald, G. (1943). *Remedial techniques in basic school subjects.* New York: McGraw-Hill.

Galda, L., & Cullinan, B. E. (1991). Literature for literacy: What research says about the benefits of using trade books in the classroom. In J. Flood, J. M. Jensen, D. Lapp, and J. R. Squire (Eds.), *Handbook of research on teaching the English language arts* (529–535). New York: Macmillan Publishing Company.

Gambrell, L. B., & Jawitz, P. B. (1993). Mental imagery, text illustrations, and children's story comprehension and recall. *Reading Research Quarterly*, *23*, 265–273.

Gardill, M. C., & Jitendra, A. K. (1999). Advanced story map instruction: Effects on the reading comprehension of students with learning disabilities. *The Journal of Special Education*, *28*, 2–17.

Gersten, R., Baker, S., & Edwards, L. (December 1999). Teaching expressive writing to students with learning disabilities. ERIC/OSEP Digest E590/EDO-99-16. Arlington, VA: ERIC Clearinghouse on Disabilities and Gifted Education.

Gersten, R., Fuchs, L. S., Williams, J. P., & Baker, S. (2001). Teaching reading comprehension strategies to students with learning disabilities: A review of the research. *Review of Educational Research*, *71*, 279–320.

Ginsburg, H. P. (1997). Mathematics learning disabilities: A view from developmental psychology. *Journal of Learning Disabilities*, *30*, 20–33.

Glazer, S. M. (1989). Oral language and literacy. In D. S. Strickland and L. M. Morrow (Eds.), *Emerging literacy: Young children learn to read and write* (pp. 16–26). Newark, DE: International Reading Association.

Gordon, J., Vaughn, S., & Schumm, S. (1993). Spelling interventions: A review of literature and implications for instruction for students with learning disabilities. *Learning Disabilities and Research*, *8*, 175–181.

Graham, S. (1983). Effective spelling instruction. *Elementary School Journal*, *83*, 560–567.

Graham, S., Berninger, V., Abbott, R., Abbott, S., & Whitaker, D. (1997). The role of mechanics in composing of elementary school students: A new methodological approach. *Journal of Educational Psychology*, *89*, 170–182.

Graham, S., & Harris, K. R. (1989). Improving learning disabled students' skills at composing essays: Self-instructional strategy training. *Exceptional Children*, *56*, 201–214.

Graham, S., & Harris, K. R. (2003). Students with learning disabilities and the process of writing: A meta-analysis of SRSD studies. In H. L. Swanson, K. R. Harris, & S. Graham (Eds.), *Handbook of learning disabilities* (pp. 323–344). New York: Guilford Press.

Graves, D. H. (1983). *Writing: Teachers and children at work.* Exeter, NH: Heinemann Educational Books.

Graves, D. H. (1991). *Build a literate classroom.* Portsmouth, NH: Heinemann.

Graves, M. F. (2000). A vocabulary program to complement and bolster a middle-grade comprehension program. In B. M. Taylor, M. F. Graves, & P. van den Broek (Eds.), *Reading for meaning: Fostering comprehension in the middle grades* (pp. 116–135). New York: Teachers College Press; Newark, DE: International Reading Association.

Graves, M. F., Juel, C., & Graves, B. B. (2004). *Teaching reading in the 21st century* (3rd ed.). Boston: Allyn & Bacon.

Graves, M. F., & Watts-Taffe, S. (2002). The role of word consciousness in a research-based vocabulary program. In A. Farstrup & S. J. Samuels (Eds.), *What research has to say about reading instruction* (pp. 140–165). Newark, DE: International Reading Association.

Greene, G. (1999). Mnemonic multiplication fact instruction for students with learning disabilities. *Learning Disabilities Research and Practice*, *14*, 141–148.

Greenleaf, R. K., & Wells-Papanek, D. (2005). *Memory, recall, the brain & learning.* Newfield, Maine: Greenleaf & Papanek Publications.

Greenwood, C. R., & Terry, B. (1993). Achievement, placement, and services: Middle school benefits of classwide peer tutoring used at the elementary school. *School Psychology Review*, *22*, 497–516.

Griffin, S. A. (1998). Fostering the development of whole number sense. Paper presented at the annual meeting of the American Educational Research Association. San Diego.

Gudschinsky, S. C. (1973). A manual of literacy for preliterate peoples. Ukarumpa, Papua New Guinea: Summer Institute of Linguistics.

Gunn, B. K., Simmons, D. C., & Kame'enui, E. J. (1995). *Emergent literacy: A synthesis of the research*. Eugene, OR: The National Center to Improve the Tools of Educators.

Hardiman, M. M. (2003). *Connecting brain research with effective teaching*. Lanham, MD: Rowman & Littlefield Education.

Hart, B., & Risley, T. R. (1995). *Meaningful differences in the everyday experience of young American children*. Baltimore, MD: Paul H. Brookes.

Hart, B., & Risley, T. R. (2003). The early catastrophe: The 30 million word gap by age 3. *American Educator*, 22, 4–9.

Hasselbring. T. S., Goin, L., & Bransford, J. D. (1988). Developing math automaticity in learning handicapped children: The role of computerized drill and practice. *Focus on Exceptional Children*, 20, 1–7.

Hasselbring, T. S., Kinsella, K., & Feldman, K. (1996). *Read 180*. New York, NY: Scholastic, Inc.

Hayden, J., & McLaughlin, T. F. (2004). The effects of cover, copy, and compare and flash card drill on correct rate of math facts for a middle school student with learning disabilities. *Journal of Precision Teaching & Celebration*, 20, 17–21.

Herman, P. A., Anderson, R. C., Pearson, P. D., & Nagy, W. E. (1987). Incidental acquisition of word meanings from expositions with varied text features. *Reading Research Quarterly*, 23, 263–284.

Hillocks, G., Jr. (1987). Synthesis of research on teaching writing. *Educational Leadership*, 44(8), 71–82.

Hillocks, G., Jr., & Smith, M. W. (1991). Grammar and usage. In J. Flood, J. M. Jensen, D. Lapp, & J. R. Squire (Eds.), *Handbook of research on teaching the English language arts* (pp. 591–603). New York: Macmillan.

Horn, J. L. (1965). Fluid and crystallized intelligence. Unpublished doctoral dissertation, University of Illinois, Urbana–Champaign.

Horn, J. L. (1988). Thinking about human abilities. In J. R. Nesselroade & R. B. Cattell (Eds.), *Handbook of multivariate psychology* (2nd ed.) (pp. 645–865). New York: Academic Press.

Horn, J. L. (1989). Models for intelligence. In R. Linn (Ed.), *Intelligence: measurement, theory and public policy* (pp. 29–73). Urbana, IL: University of Illinois Press.

Horn, J. L. (1991). Measurement of intellectual capabilities: A review of theory. In K. S. McGrew, J. K. Werder, and R. W. Woodcock, *WJ-R Technical Manual* (pp. 197–232). Rolling Meadows, IL: Riverside.

Horn, J. L., & Stankov, L. (1982). Auditory and visual factors of intelligence. *Intelligence*, 6, 165–185.

Howell, R., Sidorenko, E., & Jurica, J. (1987). The effects of computer on the acquisition of multiplication facts by a student with learning disabilities. *Journal of Learning Disabilities*, *20*, 336–341.

Hutchinson, N. L. (1993). Effects of cognitive strategy instruction on algebra problem solving of adolescents with learning disabilities. *Learning Disability Quarterly*, *16*, 34–63.

Johnson, D. D., & Pearson, P. D. (1984). *Teaching reading vocabulary*. New York: Holt, Rinehart and Winston.

Johnson, D. J. (1993). Relationships between oral and written language. *School Psychology Review*, *22*, 595–609.

Juel, C. (1991). Beginning reading. In R. Barr, M. L. Kamil, P. B. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research* (pp. 759–788). New York: Longman.

Kearney, C. A., & Drabman, R. S. (2001). The Write-Say method for improving spelling accuracy in children with learning disabilities. *Journal of Learning Disabilities*, *26*, 52–56.

Klingner, J. K., & Vaughn, S. (1998). Using Collaborative Strategic Reading. *Teaching Exceptional Children*, July/Aug 1998.

Kroesbergen, E. H., & Van Luit, J. E. H. (2003). Mathematical interventions for children with special educational needs. *Remedial and Special Education*, *24*, 97–114.

LaBerge, D., & Samuels, S. J. (1974). Toward a theory of automatic information processing in reading. *Cognitive Psychology*, *6*, 293–323.

Lane, J., & Lange, E. (1993). *Writing clearly: An editing guide*. Boston: Heinle & Heinle.

Lanham, R. (1992). *Revising prose* (3rd ed.). New York: Macmillan.

Lee, M. J., & Tingstrom, D. H. (1994). A group math intervention: The modification of cover, copy, and compare for group application. *Psychology in the Schools*, *31*, 133–145.

Lenz, B. K., Ellis, E. S., & Scanlon, D. (1996). *Teaching learning strategies to adolescents and adults with learning disabilities*. Austin, TX: Pro-Ed, Inc.

Leung, C., & Pikulski, J. J. (1990). Incidental word learning of kindergarten and first-grade children through repeated read-aloud events. In J. Zutell & S. McCormick (Eds.), *Literacy, theory and research: Analyses from multiple paradigms*. Chicago: National Reading Conference.

Levin, J. R., Levin, M. E., Glasman, L. D., & Nordwall, M. B. (1992). Mnemonic vocabulary instruction. Additional effectiveness evidence. *Contemporary Educational Psychology*, *17*, 156–174.

Levy, B. A., Abello, B., & Lysynchuk, L. (1997). Transfer from word training to reading in context: Gains in reading fluency and comprehension. *Learning Disabilities Quarterly*, *20*, 174–188.

Lindamood, P., & Lindamood, P. (1998). Lindamood Phoneme Sequencing Program for Reading, Spelling, and Speech. Austin, TX: Pro-Ed.

Lyon, G. R. (1995). Research in learning disabilities: Contributions from scientists supported by the National Institute of Child Health and Human Development. *Journal of Child Neurology*, *10*, 120–126.

MacArthur, C. A., Graham, S., & Schwarz, S. (1993). Integrating strategy instruction and word processing into a process approach to writing instruction. *School Psychology Review*, *22*, 671–681.

MacArthur, C. A., Ferretti, R. P., Okolo, C. M., & Cavalier, A. R. (2001). Technology applications for students with literacy problems: A critical review. *The Elementary School Journal*, *101*, 273–378.

MacArthur, C. A., Graham, S., Haynes, J. A., & De La Paz, S. (1996). Spelling checkers and students with learning disabilities: Performance comparisons and impact on spelling. *Journal of Special Education*, *30*, 35–57.

Maccini, P., & Gagnon, J. C. (2000). Best practices for teaching mathematics to secondary students with special needs. *Focus on Exceptional Children*, *32*, 1–22.

Maccini, P., & Hughes, C. A. (2000). Effects of a problem-solving strategy on the introductory algebra performance of secondary students with learning disabilities. *Learning Disabilities Research & Practice*, *15*, 10–21.

Marzano, R. J., Pickering, D. J., & Pollock, J. E. (2001). *Classroom instruction that works*. Alexandria, VA: Association for Supervision and Curriculum Development.

Mastropieri, M. A., Leinart, A., & Scruggs, T. E. (1999). Strategies to increase reading fluency. *Intervention in School and Clinic*, *34*, 278–283.

Mastropieri, M. A., & Scruggs, T. E. (1998). Enhancing school success with mnemonic strategies. *Intervention in School and Clinic*, *33*, 201–208.

McCoy, K. M., & Prehm, H. J. (1987). *Teaching mainstreamed students methods and techniques*. Denver, Colorado: Love Publishing Company.

McGrew, K. S. (2005). The Cattell-Horn-Carroll theory of cognitive abilities: Past, present, and future. In D. P. Flanagan & P. L. Harrison (Eds.), *Contemporary intellectual assessment: Theories, tests, and issues* (2nd ed.) (pp. 136–182). New York: Guilford.

McGrew, K. S., Schrank, F. A., & Woodcock, R. W. (2007). *Technical Manual, Woodcock-Johnson III Normative Update*. Rolling Meadows, IL: Riverside Publishing.

McLaughlin, T. F., Reiter, S. M., Mabee, W. S., & Byram, B. J. (1991). An analysis and replication of the Add-A-Word Spelling Program with mildly handicapped middle school students. *Journal of Behavior Education*, *1*, 413–426.

Meyer, M. S., & Felton, R. H. (1999). Repeated reading to enhance fluency: Old approaches and new directions. *Annals of Dyslexia*, *49*, 283–306.

Moats, L. C. (1995). *Spelling: Development, disability, and instruction*. Timonium, MD: York Press.

Moats, L. C. (1999). Teaching reading is rocket science. American Federation of Teachers.

Moats, L. C. (2001). Overcoming the language gap. *American Educator*, *25*(5), 8–9.

Moats, L. C. (2005). How Spelling Supports Reading. *American Educator*, Winter, 12–43.

Montague, M. (1992). The effects of cognitive and metacognitive strategy instruction on the mathematical problem solving of middle school students with learning disabilities. *Journal of Learning Disabilities*, *25*, 230–248.

Montague, M., & Candace, S. B. (1986). The effect of cognitive strategy instruction on verbal math problem-solving performance of learning-disabled adolescents. *Journal of Learning Disabilities*, *19*, 26–33.

Morin, V. A., & Miller, S. P. (1998). Teaching multiplication to middle school students with mental retardation. *Education and Treatment of Children*, *21*, 22–36.

Morrow, L. M. (1989). Designing the classroom to promote literacy development. In D. S. Strickland and L. M. Morrow (Eds.), *Emerging literacy: Young children learn to read and write* (pp. 96–159). Newark, DE: International Reading Association.

Nagy, W. E., & Scott, J. A. (2000). Vocabulary processes. In M. L. Kamil, P. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of reading research* (Vol. 3, pp. 269–284). Mahwah, NJ: Erlbaum.

National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction.* Washington, DC: National Institute of Child Health and Human Development.

Ogle, D. M. (1986). K-W-L: A teaching model that develops active reading of expository text. *The Reading Teacher*, *39*(6), 564–570.

O'Shea, L. J., Sindelar, P. T., & O'Shea, D. J. (1985). The effects of repeated readings and attentional cues on the reading fluency and comprehension of learning-disabled readers. *Learning Disabilities Research*, *2*, 103–109.

Palincsar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction*, *2*, 117–175.

Pellegrino. J. W., & Goldman. S. R. (1987). Information processing and elementary mathematics. *Journal of Learning Disabilities*, *20*, 23–32, 57.

Peters, E. E., & Levin, J. R. (1986). Effects of a mnemonic imagery on good and poor readers' prose recall. *Reading Research Quarterly*, *21*, 179–192.

Pittelman, S. D., Heimlich, J. E., Berglund, R. L., & French, M. P. (1991). *Semantic feature analysis: Classroom applications*. Newark, DE: International Reading Association.

Popkin, J., & Skinner, C. H. (2003). Enhancing academic performance in a classroom serving students with serious emotional disturbance: Interdependent group contingencies with randomly selected components. *School Psychology Review*, *32*, 282–295.

Pressley, M. (1998). *Reading instruction that works: The case for balanced teaching.* New York: Guilford Press.

Rashotte, C. A., & Torgeson, J. K. (1985). Repeated reading and reading fluency in learning disabled children. *Reading Research Quarterly*, *20*, 180–188.

Rathovan, N. (1999). *Effective school interventions*. New York: Guilford Press.

Rivera, D., & Deutsch Smith, D. (1988). Using a demonstration strategy to teach Midschool students with learning disabilities how to compute long division. *Journal of Learning Disabilities*, *21*, 77–81.

Samuels, S. J. (1979). The method of repeated readings. *The Reading Teacher*, *32*, 403–408.

Samuels, S. J. (1985). Automaticity and repeated reading. In J. Osborn, P. T. Wilson, & R. C. Anderson (Eds.), *Reading education: Foundations of a literate America* (215–230). Lexington, MA: Lexington Books.

Schermerhorn, P. K., & McLaughlin, T. F. (1997). Effects of the Add-A-Word Spelling Program on test accuracy, grades, and retention of spelling words with fifth- and sixth-grade regular-education students. *Child and Family Behavior Therapy*, *19*, 23–36.

Schrank, F. A. (2006). Specification of the cognitive processes involved in the performance on the Woodcock-Johnson III (Assessment Service Bulletin No. 7). Rolling Meadows, IL: Riverside Publishing.

Schumaker, J. B., Deshler, D. D., Alley, G. R., Warner, M. M., & Denton, P. H. (1982). Multipass: A learning strategy for improving reading comprehension. *Learning Disability Quarterly*, *5*, 295–304.

Sellke, D. H., Behr, M. J., & Voelker, A. M. (1991). Using data tables to represent and solve multiplicative story problems. *Journal for Research in Mathematics Education*, *22*, 30–38.

Shany, M. T., & Biemiller, A. (1995). Assisted reading practice. Effects on performance for poor readers in grades 3 and 4. *Reading Research Quarterly*, *30*, 382–395.

Shapiro, E. S., & Goldberg, R. (1986). A comparison of group contingencies for increasing spelling performance among sixth-grade students. *School Psychology Review*, *15*, 546–557.

Siegler, R. (1988). Individual differences in strategy choices: Good students, not-so-good students, and perfectionists. *Child Development*, *59*, 833–851.

Sinatra, R. C., Berg, D., & Dunn, R. (1985). Semantic mapping improves reading comprehension of learning-disabled students. *Teaching Exceptional Children*, *17*(4), 310–314.

Skinner, C. H., Turco, T. L., Beatty, K. L., & Rasavage, C. (1989). Cover, copy, and compare: A method for increasing multiplication performance. *School Psychology Review*, *18*, 412–420.

Snow, C. E., Burns, M. S., & Griffin, P. (1998). Preventing reading difficulties in young children. Washington, DC: National Academy Press.

Squire, L. R., & Schacter, D. L. (2003). *Neuropsychology of memory* (3rd ed.). New York: Guilford Press.

Stahl, S. A. (1999). *Vocabulary development*. Cambridge, MA: Brookline Books.

Stanovich, K. E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly*, *21*, 360–407.

Stanovich, K. E. (1994). Romance and reality. *Reading Teacher*, *4*, 280–90.

Stoddard, B., & MacArthur, C. A. (1993). A peer editor strategy: Guiding learning-disabled students in response and revision. *Research in the Teaching of English*, *27*, 76–103.

Strickland, D. S. (1991). Emerging literacy: How young children learn to read. In B. Persky and L. H. Golubchick (Eds.), *Early childhood education* (2nd ed.) (pp. 337–344). Lanham, MD: University Press of America.

Strickland, D. S., & Feeley, J. T. (1991). Development in the early school years. In J. Flood, J. M. Jensen, D. Lapp, & J. R. Squire (Eds.), *Handbook of research on teaching the English language arts* (pp. 529–535). New York: Macmillan Publishing Company.

Sulzby, E. (1992). Research directions: Transitions from emergent to conventional writing. *Language Arts*, *69*, 290–297.

Swanson, H. L. (2001). Searching for the best model for instructing students with learning disabilities. *Focus on Exceptional Children*, *34*, 1–15.

Tarver, S. G. (1992). Direct instruction. In W. Stainback, & S. Stainback (Eds.), *Controversial issues confronting special education: Divergent perspectives* (2nd ed.) (pp. 143–165). Boston: Allyn & Bacon.

Taylor, B. M., Frye, B. J., & Maruyama, G. M. (1990). Time spent reading and reading growth. *American Educational Research Journal*, *27*(2), 351–362.

Teale, W. H., & Sulzby, E. (1986). *Emergent literacy: Writing and reading*. Norwood, NJ: Ablex Publishing Corporation.

Templeton, S., & Bear, D. (Eds.) (1992). *Development of orthographic knowledge and the foundations of literacy*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Tierney, R. J., & Shanahan, T. (1991). Research on the reading-writing relationship: Interactions, transactions and outcomes. In R. Barr., M. L. Kamil, P. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research* (pp. 246–280). New York: Longman.

Tomeson, M., & Aarnoutse, C. (1998). Effects of an instructional programme for deriving word meanings. *Educational Studies*, *24*, 107–128.

Torgesen, J. K. (1997). The prevention and remediation of reading disabilities: Evaluating what we know from research. *Journal of Academic Language Therapy*, *1*, 11–47.

Trabasso, T., & Bouchard, E. (2002). Teaching readers how to comprehend text strategically. In C. C. Block & M. Pressley (Eds.). *Comprehension instruction: Research-based best practices* (pp. 176–200). New York: Guilford Press.

Truchlicka, M., McLaughlin, T. F., & Swain, J. C. (1998). Effects of token reinforcement and response cost on the accuracy of spelling performance with middle-school special-education students with behavior disorders. *Behavioral Interventions*, *13*, 1–10.

Uhry, J. K., & Shepherd, M. J. (1993). Segmentation and spelling instruction as part of a first-grade reading program: Effects on several measures of reading. *Reading Research Quarterly*, *28*, 219–233.

Van Houten, R., & Thompson, C. (1976). The effects of explicit timing on math performance. *Journal of Applied Behavior Analysis*, *9*, 227–230.

Walker, B., Shippen, M. E., Alberto, P., Houchins, D. E., & Cihak, D. F. (2005). Using the Expressive Writing program to improve the writing skills of high school students with learning disabilities. *Learning Disabilities Research and Practice*, *20*, 175–183.

Wallach, G. P., & Butler, K. G. (1994). Creating communication, literacy, and academic success. In G. P. Wallach & K. G. Butler (Eds.), *Language learning disabilities in school-age children & adolescents: Some principles & applications* (pp. 2–26). Boston: Allyn & Bacon.

Wiig, E. H., & Semel, E. M. (1984). *Language assessment and intervention for the learning disabled* (2nd ed.). Columbus, OH: Charles E. Merrill.

Wilson, B. (1988). *Wilson Reading*. Millbury, MA: Wilson Language Training Corporation.

Wolfe, P. (2001). *Brain matters*. Alexandria, VA: Association for Supervision and Curriculum Development.

Wong, B. Y. L., Harris, K. R., Butler, D. L., & Graham, S. (2003). Cognitive strategy instruction. *Handbook on Research in Learning Disabilities* (pp. 383–402). New York: Guilford Press.

Wong, B. Y. L., & Jones, W. (1982). Increasing metacomprehension in learning-disabled and normally achieving students through self-questioning training. *Learning Disability Quarterly*, *5*, 228–240.

Woodcock, R. W. (1998). Extending Gf-Gc theory into practice. In J. J. McArdle & R. W. Woodcock (Eds.), *Human cognitive abilities in theory and practice* (pp.137–156). Mahwah, NJ: Lawrence Erlbaum.

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001; 2007). *Woodcock Johnson III Tests of Achievement*. Rolling Meadows, IL: Riverside Publishing.

Woodcock, R. W., Schrank, F. A., McGrew, K. S., & Mather, N. (2007). *Woodcock Johnson III Tests of Achievement, Form C/Brief Battery*. Rolling Meadows, IL: Riverside Publishing.