

MULTISENSORY TEACHING_{of} Basic Language Skills



FOURTH EDITION

JUDITH R. BIRSH
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Foreword by Louisa C. Moats

Multisensory Teaching of Basic Language Skills

Fourth Edition

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Dr. Birsh was the editor of the first three editions of *Multisensory Teaching of Basic Language Skills*. She welcomes Dr. Suzanne Carreker, with her expertise in the field of literacy, as co-editor of the fourth edition. Dr. Birsh's enduring belief that well-prepared, informed teachers are the major influence on effective instruction in the field of reading and dyslexia had its beginning in 1960, when she met her first student who, although 18 years old, read poorly. The quest to find answers to this puzzle led her to a master's degree in remedial reading and a doctorate in reading and language at Teachers College, Columbia University. After training with Aylett R. Cox in Dallas, Texas, she became a Certified Academic Language Therapist and Qualified Instructor, founding and directing the multisensory teaching of basic language skills courses at Teachers College in the Department of Curriculum and Teaching, Program in Learning Disabilities. Since her retirement in 2000, Dr. Birsh has maintained her commitment to teacher preparation as an independent literacy consultant, by giving professional development workshops, consulting with private and public schools, writing articles, and working with students with dyslexia. In 2008, she received the Luke Waites Academic Language Therapy Association Award of Service and the Margaret Byrd Rawson Lifetime Achievement Award from The International Dyslexia Association.

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Dr. Carreker is developing content for blended-learning reading programs at Lexia Learning Systems. Her passion for teaching reading began with an impromptu opportunity to attend a lecture given by dyslexia pioneer Margaret Byrd Rawson. She taught at Briarwood School in Houston, Texas, and directed teacher preparation programs at Neuhaus Education Center in Houston for 28 years. During her second year of teaching, Dr. Carreker attended a 1-hour workshop presented by the three Neuhaus founders that led to her preparation as a CALT and QI at the center. Dr. Carreker believes that teachers' deep knowledge about reading and skill in teaching reading should not be the result of serendipity. To that end, Dr. Carreker served on the committee for the development of The International Dyslexia Association's (IDA) *Knowledge and Practice Standards for Teachers of Reading* and led the development of the Certification Exam for Effective Teaching of Reading—both guideposts for pre-service and in-service teacher preparation programs. She was the 2009 HBIDA Nancy LaFevers Community Service Award recipient for her contributions to students with dyslexia and related learning differences in the Houston area. In 2018, she received the Margaret Byrd Rawson Lifetime Achievement Award from the IDA.

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About the Contributors

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Ms. Allen served as Executive Director of Neuhaus Education Center from 2000 to 2007 and was Associate Director there from 1985 to 2000. She is a board member of the International Multisensory Structured Language Education Council (IMSLEC) and is coauthor of *Multisensory Reading and Spelling* (Neuhaus Education Center, 1993). She received the Nancy LaFevers Community Service Award from the Houston Branch of The International Dyslexia Association in 2016.

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Virginia (Ginger) Berninger taught in urban, suburban, and rural public schools (1967–1977) before her Ph.D. studies specializing in developmental, psycholinguistics, and cognitive psychology; she has been a licensed psychologist since 1983. She completed American Psychological Association–approved predoctoral and postdoctoral training in clinical psychology at Boston’s Children’s Hospital’s Ambulatory Pediatrics and Developmental Evaluation Clinic, specializing in specific learning disabilities, developmental disabilities, and individuals with physical and communication disabilities. She has served on medical school faculties at Harvard University and Tufts University and on the College of Education faculty at the University of Washington (1986–2016; currently Professor Emerita), where she was Director of an APA-approved school psychology program and taught courses on interdisciplinary foundations of education. She was Principal Investigator (PI) of Eunice Kennedy Shriver National Institute of Child Health and Human Development–funded grants from 1989 to 2008 on typical language learners, and later on an interdisciplinary center grant on specific learning disabilities, which conducted research on assessment, instruction, genetics, and brain imaging. She has authored or coauthored numerous peer-reviewed, interdisciplinary publications and participated in many professional development activities in person and online. She currently specializes in consultation and professional development.

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Dr. Cheesman specializes in teacher education and instructional technology to support Structured Literacy. Her university courses were among the first to be accredited by The International Dyslexia Association.

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Nancy Cushen White is a Clinical Professor at the University of California at San Francisco (UCSF) and a member of the UCSF Dyslexia Research Center Leadership Team; she also teaches classes in child and adolescent psychiatry. Since 1973, she has used multisensory structured language strategies to teach students of all ages. She worked for 40 years in San Francisco public schools as a classroom teacher, special education teacher, and program consultant in special education curriculum. Currently, Dr. Cushen White works as a Certified Academic Language Therapist, Board-Certified Educational Therapist, certified Slingerland teacher training course instructor, and dyslexia consultant in her private practice at the Dyslexia Evaluation & Remediation Clinic. She has been a Literacy Intervention Consultant and Case Manager for Lexicon Reading Center in Dubai since 2010. A member of the AB 1369 Work Group (California Department of Education) charged with drafting public school dyslexia guidelines required under the new law, Dr. Cushen White was also recipient of the 2007 Margaret Byrd Rawson Lifetime Achievement Award from The International Dyslexia Association (IDA),

the 2014 Etoile DuBard Award of Excellence from the International Multisensory Structured Language Education Council (IMSLEC), and the 2016 Lucius Waites Award of Service from the Academic Language Therapy Association (ALTA). She has served as a national IDA board member and as President of its Northern California Branch. She is an IDA representative to the National Joint Committee on Learning Disabilities; editor of the *Examiner*, IDA's monthly online newsletter; board member of IMSLEC and the Alliance for Certification and Accreditation; advisory board member for IDA's Northern California Branch and for Parents Education Network (PEN), and an advisor for PEN's student-organized, student-led SAFE Voices branch.

Carolyn DeVito, M.A., Assistant Executive Director, Montclair Community Pre-K, 49 Orange Road, Montclair, New Jersey

Carolyn DeVito is a long-time professional in the field of early childhood education. She has worked with children ages 3–5 for more than 40 years. For the past 20 years, Ms. DeVito has been Master Teacher and Assistant Executive Director at the Montclair Community Pre-K, which is a National Association for the Education of Young Children (NAEYC)-accredited center. It is also one of 21 centers initially identified by the Center for the Study of Social Policy as an exemplary program in the Strengthening Families Initiative. Ms. DeVito is a member of the adjunct faculty at Kean University in Union, New Jersey, teaching courses in the field of early childhood education.

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Mary Lupiani Farrell earned her Ph.D. at Teachers College, Columbia University. She is a professor at Fairleigh Dickinson University (FDU), where she directs the Center for Dyslexia Studies, through which FDU's International Multisensory Structured Language Education Council (IMSLEC) and International Dyslexia Association (IDA)-accredited Orton-Gillingham teacher training program is provided. Dr. Farrell is also University Director of the Regional Center for Students with Learning Disabilities, a comprehensive support program for colleges students with learning disabilities.

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Professor Garnett founded Hunter's learning disabilities graduate program in 1980. A year later, she launched the HC Learning Lab, nationally recognized in 1996 as an "Exemplary LD Program." Professor Garnett also developed the special education training for The Edison Schools and partnered with Uncommon, Achievement First, and Kipp charter systems. She has spearheaded grant programs; authored articles, chapters, and monographs; served on editorial boards; and consulted with a wide variety of public and private schools, K–12.

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Monica Gordon-Pershey is an associate professor in the School of Health Sciences at Cleveland State University in Cleveland, Ohio. She is a certified speech-language pathologist and holds a doctorate in language and literacy instruction. Her teaching and scholarship focus on language development and disorders. She is the author of over 130 articles, book chapters, and presentations.

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Ms. Hennessy is Past President of The International Dyslexia Association (IDA). She is an experienced teacher, diagnostician, and administrator. While working in public schools, she provided leadership in the development of professional learning systems, innovative programming for students with special needs, and a state-wide revision of special education code. She has designed and delivered keynote addresses, workshops, and training to educators nationally and internationally. She coauthored the second edition of Module 6 of *LETRS, Digging for Meaning: Teaching Text Comprehension* (with Louisa C. Moats; Sopris West, 2009) and was a national trainer for *Language Essentials for Teachers of Reading and Spelling (LETRS)*. In addition, she has written articles on varied topics. Ms. Hennessy is an honorary member of the Delta Kappa Gamma Society, the recipient of the North Carolina Branch of IDA's *June Lyday Orton Award* 2012 and the IDA's *Margaret Byrd Rawson Lifetime Achievement Award* in 2011.

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Dr. Henry received her doctorate in educational psychology from Stanford University. She was a Fulbright Lecturer/Research Scholar at the University of Trondheim, Norway, in 1991. Dr. Henry served as President of The International Dyslexia Association from 1992 to 1996. She now provides professional development for schools and organizations across the country.

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Dr. Hess is a psychologist in independent practice who has more than 20 years of experience in assessing toddlers, children, adolescents, and young adults. He frequently speaks at conferences and seminars about assessment and learning disorders. He is a graduate of the University of Chicago and of the Illinois School of Professional Psychology. He performed his clinical training at The University of Chicago Medical Center, Northwestern Memorial Hospital, and SUNY-Stony Brook's University Counseling Center and Child and Adolescent Program. He is

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Betsy MacDermott-Duffy is Director of Language Arts and Instruction at The Windward School and former Director of Curriculum Instruction at The Graham School, both located in Westchester County. She has published several articles in professional magazines, including *Perspectives on Language and Literacy*, the official publication of The International Dyslexia Association. She is also the author of the *Teaching Basic Writing Skills Activity Templates*, published by Voyager-Sopris Learning. In addition to serving as a consultant for educational companies, Ms. Duffy presents at conferences throughout the United States on reading, writing, and vocabulary strategies, as well as executive functioning and the Common Core State Standards (CCSS). She is an International Multisensory Structured Language Education Council (IMSLEC) teacher trainer and holds a certification as a Dyslexia Practitioner. Ms. MacDermott-Duffy has a master's degree in learning disabilities, is certified in advanced graduate study of staff development, and earned a master's degree in school administration and supervision.

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Dr. Marzola received her doctorate in special education (with a focus on learning disabilities) from Teachers College, Columbia University. She taught for more than 35 years at every level from kindergarten through graduate school and has conducted numerous staff development trainings for those interested in improving instructional strategies for struggling learners. Dr. Marzola has been a keynote speaker and presented at many national and international conferences; she has published articles in professional journals and chapters in books about learning disabilities. She was honored by the New York State Federation of the Council for Exceptional Children with the New York State Teacher of the Year Award. Dr. Marzola is Past President of the New York Branch of The International Dyslexia Association and also served on its Board of Directors. She also served on the

Board of Directors of Everyone Reading in New York and created and presented a webinar on comprehension for the New Jersey Department of Education.

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Dr. Neuhaus is a faculty member of the Psychology Department of the University of Houston–Downtown, where she teaches, mentors students, and conducts research in the area of automaticity and reading fluency.

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Dr. Paulson is a speech-language pathologist and literacy specialist with years of experience working with young children and their families and teachers in public school, Head Start, private, and university settings. She has a unique and broad-based perspective blending areas of language, literacy, and social communication together, resulting in effective and engaging learning opportunities for children and valuable foundations for teachers. She is the lead author of *Language Essentials for Teachers of Reading and Spelling (LETRS) for Early Childhood Educators, Second Edition* (Voyager Sopris Learning, 2018); *Building Early Literacy and Language Skills* (Sopris West, 2001), a resource and activity guide for young children; and *Good Talking Words* (Sopris West, 1998), a social communication skills program for preschool and kindergarten. In addition, Dr. Paulson served on the faculty of the Communicative Sciences and Disorders Department at the University of Montana, sharing responsibilities for teaching, supervising, research, and service.

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Eve Robinson is an experienced early childhood professional who has worked in the field for more than 30 years. She led an exemplary early childhood center, the Montclair Community Pre-K (MCPK), for 13 years as it became nationally and internationally known for its educational approach as well as its support of families. The MCPK was one of only 21 early childhood centers in the United States to be recognized as exemplary by the Center for the Study of Social Policy Strengthening Families Initiative. In addition, Ms. Robinson is a professor at Montclair State University and an appointed member of the Montclair Board of Education.

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Dr. Schedler partners with schools to develop and implement sustainable reading workshops and school-based programs. As an Academy Graduate of Learning

Forward, her work focuses on the intersection of reading curriculum and professional learning. Dr. Schedler is a former International Dyslexia Association (IDA) Branch President. Her experience includes classroom teacher, reading director in a private school for special needs, adjunct professor, and teacher trainer across grade levels. Dr. Schedler works nationally and internationally with schools, training centers, and educational organizations.

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Ms. Singer prepares prospective teachers in early literacy, early childhood, and special education. She was the lead teacher of the Language Enrichment Program at Pascack Hills High School, an Alphabetic Phonics–based program, created by the Neuhaus Education Center, and also taught at The Stephen Gaynor School, early intervention services, and elementary school districts in New Jersey. She received her M.A. in the education of children with learning disabilities at Teachers College, Columbia University, and began doctoral studies in teacher education teacher development at Montclair State University in Fall 2017. She is the recent recipient of the NISOD Excellence Award, which honors exceptional work of community college faculty.

Lydia H. Soifer, Ph.D., Language and Speech Pathologist; Founder and for its 25-year tenure, Director of The Soifer Center for Learning and Child Development

Dr. Soifer is an assistant professor of pediatrics at Albert Einstein College of Medicine, Bronx, New York, and a faculty member of the Early Intervention Training Institute of the Children’s Evaluation and Rehabilitation Center of the Montefiore Hospital Medical Center. As a parent educator, teacher trainer, and staff developer in public and private schools, mainstream, and special education schools, Dr. Soifer’s focus has been on the dynamic among the factors influencing a child’s ability to learn. Her approach is cognitive-linguistic in nature, with an emphasis on the role of both the teacher’s trained and conscious use of language and the student’s language abilities in effective teaching and learning. Dr. Soifer is a frequent presenter at national and local conferences and regularly offers courses on language, literacy, and learning, as well as training in her program, *Classroom Language Dynamics*.

Gloria Trabucco, M.A., Founding Teacher/Curriculum Director, Montclair Community Pre-K, Montclair, New Jersey

Ms. Trabucco has been an early childhood educator and administrator for 40 years. Opening Montclair Community Pre-K and developing its curriculum was one of the biggest and most rewarding challenges of her career. She is happy that the field of early childhood education and its teachers are beginning to get the recognition they so deserve.

Colleen Uscianowski, M.S., Ph.D candidate, Adjunct Instructor, Teachers College, Columbia University, 525 W 120th Street, New York, New York

Colleen Uscianowski is an experienced special educator and adjunct lecturer at Hunter College and Teachers College, Columbia University. She is a co-founder of Luminous Learning, a company that creates specialized math materials for students with disabilities. She is currently completing her doctoral degree in Cognitive Studies in Education at Teachers College, Columbia University. Her research focus is on early childhood math and remediation for struggling learners.

Barbara A. Wilson, M.Ed., President, Wilson Language Training, 47 Old Webster Road, Oxford, Massachusetts

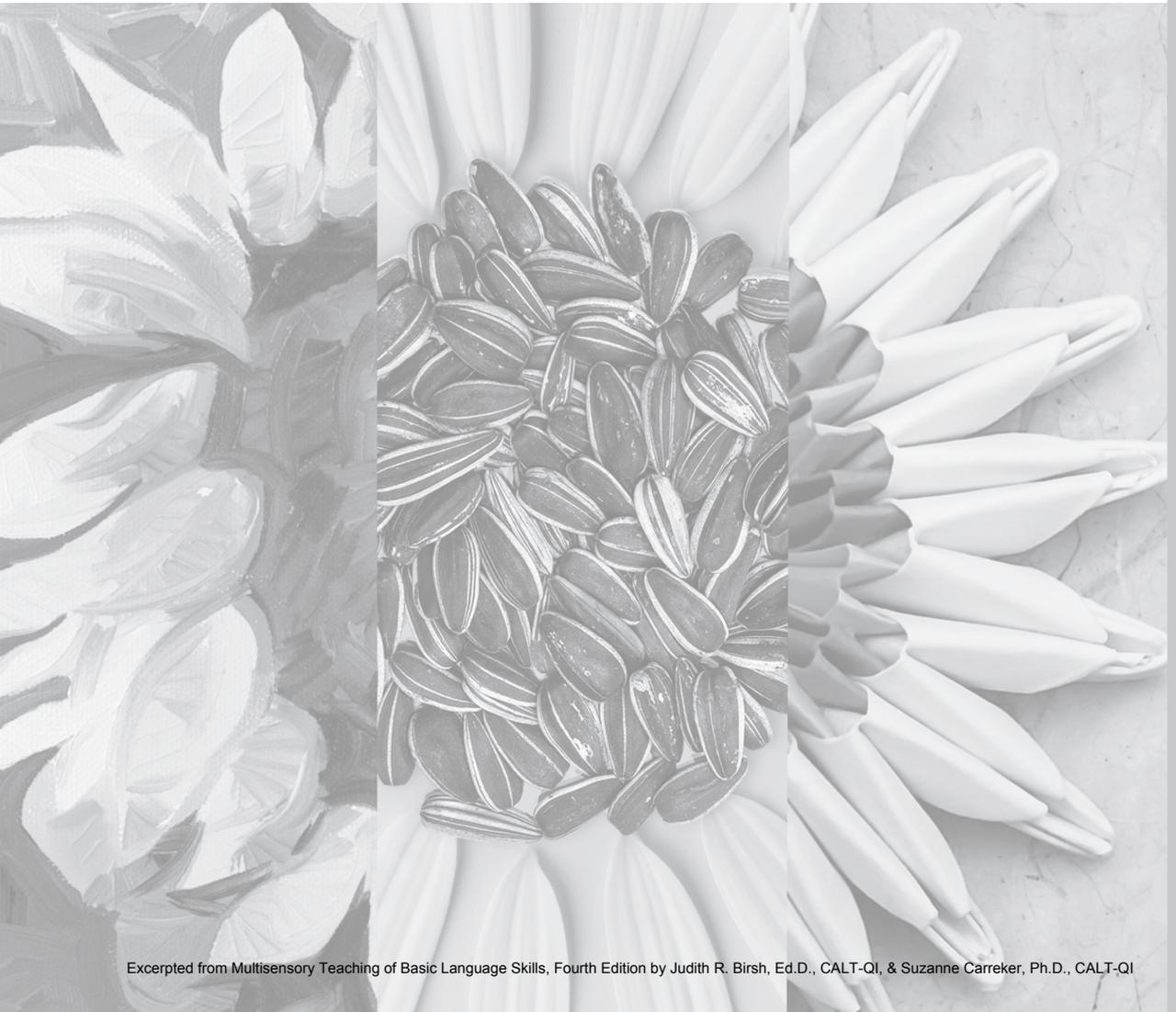
Barbara A. Wilson is the co-founder and president of Wilson Language Training, which provides materials and professional learning throughout the country. In 1988, Ms. Wilson authored the Wilson Reading System[®], now in its fourth edition, based on reading research and her work at Massachusetts General Hospital Reading Disabilities Clinic, where she taught adults with dyslexia. Ms. Wilson developed and oversees graduate courses and clinical practicums, which lead to Wilson[®] Dyslexia Practitioner and Therapist certifications, which are accredited International Dyslexia Association (IDA) Tier 3 training programs. More than 25,000 teachers hold Wilson certifications in the United States. This certification is also an integral component for several university programs. Ms. Wilson has authored two other multisensory structured language programs: Foundations[®] for K–3 students and Just Words[®] for students in Grades 4–12 and adults. Ms. Wilson provides professional expertise for several organizations and efforts dedicated to reading and dyslexia. She was invited to the White House to speak to the President’s Domestic Policy Adviser on Education regarding the issue of literacy in America’s middle and high schools, and in 2015, she testified in front of the U.S. House of Representatives’ Committee on Science, Space, and Technology in support of H.R. 3033, the Research Excellence and Advancements for Dyslexia (READ) Act, which was later signed into law. Ms. Wilson has been awarded honorary doctorate degrees from two Massachusetts institutions: Becker College and Fitchburg State University.

Beverly J. Wolf, M.Ed., Slingerland Consultant

Ms. Wolf is a former classroom teacher; tutor; Slingerland Consultant for the Renton Public Schools; Dean of Faculty for the Slingerland Institute for Literacy; and head of a Hamlin Robinson School for children with dyslexia. She continues to train teachers in the Slingerland[®] Adaptation of the Orton-Gillingham Approach and in Prerequisites for Beginning Reading. Ms. Wolf is the author of articles and books about dyslexia and creative activities for the classroom and language-related guides for classroom teachers, most recently, with Virginia Wise Berninger: *Dyslexia, Dysgraphia, OWL LD, and Dyscalculia: Lessons from Science and Teaching* (Paul H. Brookes Publishing Co., 2016).

Section I

Introduction to Multisensory Teaching



Chapter 1

Connecting Research and Practice

Judith R. Birsh

In the midst of many cultural treasures, reading is by far the finest gem.

–Stanislas Dehaene (2009)

LEARNING OBJECTIVES

1. To describe the importance of aligning the science of reading with best practices for instruction
2. To outline the essential components of reading and elements of effective instruction
3. To explain scientifically based reading research and how it has informed the understanding of dyslexia
4. To summarize the reasons for delivering evidence-based reading instruction to all students
5. To interpret the relationship between teacher preparation and student achievement

Teachers rarely remember how they learned to read, unless they met with difficulty. Some remember they learned by looking at the words and the pictures and putting them together early in first grade. Yet, understanding the complex **linguistic** tasks involved is crucial to their ability to succeed as exemplary teachers of literacy. To many, reading seems a natural act, whereas it is anything but natural. Listening and speaking are hardwired into the brain, but written language has to be acquired through instruction.

This book discusses Structured Literacy instruction, an approach grounded in scientific research for acquiring all literacy skills emphasizing direct, explicit, sequenced, systematic, cumulative, and intensive lessons, while incorporating multisensory instructional strategies. The dissemination of the relevant science of reading is a priority so that committed and motivated teachers receive appropriate information and training in this foundation in how reading works and how children learn (Seidenberg, 2017). New in this edition is a chapter focused on developing pre-kindergarten preparation for literacy; one on the importance of executive function, especially attention and memory, when planning lessons; and another on specific methods, techniques, and activities for the understanding of mathematical thinking and dyscalculia. The underlying premise of all the chapters is to promote the use of student data to drive and differentiate instruction based on specific techniques and activities to develop mastery.

The term **multisensory strategies** means the use of direct instructional strategies involving visual, auditory, and tactile–kinesthetic sensory systems to learn

the phonological, morphemic, semantic, and syntactic layers of language along with the articulatory–motor aspects of language. Listening, speaking, reading, and writing are directly involved while the student sees, hears, says, and writes during brief and varied lesson routines (Birsh, 2006).

Mastery of the details within words, sentences, and paragraphs evolves from exposure to expert teachers who have the knowledge and skills to deliver top-notch instruction from elementary school through high school. To be ready for such high-level tasks, teachers need to undergo extensive preparation in the disciplines inherent in literacy: language development, **phonology** and **phonemic awareness**, alphabet knowledge, handwriting, **decoding**, spelling, **fluency**, **vocabulary**, **comprehension**, composition, testing and **assessment**, lesson planning, behavior management, history of the English language, use of technology, and the needs of older struggling readers.

The national spotlight on literacy is intense due to several developments. One major concern is the movement toward data analysis and research to improve instruction. For example, following the **No Child Left Behind (NCLB) Act of 2001 (PL 107-110)** legislation and the subsequent Reading First initiative were several changes that affected multiple aspects of education, including literacy. These included 1) **response to intervention (RTI)** (Gersten et al. 2008) as a way of assessing risk of failure, benchmarking progress, and providing **differentiated instruction** to struggling students, including those who struggle with literacy; 2) the creation of the Common Core State Standards Initiative: Preparing America’s Students for College and Career (Council of Chief State School Officers [CCSSO] & National Governors Association Center for Best Practices [NGA Center], 2010); and the adoption of The International Dyslexia Association’s (IDA; 2018) *Knowledge and Practice Standards for Teachers of Reading*. Using research-based information, each “movement” is an attempt to bring high-level content and best practices to schools to improve the delivery of equitable instruction and to uphold high standards for administrators, teachers, parents, and students. Along with these efforts, organizations were formed to change states’ licensure for teaching reading and to influence how teachers are prepared in schools of education and through professional development in alternative pathways models of effective instruction, with the help of coaching and mentoring to ensure consistent translation into good practice. Parents organized to improve understanding and ensure better provision of services. Appendix 1.2 lists organizations dedicated to these purposes.

Teachers who have a wide range of experience and a strong foundation of knowledge enhanced by scientifically based reading research from which to make judgments about what to teach, how to teach it, when to teach it, and to whom to teach it, increase the chances of a successful outcome when working with all students but especially with students at risk of failing to learn to read or with those who have already fallen behind (Aaron, Joshi, & Quatroche, 2008; McCardle, Chhabra, & Kapinus, 2008). When an individual struggles with written language, none of the myriad layers of language processing can be taken for granted. Differentiated instruction is language based—intensive, systematic, direct, and comprehensive. Each individual is different and brings unique cognitive and linguistic strengths and weaknesses to the task. Therefore, teachers who work at prevention, intervention, or remediation require a foundation based on scientific evidence and need to be informed about the complex nature of instruction in reading and related skills.

Since the early 1980s, a broad range of individuals have made major contributions to research on the component processes of learning to read, reading disabilities, language disabilities, and models of effective instruction. More research is needed, but teachers must work with what is already known.

THE SCIENCE OF READING

This keen interest in the newly acknowledged science of reading (Kilpatrick, 2015; Seidenberg, 2017) has involved general and special educators, psychologists, linguists, neuroscientists, geneticists, speech-language specialists, parents, and children with and without reading difficulties. Since the previous edition of this book, reading instruction is no longer based on opinion; rather, it is informed by science in an orderly progression of research data that shows what works. This book focuses on scientifically based instruction in reading and related literacy skills. In this chapter, five major concerns from research are explored so that teachers have ways to think about and apply relevant theory and substantiated practices:

1. What is scientifically based reading research, and why is it important?
2. What has scientifically based reading research explained about the components of reading?
3. How has scientifically based reading research advanced understanding of **dyslexia**?
4. How can teachers deliver evidence-based reading instruction with fidelity of implementation so that students learn to read with accuracy, fluency, and comprehension?
5. How does scientifically based reading instruction correspond to the Common Core State Standards and other state standards in furthering reading proficiency and preparing students for college, career, and life?

DEFINITION AND IMPORTANCE OF SCIENTIFICALLY BASED RESEARCH

Scientifically based research, also referred to as **evidence-based research**, gathers evidence to answer questions and bring new knowledge to a field of study so that effective practices can be determined and implemented. Scientific research is a process.

A scientist develops a theory and uses it to formulate hypotheses. A study is designed to evaluate the hypotheses. The methods used in the study depend on the hypotheses, and these methods result in findings. The scientist then integrates what is found from this particular study into the body of knowledge that has accumulated around the research question. As such, scientific research is a cumulative process that builds on understandings derived from systematic evaluations of questions, models, and theories (Fletcher & Francis, 2004). Lyon and Chhabra (2004) underscored that good evidence is derived from a study that asks clear questions that can be answered empirically, selects and implements valid research methods, and accurately analyzes and interprets data.

Using **randomized controlled trials** is a critical factor in establishing strong evidence for what works (causation) in **experimental research**. This means that individuals in an intervention study are randomly assigned to experimental and

control groups. With randomized controlled trials, all variables are held constant (e.g., gender, age, demographics, skill levels) except the one variable that is hypothesized to cause a change. This allows the researcher to show a causal relationship between the intervention and the **outcomes**; in other words, the intervention caused a change, thus establishing what does and does not work. **Quasi-experimental research** attempts to determine cause and effect without strict randomized controlled trials and is valid but less reliable. The **meta-analysis** done by the National Reading Panel (NRP; National Institute of Child Health and Human Development [NICHD], 2000) reviewed both experimental and quasi-experimental studies of instructional practices, procedures, and techniques in real classrooms. The NRP's criteria closely followed accepted practices for evaluating research literature found in other scientific disciplines, such as medicine, and in behavioral and social research (Keller-Allen, 2004). The major recommendations from the meta-analyses were that every child needs to be taught the Big Five—phonemic awareness, **phonics**, fluency, vocabulary, and comprehension—as the basis of literacy instruction beginning in kindergarten.

Peer review and the **convergence of evidence** should also be considered. Peer review stipulates that the results of an intervention study be scrutinized and evaluated by a group of independent researchers with expertise and credentials in that field of study before the results are publicly reported in a journal article, book, or other type of publication. Another avenue of critical review is through presentations and papers that are scrutinized by fellow scientists to bring objectivity, validity, and reliability into the process of educational research (Fletcher & Francis, 2004). Convergence of evidence derives from the identical replication of a study in a similar population by other researchers because the outcomes from a single study are not sufficient to generalize across all populations. Other caveats for educational research are to be clear about the specific intervention, monitor it, and then use valid and reliable outcome measures (Reyna, 2004).

There are two kinds of educational research methodology: qualitative and quantitative. **Qualitative research** involves observing individuals and settings and relies on observation and description of events in the immediate context. **Ethnographic observation** is an example of qualitative research in which researchers observe, listen, and ask questions to collect descriptive data in order to understand the content, context, and dynamics of an instructional setting. Qualitative research can be scientific if it follows the principles of scientific inquiry. It is difficult to say what works or does not work (causation) in qualitative research; however, this kind of research affords a picture of what is happening and a description of the context.

Quantitative research uses large numbers of individuals to generalize findings to similar settings using statistical analyses. Quantitative research must use experimental or quasi-experimental design methods to gather data.

Some debate exists over whether quantitative or qualitative research is better, which obscures the principle. It is not the method of observation (qualitative vs. quantitative) that qualifies a study as providing rigorous evidence; rather, it is the fact that the design follows scientific inquiry. For example, a study must have enough individuals in well-matched groups so that **statistical significance** between groups can be established. Regression-discontinuity (Schochet et al., 2010), which uses a cut-off point instead of random assignment in making comparison groups, and the use of single-case studies (Kratochwill et al., 2010) are now being considered along with randomized controlled trials. This expansion to

include both experimental and descriptive research paradigms will be interesting to follow for its effect on the outcomes of interventions in reading.

The U.S. Department of Education, Institute of Education Sciences (2008), is a resource that further explains evidence-based research and provides educational practitioners with tools to distinguish practices supported by rigorous evidence from those that are not. Also, Kilpatrick (2015) and Seidenberg (2017) discussed the progress and the pitfalls in current reading research. Another resource to find out what works in education is the Florida Center for Reading Research web site (<http://www.fcrr.org>), which provides excellent reviews of programs.

The National Reading Panel

In 1997, the U.S. Congress asked the director of the National Institute of Child Health and Human Development (NICHD), in consultation with the Secretary of Education, to convene a national panel to assess the status of research-based knowledge, including the effectiveness of various approaches for teaching children to read (NICHD, 2000). Thus, unlike previous inquiries, the NRP analyzed experimental and quasi-experimental research literature, using rigorous research standards, to determine how “critical reading skills are most effectively taught and what instructional methods, materials, and approaches are most beneficial for students of varying abilities” (NICHD, 2000, p. 1-1). The NRP intensively reviewed the following topics:

- Phonemic awareness
- Phonics instruction
- Fluency
- Comprehension
- Teacher education and reading instruction
- Computer technology and reading instruction

The findings from the meta-analyses (i.e., longitudinal studies, cognitive and linguistic studies, studies in neurobiology) by the subgroups in this list of topics reviewed by the 14 members of the NRP (NICHD, 2000) revealed consensus among effective educators on what works in reading instruction. As a result of the review of the literature, the panel arrived at strong conclusions (Pressley, 2002) and identified the following five critical components that are essential for teaching young children to read:

1. Phonemic awareness
2. Phonics
3. Vocabulary development
4. Reading fluency, including oral reading skills
5. Reading comprehension strategies

Research by itself cannot improve practice. The importance of converging scientific evidence in reading research and its relationship to practice, however, has begun to gain new prominence in the thinking of not only teacher educators and teachers but also government officials on the federal, state, and local levels charged

with educational reform; business people; and parents and caregivers of young children. The 2017 report of the most recent National Assessment of Educational Progress (NAEP) indicated that fourth-grade reading scores have changed little since the 1980s, with about 67% of fourth-grade students performing at or below *basic* level, and only 31% performing at or above *proficient* (National Center for Education Statistics, 2017). Achievement gaps still persist, with no significant changes among racial/ethnic groups, gender, or types of schools (National Center for Education Statistics, 2017). The tests measured knowledge of literary and informational reading comprehension. Teachers must adopt more effective instructional practices and policies to close the reading gap and to solve the problem of pervasive, persistent reading failure.

The ongoing, dynamic process of scientifically based reading research is identifying the causes of reading failure and the practices that help children—including those most at risk—learn to read. Snow (2004) emphasized that knowing which practices work to produce specific results in the critical areas of reading instruction could help many teachers use methods and approaches in their daily work that are consonant with research-based evidence and could thus help significantly more children learn to read proficiently. Layered on top of this important research are the new fields being investigated with a future impact on reading instruction in psychology, linguistics, cognitive science, cognitive neuroscience, and human memory, which Seidenberg said are “being studied in the context of how students acquire, retain, and forget new information and how courses can be structured to promote learning, retention and ‘transfer’” (2017, p. 290).

College- and Career-Readiness Standards

The **Common Core State Standards (CCSS)** and other state standards define educational goals for what students should know and be able to do in reading by the end of each grade level so that by high school graduation they will be prepared to succeed in college, career, and adult life. In part, the genesis of these college- and career-readiness standards were studies that documented a steady decrease in the complexity of K–12 textbooks since the 1960s, whereas the complexity of college textbooks has remained the same or has increased (see Williamson, 2008). Because of the gap between students’ reading proficiency at the end of high school and the demands of more complex texts, many students face significant challenges related to reading ability in college.

Readiness standards are responsible for the trend of reading increasingly complex texts, beginning in kindergarten and continuing through high school. By the end of high school, students are expected to read grade-appropriate complex text independently and proficiently. Fluent reading, vocabulary, syntactic awareness, general knowledge, and basic comprehension skills and strategies are indispensable as the foundation for reading increasingly complex text. The instruction presented in this book will prepare students for the rigorous reading they will need for college, career, and adult life.

RESEARCH ON THE COMPONENTS OF READING

While researchers were studying learning disabilities such as dyslexia, they learned how reading develops in readers both with and without reading impairments. NICHD-sponsored studies of both struggling and skilled readers led to data on more than 42,000 readers. These findings have straightforward, practical

implications for teachers of typically developing readers and those students with dyslexia and other related co-occurring challenges (Lyon, 2004).

There is a broad scientific consensus, based on empirical evidence, on what is needed to become a good reader. Two important sources for this agreement are the National Research Council report (Snow, Burns, & Griffin, 1998) and the NRP report (NICHD, 2000). This consensus on the high-priority skills that children must acquire as they learn to read is based on clear evidence.

The five essential components of reading instruction are sometimes referred to as the building blocks for reading (Partnership for Reading, 2003). Most educators agree that no single reading component is sufficient in itself. Students need to acquire all of the combined essential components in a balanced, comprehensive reading program to become successful readers. The chapters in this book give detailed analyses of the research pertaining to each component and provide the reader with in-depth discussions of approaches for developing and implementing instruction in each of these component areas. Consider the conclusions of the NRP on essential reading skills instruction, along with a few key ideas from the CCSS.

Phonemic Awareness

The Partnership for Reading defined *phonemic awareness* as “the ability to notice, think about and work with the individual sounds in words” (2003, p. 2). The NRP meta-analysis confirmed that phonemic awareness, along with knowing the names and shapes of both lower- and uppercase letters, is a key component “that contributes significantly to the effectiveness of beginning reading and spelling instruction” (NICHD, 2000, p. 2-43). Phonemic awareness plays a vital role in learning to read because it helps children connect spoken language to written language. (See Chapter 6 for a detailed discussion of how to teach phonemic awareness.) It helps expose the underlying sounds in language that consequently relate to the alphabetic symbols on the printed page. Phonemic awareness has a causal relationship with literacy achievement, and understanding it in kindergarten is the single best predictor of later reading and spelling achievement in first and second grade (Catts, Nielsen, Liu, & Bontempo, 2015; de Groot, van den Bos, Minnaert, & van der Meulen, 2015).

In kindergarten, phonemic awareness predicts growth in word-reading ability (Torgesen, Wagner, & Rashotte, 1994). Children at risk because of early speech-language impairments and those with dyslexia perform more poorly on tests of phonemic awareness than typically developing children. When children do not have good word-identification skills, they fall behind in reading, and without appropriate intervention, they have only a 1 in 8 chance of catching up to grade level (Juel, 1988).

Numerous studies of weak readers with highly effective outcomes that provided training intensively in phonemic awareness, phonic decoding, and opportunities to read connected text reported by Kilpatrick stand as a rebuttal to taking a “wait-and-see” approach to early reading difficulties (2015, p. 113). Without the ability to think about and manipulate the individual sounds in words, beginning and especially older struggling readers risk falling behind or never catching up to their peers. Isolating and manipulating sounds in words using oral **segmenting** and **blending** activities helps children learn the **alphabetic principle** as they are learning to read and spell. Learning letter names and shapes is an important adjunct to these skills (see Chapter 5 on alphabet knowledge).

Although phonemic awareness is a means to understanding and using letters and sounds for reading and writing, it is not an end in itself (see NICHD, 2000, p. 2-43). Phonemic awareness stands as one of the major components of a comprehensive program of instruction when taught in small groups and in moderate amounts. Children differ in their need for instruction, but phonemic awareness benefits everyone, especially those with little experience detecting and manipulating speech sounds (see Chapter 5).

Phonics

Systematic and explicit instruction in phonics, the relationship between letters or **letter combinations** in written language (**graphemes**) and the approximately 44 sounds in English spoken language (**phonemes**), has proven effective for improving children's reading (Adams, 1990; NICHD, 2000; Partnership for Reading, 2003). It is best introduced early in kindergarten and first grade, which leads to accurately recognizing familiar words and decoding unfamiliar words. Teaching phonics is beneficial for all children, regardless of socioeconomic status (SES), especially when it is accompanied by memory aids such as **key words** for sounds, pictures, and articulatory gestures (McCardle et al., 2008).

Eden and Moats pointed out the reciprocal relationship between phonemic awareness and reading in that "learning how letters represent sounds (phonology) and seeing words in print (**orthography**) helps novice readers to attend to speech sounds" (2002, p. 1082). Phonics, deemed valuable and essential, should be integrated with other types of reading instruction in a comprehensive program that includes all of the reading components listed previously in this chapter. The NRP found solid support for using systematic phonics rather than an unsystematic approach or no phonics at all because systematic phonics (i.e., a plan or sequence to introducing letter-sound relationships) provided a more significant contribution to children's growth in reading (NICHD, 2000). It has a great impact on children in kindergarten and first grade, with the greatest effects shown with beginning readers who are at risk and have low SES backgrounds (Keller-Allen, 2004). However, **effect sizes** among children from low- and middle-income homes for the outcomes of phonics instruction did not differ, leading Ehri, Nunes, Stahl, and Willows to conclude that "phonics instruction contributes to higher performance in reading" in students from low-SES and middle-SES backgrounds (2001, p. 418). Systematic phonics has its greatest effect in the early grades; that is, in kindergarten and first grade for all beginning readers, children at risk, and children diagnosed with reading disabilities. Phonics instruction at any age, however, facilitates learning to read.

Another important finding of the NRP meta-analysis was that positive results were produced through one-to-one tutoring, in small-group instruction, and in whole-class programs (Ehri et al., 2001). Furthermore, systematic phonics can be taught through **synthetic** phonics, **analytic** phonics, phonics through spelling, analogy phonics, and **embedded phonics**. (It is beyond the scope of this chapter to discuss these approaches in detail; for more information see Ehri, 2004.) Pressley (2002) agreed that phonics instruction calls for more than a one-size-fits-all approach. Many variations are possible as long as the program is both extensive and systematic.

One added benefit of systematic phonics instruction is its impact on beginning readers' comprehension. Subsequent to the NRP report, researchers have found

that phonics does indeed have benefits for struggling readers who are older when taught systematically (Connor, Morrison, & Underwood, 2007). In many ways, Chall (1967) said it best when she said students need both phonics and meaning-focused activities in balanced reading programs. (See Chapter 9 for discussion of teaching accurate decoding as part of reading instruction.)

Fluency

Beginning readers need to be fluent in letter naming, knowledge of sounds, and phonemic awareness activities. Fluency, however, was defined by the Partnership for Reading as “the ability to read a text accurately and quickly, recognize words, [and] gain meaning from text” (2003, p. 22). This is a key concept, with well-documented converging evidence supporting the connection between fluency and reading comprehension (Rasinski, 2017; Snow et al., 1998). Without the advantage of fluency, children remain slow and laborious readers. Meaningful improvements in reading fluency are well documented when a range of well-described instructional approaches are used. (See Chapter 12 for a detailed discussion of methods for building fluency.)

Major approaches to teaching fluency include **guided oral reading** procedures that include repeated oral reading, with modeling by the instructor, in which students receive feedback from peers, parents, or teachers. Guided oral reading and encouraging students to read are effective in improving fluency and overall reading achievement (see NICHD, 2000). Gaps in fluency remain in older students, however, in both those with extremely low word-level reading skills and those who have good, compensated word accuracy skills but need remediation to enable them to read faster with sufficient comprehension.

Vocabulary

Knowing word meanings is a major contributor to students’ ability to communicate ideas and comprehend text. The NRP analyses confirmed that there is a strong relationship between vocabulary learning and comprehension gains (NICHD, 2000). Although the database of studies on vocabulary instruction and measurement that qualified for the NRP review was small, the panel did find some trends in the data that have implications for instruction:

- Vocabulary should be taught both directly and indirectly.
- Repetition and multiple exposures to vocabulary items are important.
- Learning in rich contexts is valuable for vocabulary learning.
- Vocabulary tasks should be restructured when necessary.
- Vocabulary learning should entail active engagement in learning tasks.
- Computer technology can be used to help teach vocabulary.
- Vocabulary can be acquired through **incidental learning**.
- How vocabulary is assessed and evaluated can have a differential effect on instruction.
- Dependence on a single vocabulary instruction method will not result in optimal learning.

The CCSS promotes the use of **academic vocabulary**, which is different from the vocabulary that is used in everyday conversation. Academic vocabulary is often referred to as the language of the classroom. Words related to the features and structures of informational text, rhetorical devices used in literary text, domain-specific words, grammatical terms, and morphology are examples of academic vocabulary. Such language is an essential part of the oral and written discourse necessary for academic success and should be used liberally throughout the school day. Many of the bolded words in the chapters of this book (collected and defined in the Glossary) are academic vocabulary. See Chapter 15 for research and teaching activities for vocabulary. Each academic content area includes vocabulary specific to that content area; for example, see Chapter 13 on math, which stresses the importance of understanding the many terms used regularly as students learn all levels of math.

Students need a broad daily lexicon to function in and out of school, but to carry them through content courses, they will need academic language to allow them to comprehend what their courses demand by understanding the vocabulary in the material being studied. Chapter 15 describes in detail the most practical and useful ways to teach vocabulary and its impact on comprehension.

Comprehension

Comprehension is making sense of what is read and depends on good **word recognition**, fluency, vocabulary, world knowledge, and verbal reasoning. Good instruction calls for attention to comprehension when children listen to books read aloud and as soon as they begin reading text. Since the 1980s, research on comprehension instruction has supported using specific **cognitive strategies**, either individually or in concert, to help readers understand and remember what they read (NICHD, 2000). Direct instruction of these cognitive strategies in the classroom leads to active involvement of the readers and helps readers across the range of ability. Chapter 16 presents many research-supported strategies as well as other promising methods designed to improve this essential reading skill within a multisensory learning environment.

Metacognition is thinking about thinking. Good readers think about what they are reading in complex ways. The research suggests that students will improve in their ability to comprehend text through modeling and metacognitive instruction by the teacher (Klingner, Morrison, & Eppolito, 2011). Effective strategies include question answering and generation, summarization, graphic and semantic organizers such as story maps, **comprehension monitoring**, and **cooperative learning**. Many opportunities for discussion and writing enhance comprehension. The evidence reviewed by the NRP led the panel to conclude that instruction that provides a “variety of reading comprehension strategies leads to increased learning of the strategies, to specific transfer of learning, to increased memory and understanding of new passages, and in some cases, general improvements in comprehension” (NICHD, 2000, p. 4-52).

The CCSS and other state standards present several important ideas about reading that further develop the solid foundation laid by the NRP. **Close reading**, **text-dependent questions**, and **evidence** are terms that speak to how the readiness standards have increased rigor to ensure that students are prepared for college and career. Close reading is a deep examination of a text. Text-dependent questions that involve analysis, evaluation, and synthesis require students to look carefully and

critically at the text. To answer text-dependent questions, students must find evidence in the text to support a claim. These questions lead students to understand what a text means, how it works, and what the text implies in terms of a deeper meaning, themes, and other ideas. Along with the five essential areas of skills needed to learn to read as outlined in the NRP, the CCSS presented other critical factors needed for proficient reading and academic success. These are described in detail in Textbox 1.1.

TEXTBOX 1.1 Consensus from scientifically based research on learning to read and write

Oral language—Long before children begin to read, they need solid oral language and literacy experiences at home and in preschool that will support them later in acquiring abstract linguistic skills necessary for reading. These include language play, such as saying rhymes; listening to, discussing, and examining books; developing oral vocabulary and verbal reasoning; and learning the purposes of reading, along with gross and fine motor writing activities. Exposure to reading aloud and oral language play fosters development of sounds and symbols and a language about reading. Oral language is the foundation of comprehension and helps the reader use decoding strategies. (See Chapter 3 for more about developing oral language.)

Emergent literacy—Early childhood educators have a great impact on the emergent literacy skills of the children in their classrooms. They promote language development and literacy skills by providing an appropriate learning environment; engaging in language play; conducting read-alouds with emphasis on the sounds in words; developing concepts of print and alphabetic and letter-sound knowledge; providing scaffolded teaching of writing; and using formal and informal assessment. (See Chapter 4 for more about building emergent literacy skills.)

Alphabet knowledge—It is essential that children learn the alphabet and be able to say the names of the letters, recognize letter shapes, and write the letters. They need to know the difference between upper- and lowercase letters. These skills are powerful predictors of reading success. (See Chapter 5 for more about alphabet knowledge.)

Phonemic awareness—Reading development depends on acquiring phonemic awareness and other phonological processes. Phonemic awareness is the ability to understand the sound structure in spoken words. To learn to read, however, children also must be able to pay attention to the sequence of sounds or phonemes in words and to manipulate these sounds. Children learn to do this by engaging in intensive oral play activities of sufficient duration, such as identifying and making rhymes, counting and working with syllables in words, segmenting initial and final phonemes, hearing and blending sounds, analyzing initial and final

sounds of words, and segmenting words fully before learning to read and during beginning reading. This training facilitates and predicts later reading and spelling achievement. (See Chapter 6 for more about teaching phonemic awareness.)

Phonics—Along with instruction on letter names, children need well-designed and focused phonics instruction to learn predictable letter-sound correspondences. Fast and accurate decoding of familiar and unfamiliar words and spelling rest on the alphabetic principle: how the written spellings of words systematically represent the phonemes in the spoken words. The efficacy of the code-emphasis approach is supported by decades of research. It requires explicit, systematic, and sequential instruction for at least 25% of students, without which they are likely to fail. (See Chapter 9 for more about decoding and reading instruction.)

Fluency—Fluency and comprehension depend on the accuracy and speed of word recognition; a reader who can read words quickly and accurately without laboring to decode them has developed automaticity. Word accuracy and automaticity are problem areas for most students with reading/learning disabilities. Slow decoders are poor at comprehension due to reduced attentional and memory resources. Adequate oral reading fluency rates with connected texts leads to better comprehension. There are reading fluency goals for first through eighth grade supported by research (Hasbrouck & Tindal, 2006). Overall, fluency needs to be addressed in each of the component sub-skills of reading instruction. (See Chapter 12 for more about developing fluency.)

Morphology—Explicit teaching of morphology and etymology can begin as early as kindergarten and first grade as an important part of literacy instruction. It has been proven to have a significant role in learning word meanings and improving spelling. Exposure to Greek and Latin roots, Anglo-Saxon compounds, and prefixes and suffixes helps students read and spell an unlimited number of words.

Vocabulary development—Vocabulary facilitates phonological awareness and word recognition in students and is important for reading comprehension. The predictive value for vocabulary in later reading comprehension and the relationship between kindergarten and first-grade word knowledge and elementary, middle, and secondary reading performance have been documented. Vocabulary growth benefits from repeated exposure to word meanings and use in context and from studying morphology with direct, explicit instruction across the curriculum. Vocabulary should be taught both directly and indirectly. Wide reading mitigates against reduced exposure to rich vocabulary, which is often the experience of struggling readers. (See Chapter 15 for more about word learning and vocabulary instruction.)

(continued)

TEXTBOX 1.1 (continued)

Comprehension—Comprehension depends on accurate, fluent decoding skills and efficient, active comprehension strategies, including monitoring for understanding while reading. Comprehension also depends on activating relevant background knowledge and is related strongly to oral language comprehension and vocabulary growth. Along with providing explicit vocabulary instruction and instruction in how to understand sentence structure, teachers should **model** and use direct teaching of **metacognitive strategies** such as questioning, predicting, making inferences, clarifying misunderstandings, and summarizing. The Common Core State Standards presented other critical factors needed for proficient reading and academic success, such as close reading, a deep examination of a text; text-dependent questions that involve analysis, evaluation, and synthesis by looking carefully and critically at text; and finding evidence in the text to answer text-dependent questions. Written expression reinforces students' comprehension skills. (See Chapter 16 for more about specific strategies for teaching reading comprehension.)

Spelling—English orthography is 87% reliable. When children are familiar with the spelling regularities of English, their reading and spelling are strengthened. Opportunities to apply the predictable and logical rules and spelling patterns that match the reading patterns being learned give children a double immersion in the information. Spelling is an essential and interconnected complement to reading instruction because it enhances reading proficiency by reinforcing sounds and letter patterns (Adams, 1990). Explicit instruction in the sounds of the language and exposure to consistent and frequent letter patterns and spelling rules lead to successful spelling outcomes.

Handwriting—Manuscript and cursive handwriting is a vital component of multisensory instruction of literacy skills and a component skill for developing a functional writing system (Berninger & Wolf, 2009). Formal, multisensory handwriting instruction reinforces students' knowledge of letter shapes and letter formation while connecting them to letter names and sounds in beginning reading. Later, both legibility and fluency aid students in the quality of their compositions, improve spelling, and help in proofreading and notetaking. Motor skills in handwriting can be improved with practice. Including accurate keyboarding is an appropriate use of technology with students. (See Chapter 11 for more about teaching handwriting.)

Written expression—Three areas need to be addressed in written expression: the purpose and structure of sentences, including grammar, word choice, and **sentence expansion**; step-by-step building of paragraphs and compositions with the emphasis on developing ideas for expository text; and revising and editing compositions. Direct, explicit instruction is

needed in grammar, punctuation, and capitalization, using multisensory methods differentiated for students' unique abilities and weaknesses. Teaching writing should contain oral language practice activities preliminary to paper-and-pencil tasks. Working on complex ideas for sentence generation has a positive effect on reading comprehension. (See Chapter 17 for more about evidence-based instruction in composition.)

Executive function in literacy instruction—There are tools that teachers and parents can use to support learners across all learning contexts to increase the development of language, literacy, and academic skills. By using all learning modalities and joining together visual, auditory, kinesthetic, print-oriented, and interactive activities, students with executive function challenges can build cognitive flexibility. Explicit instruction in academic skills can sharpen their self-regulation and build inhibitory control and working memory. (See Chapter 8 for more about the role of executive function in literacy instruction.)

Well-prepared teachers able to implement research-based instruction—Well-prepared, knowledgeable, and accomplished teachers who can screen students for potential problems, analyze their work, monitor progress, set goals and plan efficiently, provide opportunities for constructive feedback, and review and practice while continuing to learn about effective practices are the mainstay of children's success in learning to read and write.

From *Multisensory Teaching of Basic Language Skills, Third Edition* (pp. 9-10).

UNDERSTANDING DYSLEXIA THROUGH READING RESEARCH

Understanding dyslexia is one way to have a sophisticated understanding of the reading process. Following is the definition of *dyslexia* adopted in 2003 by the IDA in collaboration with the NICHD.

Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge. (Lyon, Shaywitz, & Shaywitz, 2003, p. 2)

Dyslexia is a **specific learning disability** because it is associated with specific cognitive deficits in basic reading skills (Lyon et al., 2003). It affects 80% of those identified with learning disabilities and is one of the most common learning problems in children and adults (Lerner, 1989). Dyslexia is estimated to occur in approximately 5%–17% of the population in the United States (Shaywitz, 1998). Only about one third of fourth- and eighth-grade students score at or above proficient levels of

reading on the NAEP assessment (National Center for Education Statistics, 2017). Among these children not showing even partial mastery of grade-level skills in reading, there is a disproportionate representation of students who are from low-SES households and racial minorities and students whose home language is a language other than English. Large numbers of children from every social class, race, and ethnic group, however, have significant difficulties with reading. Children most at risk for reading failure have limited exposure to the English language; have little understanding of phonemic awareness, letter knowledge, **print awareness**, and the purposes of reading; and lack oral language and vocabulary skills. Children from very low-SES households, children with speech and hearing impairments, and children whose parents' or caregivers' reading levels are low are also at risk for reading failure.

As Lyon noted, "Children with **reading disability** differ from one another *and* from other readers along a continuum" (1996, p. 64), with reading disability representing the lower tail of a normal distribution of reading ability (Shaywitz, 2003). An individual with dyslexia typically will have some but not all of the problems that are described next because of individual differences and access to early remediation. The clinical diagnosis of dyslexia with its long-term outcomes is a language-based **learning disability** and is the most widespread form of learning disability. Some common signs of dyslexia are 1) difficulty learning to speak; 2) problems organizing written and spoken language; 3) difficulty learning the letter names and their sounds; 4) inaccurate decoding; 5) slow, laborious reading lacking fluency due to using compensatory systems; 6) conspicuous problems with spelling and writing; 7) difficulty learning a foreign language; 8) having a hard time memorizing number facts; and 9) difficulty with math operations. Dyslexia varies in severity, and the prognosis depends on the severity of the disability, each individual's strengths and weaknesses, and the appropriateness and intensity of intervention. Dyslexia is not caused by a lack of motivation to learn to read, sensory impairment, inadequate instruction, a lack of environmental opportunities, or low intelligence.

Reading involves many regions throughout the brain. The present working definition, based on empirical support, emphasizes that dyslexia is neurobiological in origin because of the involvement of the neural systems in the brain that process the sounds of language and are critical to reading (see Figure 1.1). Dyslexia is manifested by a disruption in these language systems, which leads to **phonological** weaknesses. According to Shaywitz, the phonological weakness occurs "at the lowest level of the language system" (2003, p. 41) and, in turn, impairs decoding. In fact, there are two neural systems for reading: one for word analysis in the parieto-temporal region and the other for automatic, rapid responses localized in the occipito-temporal area that is used by skilled readers for rapid word recognition. Low **phonological processing** skills are the result of left hemisphere posterior processing anomalies typical of children with dyslexia. See Chapter 2 for a more detailed analysis of the reading brain and the neural correlates of typical reading and reading disability using current imagery techniques.

Individuals with dyslexia have difficulty gaining access to and manipulating the sound structure (phonemes) of spoken language. Such a deficit prevents easy and early access to **letter-sound correspondences** and decoding strategies that foster accurate and fluent word decoding and recognition. A vast majority of individuals with dyslexia have a phonological core deficit (Morris et al., 1998; Ramus et al., 2003). Phonological abilities include awareness of the sounds of words in

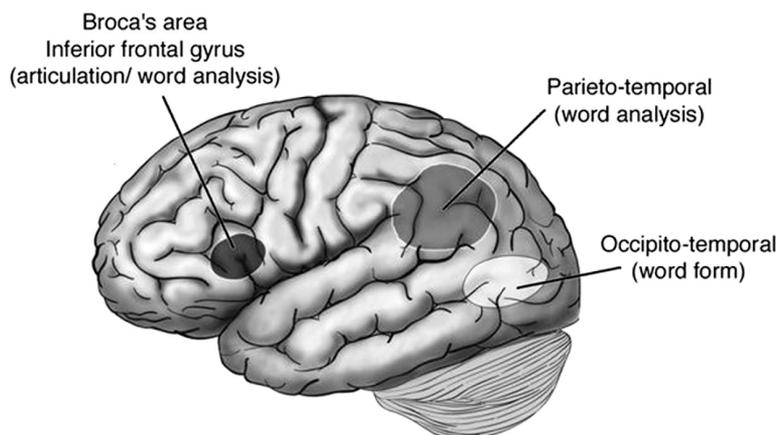


Figure 1.1. The brain system has three important neural pathways: 1) an interior system in the left inferior frontal region (Broca's area) for articulation and slower word analysis; 2) a parieto-temporal region for step-by-step analytic word reading; and 3) an occipital-temporal word-form area for skilled, rapid reading. (From Shaywitz, S. [2003]. *Overcoming dyslexia: A new and complete science-based program for reading problems at any level*. New York, NY: Alfred A. Knopf, p. 78. Copyright © 2003 by Sally E. Shaywitz, M.D. Used by permission of Sally E. Shaywitz, M.D.)

sentences, awareness of **syllables** in words, and awareness of phonemes in words or syllables (see Chapter 6).

Approximately 17%–20% of school-age children are affected to some degree by impairments in phonemic awareness (Lyon, 1999). The result is that individuals with dyslexia have difficulty recognizing both real and **pseudowords** (i.e., nonsense words), which leads to overreliance on context and guessing and prevents building words in memory instead of using the alphabetic principle to **decode** words. Readers with dyslexia may also have difficulties with processes underlying the rapid, precise retrieval of visually presented linguistic information. Measures of letter, digit, and color naming are predictors of later reading fluency (Wolf, Bowers, & Biddle, 2000).

Difficulties with accurate and/or fluent word recognition mean that poor readers lack the ability to read quickly, accurately, and with good understanding (Partnership for Reading, 2003). They fail to grasp the meaning of the text, avoid reading, and fail to develop the necessary vocabulary and **background knowledge** for comprehension.

Poor spelling is a hallmark of dyslexia because of its intimate connection to reading. Educators can identify students with phoneme and word-recognition weaknesses early by administering screening tools for phonemic awareness and other pre-reading skills validated by research and promptly applying appropriate intervention in kindergarten and first grade before failure sets in, thus preventing a pattern of compromised text-reading fluency, deficient vocabulary acquisition, and difficulty with reading comprehension (Eden & Moats, 2002).

Another aspect of the biological origin of dyslexia is that it runs in families. A child with dyslexia will commonly have parents and siblings who also have dyslexia. If a parent has dyslexia, between one quarter and one half of his or her children will likely have dyslexia too (Shaywitz, 2003). According to Olson (2004), genetic influences on reading disability are just as important as shared environmental ones. Both are partly dependent on the quality of instruction available

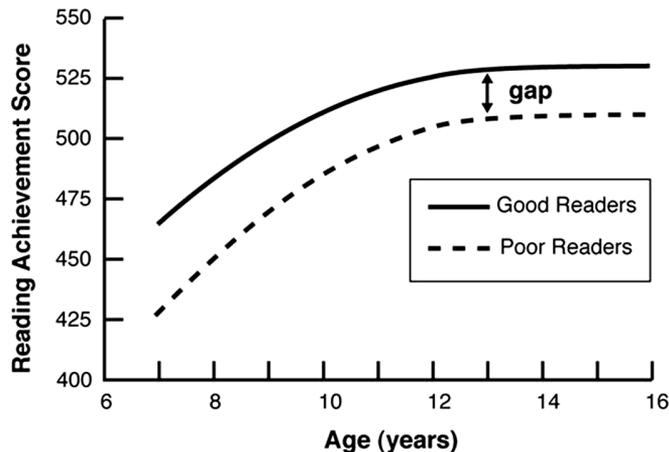


Figure 1.2. Trajectory of reading skills over time in readers with and without dyslexia. The y axis indicates Rasch scores (*W* scores) from the Reading subtest of the *Woodcock-Johnson-Revised Tests of Achievement* (Woodcock & Johnson, 1989). Both readers with and without dyslexia improved their reading scores as they get older, but the gap between the two groups remains. Thus, dyslexia is a deficit and not a developmental lag. (Adapted from *Frames of Reference for the Assessment of Learning Disabilities: New View of Measurement Issues* [p. 40] Edited by G. Reid Lyon, Ph.D., © 1994 by Paul H. Brookes Publishing Co., Inc.)

because improper instruction and lack of reading might affect brain processes. A number of genes play a part in individual differences in phonemic awareness, word reading, and related skills. Deficits in phonemic awareness and reading of pseudowords are heritable. Evidence from research on identical and fraternal twins, funded by NICHD and conducted at the Colorado Learning Disabilities Research Center (Olson, 2004), has shown that these genetic constraints can be remediated so that children read normally after engaging in intensive practice with an early emphasis on phonological skills and more time in later grades spent reading for accuracy and fluency to promote continued growth. Olson (2004) suggested that there may be a genetic influence on learning rates for reading and related skills. Children with a family history of dyslexia should be monitored for early signs of oral language problems and attention given to pre-reading language play at home and the opportunity for effective beginning reading instruction at school.

Beginning with data from the Connecticut Longitudinal Study (Shaywitz, 2003), funded by the NICHD, ongoing research has underscored that early identification along with intensive, scientifically based instruction can bring poor readers up to grade level. Unless these readers receive intensive help early on, the gap between good and poor readers stays the same, although both groups progress over time. Children facing reading difficulties at the beginning of school remain poor readers, as depicted in Figure 1.2. As noted by Lyon, a reading disability “reflects a persistent deficit rather than a developmental lag” and “longitudinal studies show that of those children who have a [reading disability] in the third grade, approximately 74% continue to read significantly below grade level in the ninth grade” (1996, p. 64). They are unlikely to catch up without informed teaching. Compounding that dire circumstance is the fact that students who receive help often receive it for a short period of time, inconsistently, and from untrained teachers using methods that lack a scientific base (Shaywitz, 2003).

Dyslexia is recognized in the definition as difficulty in learning to read that is unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. The **Individuals with Disabilities Education Improvement Act (IDEA) of 2004 (PL 108-446)** neither requires nor prohibits discrepancy between IQ score and achievement to determine a specific learning disability such as dyslexia (i.e., use of the **discrepancy model**). In identifying dyslexia, an alternative is the need to compare reading age with chronological age or, in the case of adults, career attainment level. New to the definition is the idea that effective classroom instruction to meet the range of needs children bring to school may be factored in to recognize dyslexia and to tease out reading failure from inadequate instruction, poor preschool preparation, and lack of response to quality instruction. In addition, there are secondary consequences such as weaknesses in vocabulary development and reading comprehension due to less developed accuracy and fluency and a smaller store of background knowledge to support comprehension. Much of this is due to reduced reading experience.

Deficits in attention, problems in short-term verbal memory, and difficulty with word retrieval and mathematics have also been identified in students with dyslexia. These deficits can affect listening and reading comprehension. (For more information about these effects, see Chapter 8 on the role of executive function in literacy and Chapter 16 on strategies to improve reading comprehension.) Students with dyslexia who spell poorly often have difficulty with the motor aspects of writing. Poor pencil grip and messy handwriting persist (Berninger & Wolf, 2009). (See Chapter 11 for more about teaching handwriting.) Expression of ideas clearly in both written and oral form is slow to develop. According to Ramus and colleagues (2003), it is not clear why sensory and motor disorders are often associated with phonological deficits.

Parents and teachers, therefore, should be aware of the manifestations of dyslexia in early childhood, such as difficulty learning to talk and incorrectly pronouncing words. Following directions, retrieving names of things such as letters of the alphabet, **sequencing**, and/or forming letters or numbers also can be areas of poor functioning. Characteristics that may accompany dyslexia include time management and organization problems, lack of social awareness, difficulty with attention (e.g., **attention-deficit/hyperactivity disorder [ADHD]**), poor spatial sense, and difficulty with motor skills.

Many individuals with dyslexia may also have attention disorders. Reading disabilities and attention disorders, however, are distinct. Although they are separate from learning disabilities, attention disorders and organization difficulties frequently co-occur with language-based reading disability. The severity of a reading disability may be compounded by attention disorders (Lyon, 1996). The IDA's web site (<http://www.aida.org>) is a good resource that explains these symptoms and offers timely and research-based information. See Chapter 8 for hallmarks of how attention disorders affect language skills and Chapter 7 for discussion of the need for a good reading assessment that can determine the existence of an attention disorder affecting progress in school.

Perhaps what puzzles teachers and parents the most is that students who fail to learn how letters represent speech sounds and how sounds are represented by the letters in words often are good thinkers and are talented in other areas. Because dyslexia is domain specific, other cognitive abilities such as reasoning, comprehension, vocabulary, **syntax**, and general IQ score typically are unaffected (Shaywitz & Shaywitz, 2004). In fact, although IQ score and reading in the typical

reader influence each other over time, IQ score and reading are not linked in the reader who has dyslexia (Ferrer, Shaywitz, Holahan, Marchione, & Shaywitz, 2010). People with dyslexia may excel in the arts, law, politics, architecture, science, medicine, business, and sports, for example.

REFLECT, CONNECT, and RESPOND

How important is it for students to understand the internal structure of words for their overall reading achievement?

Data from the representative sample of children tested in the Connecticut Longitudinal Study (Shaywitz, Shaywitz, Fletcher, & Escobar, 1990) showed that although boys are identified as having dyslexia four times more often than girls, there are as many girls as boys with dyslexia. Boys are more often referred for special services due to behavior that signals problems, whereas girls in need of help are less likely to be identified (Shaywitz, 2003). There are accurate and reliable screening and identification procedures available that are linked to prevention programs. Early identification and intervention are essential to successful treatment of children who are at risk for reading failure.

There has been a shift in the approach of identifying a specific reading disability. According to Lyon, “Definitions that measure the discrepancy between IQ and achievement do not adequately identify learning disabilities, particularly in the area of beginning reading skills” (1996, p. 64).

There is growing evidence in support of an alternative approach. Fletcher, Coulter, Reschly, and Vaughn stated, “Our most pressing challenge is conveying urgency about preventing disabilities through early screening and effective instruction, and for those who do not respond sufficiently, providing effective special education interventions that change achievement and social/behavioral outcomes” (2004, p. 312). The claim that using RTI as identification criteria can lead to targeting intervention first and assessment second, using formal progress monitoring with data on student response for accountability and planning, and building bridges between general and **special education** (Fletcher et al., 2004) has no evidence yet to support it. However, there are signs that RTI is beginning to be put to the tasks it was designed to carry out, especially in early identification of children at risk (Gillis, 2017).

As mentioned previously, dyslexia persists across the life span and is not a developmental lag. This is most clearly seen in the manifestations of dyslexia among adults (Brozgold, 2002). As in children, it exists across a continuum, with varying indications depending on the individual. Adults with dyslexia show decreased reading efficiency (i.e., slower reading rate and lower accuracy) relative to individuals without dyslexia, despite good intelligence, education, and career achievement. Their **phonetic** decoding is impaired relative to their reading comprehension, which may be better because they rely on context cues and know about the subject that they are reading. When tested, their decoding of pseudowords is impaired. Other language-based difficulties can be observed, such as mispronouncing words and names and word-retrieval difficulty. Written composition is problematic because writing calls on integrating so many language skills. Spelling is likely to be persistently weak. Unless the text is of particular interest, the individual may have ongoing difficulty retaining information that he or she reads. A diagnosis of dyslexia in adults can have significant therapeutic and practical value because it confirms and validates the individual’s strengths and weaknesses

and leads to interventions and **accommodations**, a plethora of electronic devices to help mitigate these difficulties, and, especially, extended time on tests, which can improve academic skills, vocational functioning, and self-esteem (Brozgold, 2002).

TEACHERS CAN DELIVER EVIDENCE-BASED READING INSTRUCTION TO ALL STUDENTS

Consensus on effective teacher preparation has been widely accepted by scholarly panels, scientific investigators, and noted professional organizations, as indicated previously. What is paramount is being able to teach the elements of language structure well, using research-based instructional practices, to diverse groups of students in need of such instruction.

Effective Instruction Improves Reading and Changes the Brain

Although dyslexia affects individuals over the life span and cannot be cured, reading skills can be increased with the right early intervention and prevention programs. Researchers have drawn attention to the interactions between the neurobiological and environmental factors in students with reading disabilities using **functional magnetic resonance imaging (fMRI)**. When children with reading disabilities were given intensive, systematic code-based reading interventions, they demonstrated increased activation in the left occipito-temporal brain region and also made significant gains in reading fluency and comprehension 1 year after the intervention had ended. Shaywitz and colleagues (2004) reported that this outcome provides evidence of the neuroplasticity of the systems for reading and demonstrates that a scientifically based reading intervention brings about significant and durable changes in brain organization so that the brain facilitates the development of those fast-paced neural systems that underlie skilled reading.

Using a scientifically based reading intervention with children who were poor readers who participated in a fMRI study, Shaywitz and colleagues found that the intensive, phonologically based intervention made “significant and durable changes in brain organization so that brain activation patterns resemble those of typical readers” of the neural system for reading (2004, p. 931). The children’s reading fluency improved. NICHD-supported research also has found that older individuals with dyslexia can improve with intervention that focuses on remediation of reading and writing skills and other areas of weakness. Sometimes, it is a matter of learning how to learn (see Chapter 21). As children get older, however, Lyon found that “the intensity and duration of reading interventions must increase exponentially” (1999) to achieve the same improvement possible with younger children. In fact, Torgesen and colleagues found that adolescent students will attain grade-level standards only with “instruction sufficiently powerful to accelerate reading development dramatically so that students make more than one year’s progress during one year of school” (2007, p. 5).

Effective programs must involve intensive instruction using a systematic, structured language approach. It is crucial that the programs be consistent and of sufficient duration for individuals to make progress in improving reading and related skills (Shaywitz, 2003). (See Chapter 20 for information about instructing older students with word-level reading disabilities.) Although not a substitute for remediation, **modifications** and accommodations, along with robust use of technology to support learning, can pave the way for many poor readers to gain

information, expand their world knowledge, and be successful at school or work. They can improve their decoding and comprehension skills at any age but often remain slow readers. Accommodations that build on the strengths of older students and adults with dyslexia can help them to lead successful lives.

Content and Delivery of Reading Instruction Is Critical

It is clear from the consensus of scientifically based reading research that the nature of the educational intervention for individuals with reading disabilities and dyslexia is critical. Characterizing reading and writing as language is central to every aspect of intervention for individuals with language-based learning disabilities. Knowledge of language development and disabilities is essential for those who administer assessments and interpret them, deliver instruction, and design and carry out programs at all levels (Dickman, Hennessy, Moats, Rooney, & Tomey, 2002).

Relationship Between Teacher Preparation and Student Achievement As teachers learn about underlying concepts and instructional strategies in the components of reading, accompanied by comprehensive instruction and practice, they begin to incorporate these ideas into their everyday work, and student achievement improves (Moats & Foorman, 2003). Evidence shows that student achievement and teacher preparation and domain-specific knowledge are correlated (Darling-Hammond, 2000; Moats & Foorman, 2003; NICHD, 2000).

There is also mounting evidence that teachers are being underprepared in schools of education because these schools are not designating the science of reading, five basic components of reading, and, most important, knowledge of language structure as essential information (Spear-Swerling, Brucker, & Alfano, 2005; Walsh, Glaser, & Wilcox, 2006). Spear-Swerling and colleagues (2005) pointed out that the most experienced and well-trained teachers do not promote student growth unless they use this knowledge and translate it into classroom practice. In a survey, teacher educators were asked how important it was for public school teachers to “teach phonics and phonemic awareness when teaching literacy in the early grades” (Farkas & Duffett, 2010). Only 44% thought it was “absolutely essential” (Farkas & Duffett, 2010).

Too often, content knowledge and depth of training are lacking in the most basic areas of preparation for reading instruction. For example, Cheesman and colleagues (2009) found that the beginning certified teachers they surveyed lacked the ability to differentiate between phonemic awareness and phonics and the ability to segment written words by phonemes. Other studies have found that teachers cannot count speech sounds in words. This raises questions about the quality of pre-service teacher education and the availability of quality professional development and mentoring for beginning certified teachers.

A study by Piasta, Connor, Fishman, and Morrison (2009) showed that in addition to teacher knowledge about language and literacy concepts, including elements of explicit decoding instruction, the actual classroom practices that accompanied this specialized knowledge were vital to produce student gains in first-grade word-reading growth. This synergy of both expert teaching practice and the knowledge to call on when responding to student errors is important (Moats, 1999). Through better pre-service and professional development and mentoring, teachers can be sufficiently prepared to deliver effective reading instruction that teaches listening, speaking, reading, and writing using explicit, systematic, cumulative, and

multisensory methods based on scientific research to students at risk and students with dyslexia.

Because of well-documented insufficient preparation of classroom teachers and specialists in teaching students who are struggling with reading, the IDA saw the need to adopt and promote standards for “1) content knowledge necessary to teach reading and writing to students with dyslexia or related disorders who are at risk for reading difficulty; 2) practices of effective instruction; and 3) ethical conduct expected of professional educators and clinicians” (2010, p. 3). The IDA *Knowledge and Practice Standards* call for teacher educators to base their courses on the following standards:

- Foundation concepts about oral and written language learning
- Knowledge of dyslexia and other learning disorders
- Interpretation and administration of assessments for planning instruction
- Structured language teaching

Phonology

Phonics and word study

Fluent, automatic reading of text

Vocabulary

Text comprehension

Handwriting, spelling, and written expression

Ethical standards for the profession

These standards are also appropriate for classroom teachers, who are responsible for recognizing and preventing reading difficulties. The knowledge and practice criteria outlined in detail in this book are aligned with these standards to assist teachers and their instructors in the complex endeavor to become the experts their students deserve. (See also the IDA *Knowledge and Practice Standards for Teachers of Reading, Second Edition* [IDA, 2018].)

REFLECT, CONNECT, and RESPOND

Will changes in teacher preparation and licensure make a difference in how students are taught to read? Explain your answer.

Elements of Effective Instruction The importance of critical reading and thinking, highlighted in the CCSS, is predicated on a solid foundation of basic reading skills. Contrary to the belief that comprehension is hard and takes intensive instruction whereas basic reading skills are easily and naturally acquired, Seidenberg (2017) pointed out that science supports the opposite. Writing systems represent only an abstract and partial connection to spoken language; therefore, “[b]asic skills are difficult to acquire” and need exemplary instruction (p. 272). To minimize reading failure, classroom reading approaches must include systematic, explicit instruction in phonemic awareness (orally identifying and manipulating syllables and speech sounds); particular attention to letter–sound knowledge (phonics); spelling integrated with reading; fluency

(developing speed and **automaticity** in accurate letter, word, and text reading); vocabulary building; and text comprehension strategies. If such classroom programs prove to be insufficient for students with dyslexia, then these students will need a **Multisensory Structured Literacy (MSL)** program, which incorporates systematic, cumulative, explicit, and sequential approaches taught by teachers trained in language structure at the levels of sounds, syllables, meaningful parts of words, sentence structure, and paragraph and discourse organization (Eden & Moats, 2002). (See Chapter 2 for an introduction to Multisensory Structured Literacy.)

Some commercial programs that fit this description are Alphabetic Phonics, Slingerland, Project Read, LANGUAGE!, the Sonday System, Orton-Gillingham, Wilson Language, the Spalding Method, Lindamood-Bell, Take Flight, Preventing Academic Failure, and Read Write Type. (See the Online Companion Materials for this chapter for more information about MSL programs.) Instruction in these programs is multisensory and engages the learner in visual, auditory, and **kines-
thetic** responses and feedback with deliberate and intensive practice in reading and spelling, controlled for what has been taught. Teachers use structured lesson planning and ongoing monitoring of progress to organize instruction and chart the growth in skills. One added benefit to this type of instruction is that it helps students with executive function difficulties deal with them in the classroom while learning the basic skills of reading.

Figure 1.3 shows the content (the structure of the English language) allied with the principles of instruction inherent in all MSL programs. All are in agreement

Principles of instruction					
Content: Structure of the English language	Simultaneous multisensory VAKT (visual, auditory, kinesthetic, tactile)	Systematic and cumulative	Direct instruction	Diagnostic teaching to automaticity	Synthetic/analytic instruction
Phonology and phonological awareness	√	√	√	√	√
Sound-symbol association: visual to auditory, auditory to visual, blending, segmenting	√	√	√	√	√
Syllables: types and patterns for division	√	√	√	√	√
Morphology: base words, roots, affixes	√	√	√	√	√
Syntax: grammar, sentence variation, mechanics of language	√	√	√	√	√
Semantics: meaning	√	√	√	√	√

Figure 1.3. Multisensory structured language programs: Content and principles of instruction. (Key: VAKT, visual, auditory, kinesthetic, tactile.) (Adapted from *IMSLEC Directory: MSL Training Courses and Graduates* [2010]. Dallas, TX: The International Multisensory Structured Language Education Council, p. 11. Adapted by permission.)

with the IDA (2018) *Knowledge and Practice Standards*. These standards are the metric that will measure effective preparation programs and will lead to certification. After examining what teachers are minimally exposed to in their preparation for their profession, Seidenberg (2017) called for licensure that reflects expertise using similar science-based knowledge and practice standards to those of the IDA. Text-box 1.2 provides a more detailed explanation of the terms used in Figure 1.3.

Personalized Instruction Is Important

The role of technology in MSL instruction is important. Technology will not replace the teacher but will provide the specific practice and additional instructional support that individual students need. It will provide useful data about the type of personalized instruction students require. Personalized learning tells teachers what to teach and indicates the intensity (or acceleration) of instruction. The idea of acceleration is important for older students and for students who are slightly below grade level versus students who are well below grade level.

Intensity of Instruction Matters

From 25 years of prevention and intervention research targeting the five major components of reading, Torgesen (2004) concluded that explicitness and intensity of instruction are the key ingredients in teaching this knowledge and these skills to students who are struggling greatly with reading. He clarified that “explicit instruction is instruction that does not leave anything to chance and does not make assumptions about skills and knowledge that children will acquire on their own” (2004, p. 363).

In contrast to leaving things to chance or assuming that students are absorbing the necessary concepts to decode new words or comprehend text, explicit instruction calls on teachers to 1) make clear connections between letters and sounds and their consistent, systematic relationships; 2) teach individual word meanings and word-learning strategies; 3) provide modeling for fluent reading and have students engage in repeated oral reading; and 4) learn how to use explicit, carefully sequenced instruction in comprehension strategies. Research has shown that more favorable outcomes are associated with systematic phonics instruction than with an approach emphasizing implicit phonics (Lyon, 1996; NICHD, 2000).

Furthermore, Torgesen (2004) reinforced the importance of **explicit instruction** for remediation and intervention by including the need for intensity, which is wholly different from general education classroom experiences. Through small-group instruction of one-to-one and one-to-three, with intensity guided by students’ rate of progress, students with reading problems have a better chance of closing the grade gap with their peers in reading accuracy and reading comprehension than in large-group configurations (Vaughn & Linan-Thompson, 2003). To make gains, students need to engage in highly structured, sequential activities and be closely monitored in ways that are not possible in the general education classroom. They need to form direct connections between the known and the new, and they need time for explicit practice to build automaticity and fluency. In addition, the curriculum needs a sequential order for instruction and practice.

Teachers in the general education classroom can also apply these practices with students struggling with reading by incorporating these teaching approaches and rethinking their grouping of students. The instructional practices and curriculum

TEXTBOX 1.2 Definition of terms**Content of Structured Language Teaching**

Phonology and phonological awareness—Phonology is the study of sounds and how they work within their environment. A phoneme is the smallest unit of sound in a given language that can be recognized as being distinct from other sounds. Phonological awareness is understanding the internal linguistic structure of words. An important aspect of phonological awareness is the ability to segment words into their component phonemes [phonemic awareness].

Sound-symbol association—This is knowing the various sounds in the English language and their correspondence to the letters and combinations of letters that represent those sounds. Sound-symbol association must be taught (and mastered) in two directions: visual to auditory and auditory to visual. In addition, students must master blending sounds and letters into words as well as segmenting whole words into the individual sounds.

Syllable instruction—A syllable is a unit of oral or written language with one vowel sound. Instruction must include teaching the six basic types of syllables in the English language: closed, open, vowel-consonant-*e*, *r*-controlled, vowel pair [or vowel team], and final stable syllable. Syllable division rules must be directly taught in relation to the word structure.

Morphology—Morphology is the study of how morphemes are combined to form words. A morpheme is the smallest unit of meaning in the language. The curriculum must include the study of base words, roots, and affixes.

Syntax—Syntax is the set of principles that dictate the sequence and function of words in a sentence in order to convey meaning. This includes grammar, sentence variation, and the mechanics of language.

Semantics—Semantics is that aspect of language concerned with meaning. The curriculum (from the beginning) must include instruction in comprehending written language.

Principles of Instruction

Simultaneous, multisensory (VAKT)—Teaching is done using all learning pathways in the brain (visual, auditory, kinesthetic, tactile) simultaneously in order to enhance memory and learning.

Systematic and cumulative—Multisensory language instruction requires that the organization of material follow the logical order of the language. The sequence must begin with the easiest and most basic elements and progress methodically to more difficult material. Each step must also be based on those [elements] already learned. Concepts taught must be systematically reviewed to strengthen memory.

Direct instruction—The inferential learning of any concept cannot be taken for granted. Multisensory language instruction requires the direct teaching of all concepts with [continual] student-teacher interaction.

Diagnostic teaching to automaticity—The teacher must be adept at prescriptive or individualized teaching. The teaching plan is based on careful and [continual] assessment of the individual's needs. The content presented must be mastered to the degree of automaticity.

Synthetic and analytic instruction—Multisensory structured language programs include both synthetic and analytic instruction. Synthetic instruction presents the parts of the language and then teaches how the parts work together to form a whole. Analytic instruction presents the whole and teaches how this can be broken down into its component parts.

From McIntyre, C.W., & Pickering, J.S. (1995). *Clinical studies of multisensory structured language education for students with dyslexia and related disorders* (p. xii). Salem, OR: International Multisensory Structured Language Education Council.

content described in this book fit this model of intervention and remediation. It is encouraging that research evidence has arrived at a consensus on the critical element of instruction and how it should be delivered.

Reading disability has far-reaching consequences, which is why teachers must be prepared to intervene early and intensively until the reader is on target for success. Pre- and in-service teachers must be prepared to work directly with children with reading, writing, and spelling disabilities who also may have co-occurring difficulties, such as difficulties with arithmetic calculation. Without question, general and special education teachers need the tools to identify students with language-based learning disabilities, to intervene with explicit instructional procedures, and to continue to sustain their students with intensive support for as long as they need it.

REFLECT, CONNECT, and RESPOND

Based on what you have read in this chapter, which is the best way for students to attack an unknown word?

CLOSING THOUGHTS: THE IMPACT OF RESEARCH ON PRACTICE

There have been more than 45,000 participants in the NICHD-funded research programs in reading development, reading disorders, and reading instruction. Both children and adults have participated, including more than 22,500 good readers at the 50th percentile and above and about 22,500 struggling readers below the 25th percentile (Lyon, 2004). Researchers have learned from these studies and others how children read, why some children have difficulties, how to prevent difficulties from becoming ingrained, and how to provide intervention when readers continue to struggle.

Reading emerges from substantial and significant oral language experiences from birth onward. (See Chapter 3 for more on oral language development.) The importance of providing oral language and literacy experiences from birth onward, including reading to children, playing with language through rhyming and games, and encouraging writing activities, is well documented. These activities encourage vocabulary development and enhance verbal reasoning and semantic and syntactic abilities. The importance of early assessment and intervention for reading problems is supported by the fact that reading problems identified in Grade 3 and beyond require considerable intervention; children do not simply outgrow reading problems. In fact, 74% of children identified as having a reading disability in Grade 3 still had a reading disability in Grade 9 (Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996).

The risk factors for dyslexia can be seen in kindergarten and first grade—trouble with letter–sound knowledge, **phonological awareness**, and oral language development. The earliest clue to dyslexia is what Shaywitz described as “a weakness in getting to the sounds of words” (2003, p. 93). Lyon noted that “the best predictor of reading ability from kindergarten and first-grade performance is phoneme **segmentation** ability” (1996, p. 64). It is best to assess all children and intervene first in the classroom, with explicit instruction in phonemic awareness, phonics, and comprehension with an emphasis on fluency in all these competencies.

The instruction should be guided by a carefully constructed, sequenced curriculum that is designed to be explicit about language structure and leaves nothing to chance. The texts chosen for practice need to be controlled and later **decodable texts** so that children are taught to mastery. Developing phonemic awareness is necessary but not the sole component of learning to read. From the beginning, reading instruction must include attention to phonics principles for accurate and rapid decoding and active use of comprehension strategies.

According to Lyon, “the ability to read and comprehend is dependent on rapid and automatic recognition and decoding of single words. Slow and inaccurate decoding are the best predictors of deficits in reading comprehension” (1996, p. 64). Additional factors impeding reading comprehension include vocabulary deficits, lack of background knowledge for understanding text information, deficient understanding of semantic and syntactic structures, insufficient knowledge of writing conventions for different purposes, lack of verbal reasoning, and inability to remember and/or retrieve verbal information. There are now proven strategies to maximize reading comprehension and develop background knowledge and vocabulary through reciprocal teaching and monitoring feedback.

Educators can make changes by intervening early with instruction that changes the way the brain learns. For example, neurobiological investigations show that there are differences in the parietal-temporal and occipital-temporal brain regions among individuals with dyslexia, compared to individuals without dyslexia. Although these differences affect the ability to read, neural systems for reading are malleable and highly responsive to effective reading instruction. In their research using fMRI to study the effects of a systematic phonics-based intervention with 6- to 9-year-old children, Shaywitz and colleagues (2004) found evidence of plasticity of neural systems for reading. The changes in the brain made these readers comparable with good readers. The children were still making gains in reading fluency and comprehension 1 year later after the intervention ended.

Shaywitz and colleagues concluded that providing “evidence-based reading intervention at an early age improves reading fluency and facilitates the development of those neural systems that underlie skilled reading. Teaching matters and can change the brain” (2004, p. 931). Many states are using research to guide their policy in reading education. With high-level pre-service preparation and professional development efforts that pay strict attention to this evidence, the impact of science should bring about changes at the school level. This book is dedicated to that goal and to teachers in the classroom.

There is still serious underpreparation among teachers regarding the theory and contents of language instruction. Teachers need to have multiple layers of expertise on how children acquire reading, the relationship between language development and reading development, the characteristics of disabilities, and the basic tenets of reading instruction methodologies. There needs to be serious reform in colleges of education and professional development programs.

The time has come to merge the evidence from the science of reading—the knowledge gained from research on what works in the classroom—with serious and sustained pre-service training and ongoing professional development so that teachers can better carry out the complex demands of reading instruction. Efforts are underway in many colleges, universities, and private training organizations to rethink and explore new ways of delivering coursework, online and in the classroom, in conjunction with innovative ways of gaining practical, hands-on experience with validated practices (Moats, 2003). The way to proceed has been explicitly described by many guides that prescribe what expert teachers should know and be able to do (Brady & Moats, 1997; Clark & Uhry, 1995; IDA, 2018; Learning First Alliance, 2000; NICHD, 2000; Snow et al., 1998). Appendix 1.2 lists college programs and training organizations that have been evaluated by accrediting associations that use scientifically based **Structured Literacy** standards to train their teachers to teach reading.

Teachers have to know how reading develops from pre-reading to reading for information and enjoyment. Detecting reading difficulties early and providing appropriate intervention in time to keep children from failing is critical. A thorough knowledge of the structure of language and how to teach it layer by layer helps teachers to monitor their students’ progress and gives them the tools to pace lessons and move their students along based on consistent monitoring of progress (Moats, 1999; Moats & Brady, 1997). This ensures that special educators, who work with the students with the most serious problems, and general educators, who must reach a range of students with diverse needs on a daily basis, receive the best professional development based on what scientifically based reading research shows is effective. Good instruction can prevent a lifetime of difficulties: A good beginning has no end.

ONLINE COMPANION MATERIALS

The following Chapter 1 resources are available at <http://www.brookespublishing.com/birshcarreker/materials>:

- Reflect, Connect, and Respond Questions
- Appendix 1.1: Knowledge and Skill Assessment Answer Key
- Appendix 1.2: Resources

KNOWLEDGE AND SKILL ASSESSMENT

1. Research suggests that the defining characteristic of dyslexia is that a student does what?
 - a. Reads letters and words backward
 - b. Has difficulties with the phonology of language
 - c. Has attention and motivation issues
 - d. Has inadequate cognitive abilities
2. Impairments in phonemic awareness skills in kindergarteners will do which of the following?
 - a. Resolve themselves over time
 - b. Be remediated in later grades
 - c. Persist without explicit instruction
 - d. Affect decoding but not spelling
3. Research suggests that effective phonics instruction is what?
 - a. Indirect
 - b. Systematic
 - c. Incidental
 - d. Optional
4. How can academic language be described?
 - a. Naturally acquired
 - b. Everyday language
 - c. Useful but not necessary
 - d. Classroom language
5. Close reading is meant to reduce college students' challenges related to reading because of which of the following?
 - a. The demands of complex text
 - b. Issues with attention and motivation
 - c. Lack of motivation and engagement
 - d. Difficulties with decoding and fluency

REFERENCES

- Aaron, P.G., Joshi, R.M., & Quatroche, D. (2008). *Becoming a professional reading teacher*. Baltimore, MD: Paul H. Brookes Publishing Co.
- Adams, M.J. (1990). *Beginning to read: Thinking and learning about print*. Cambridge, MA: The MIT Press.
- Berninger, V.W., & Wolf, B.J. (2009). *Teaching students with dyslexia and dysgraphia: Lessons from teaching and science*. Baltimore, MD: Paul H. Brookes Publishing Co.

- Birsh, J.R. (2006, Fall). What is multisensory structured language? *Perspectives*, 32(4).
- Brady, S., & Moats, L.C. (1997). *Informed instruction for reading success: Foundations for teacher preparation*. Baltimore, MD: The International Dyslexia Association.
- Brozgold, A.Z. (2002, March 22). *The diagnosis of dyslexia in adults*. Paper presented at the 29th Annual Conference on Dyslexia and Related Learning Disabilities, New York Branch of the International Dyslexia Association.
- Catts, H.W., Nielsen, D.C., Bridges, M.S., Liu, Y.S., & Bontempo, D.E. (2015). Early identification of reading disabilities within an RTI framework. *Journal of Learning Disabilities*, 48(3), 281–297.
- Chall, J. (1967). *Learning to read: The great debate*. New York, NY: McGraw-Hill.
- Cheesman, E.A., McGuire, J.M., Shankweiler, D., & Coyne, M. (2009). First-year teacher knowledge of phonemic awareness and its instruction. *Teacher Education and Special Education*, 32(3), 270–289. doi:10.1177/0888406409339685
- Clark, D.B., & Uhry, J.K. (1995). *Dyslexia: Theory and practice of remedial instruction*. Timonium, MD: York Press.
- Connor, C.M., Morrison, F.J., & Underwood, P. (2007). A second chance in second grade? The cumulative impact of first and second grade reading instruction on students' letter–word reading skills. *Scientific Studies of Reading*, 11(3), 199–233.
- Council of Chief State School Officers (CCSSO) & National Governors Association Center for Best Practices (NGA Center). (2010). *Common Core State Standards for English language arts and literacy in history/social studies, science and technical subjects*. Retrieved from <http://www.corestandards.org/the-standards>
- Darling-Hammond, L. (2000). *Teacher quality and student achievement: A review of state policy evidence*. Retrieved from <https://epaa.asu.edu/ojs/article/view/392>
- de Groot, B.J., van den Bos, K.P., Minnaert, A.E., & van der Meulen, B.F. (2015). Phonological processing and word reading in typically developing and reading disabled children: Severity matters. *Scientific Studies of Reading*, 19(2), 166–181.
- Dehaene, S. (2009). *Reading in the brain: The science and evolution of a human invention*. New York, NY: Viking Penguin.
- Dickman, G.E., Hennessy, N.L., Moats, L.C., Rooney, K.J., & Tomey, H.A. (2002). *The nature of learning disabilities: Response to OSEP Summit on Learning Disabilities*. Baltimore, MD: The International Dyslexia Association.
- Eden, G.F., & Moats, L.C. (2002). The role of neuroscience in the remediation of students with dyslexia. *Nature Neuroscience*, 5(Suppl.), 1080–1084.
- Ehri, L.C. (2004). Teaching phonemic awareness and phonics: An explanation of the National Reading Panel meta-analyses. In P. McCardle & V. Chhabra (Eds.), *The voice of evidence in reading research* (pp. 153–186). Baltimore, MD: Paul H. Brookes Publishing Co.
- Ehri, L.C., Nunes, S.R., Stahl, S.A., & Willows, D.M. (2001). Systematic phonics instruction helps students learn to read: Evidence from the National Reading Panel's meta-analysis. *Review of Educational Research*, 71(3), 393–447.
- Farkas, S., & Duffett, A. (2010). *Cracks in the ivory tower: The views of education professors circa 2010*. Washington, DC: Thomas B. Fordham Institute.
- Ferrer, E., Shaywitz, B.A., Holahan, J.M., Marchione, K., & Shaywitz, S.E. (2010). Uncoupling of reading and IQ over time: Empirical evidence of a definition of dyslexia. *Psychological Science*, 21(1), 93–101.
- Fletcher, J.M., Coulter, W.A., Reschly, D.J., & Vaughn, S. (2004). Alternative approaches to the definition and identification of learning disabilities: Some questions and answers. *Annals of Dyslexia*, 54(2), 304–331.
- Fletcher, J.M., & Francis, D.J. (2004). Scientifically based educational research: Questions, designs, and methods. In P. McCardle & V. Chhabra (Eds.), *The voice of evidence in reading research* (pp. 59–80). Baltimore, MD: Paul H. Brookes Publishing Co.
- Francis, D.J., Shaywitz, S.E., Stuebing, K.K., Shaywitz, B.A., & Fletcher, J.M. (1996). Developmental lag versus deficit models of reading disability: A longitudinal, individual growth curve analysis. *Journal of Educational Psychology*, 88(1), 3–17.
- Gersten, R., Compton, D., Connor, C.M., Dimino, J., Santoro, I., Linan-Thompson, S., & Tilly, W.D. (2008). *Assisting students struggling with reading: Response to intervention and multi-tier intervention for reading in the primary grades*. A practice guide (NCEE, 2009-4045). Washington, DC: U.S. Department of Education, National Center for Educational Evaluation and Regional Assistance, Institute of Educational Sciences. Retrieved from <https://ies.ed.gov/ncee/wwc/PracticeGuides>

- Gillis, M.B. (2017, Summer). How RTI supports early identification of students with different reading profiles. *Perspectives on Language and Literacy*, 43(3), 41–45.
- Hasbrouck, J., & Tindal, G. (2006). Oral reading fluency norms: A valuable assessment tool for reading teachers. *The Reading Teacher*, 59, 636–634.
- Individuals with Disabilities Education Improvement Act (IDEA) of 2004, PL 108-446, 20 U.S.C. §§ 1400 *et seq.*
- International Dyslexia Association, The. (2010). *Knowledge and practice standards for teachers of reading: With commentary for dyslexia specialists*. Baltimore, MD: Author.
- International Dyslexia Association, The. (2018, March). *Knowledge and practice standards for teachers of reading*. Retrieved from <https://dyslexiaida.org/knowledge-and-practices/>
- International Multisensory Structured Language Education Council. (2010). *IMSLEC directory: MSL training courses and graduates*. Dallas, TX: Author.
- Juel, C. (1988). Learning to read and write: A longitudinal study of 54 children from first to fourth grades. *Journal of Educational Psychology*, 80, 437–447.
- Keller-Allen, C. (2004). *The National Reading Panel: The accuracy of concerns about the report*. Unpublished manuscript.
- Kilpatrick, D.A. (2015). *Essentials of assessing, preventing, and overcoming reading difficulties*. Hoboken, NJ: John Wiley & Sons.
- Klingner, J.K., Morrison, A., & Eppolito, A. (2011). Metacognition to improve reading comprehension. In R.E. O'Connor & P.F. Vadasy (Eds.), *Handbook of reading interventions* (pp. 220–253). New York, NY: Guilford.
- Kratochwill, T.R., Hitchcock, J., Horner, R.H., Levin, J.R., Odom, S.L., Rindskopf, D.M., & Shadish, W.R. (2010). *Single-case designs technical documentation*. Retrieved from <http://files.eric.ed.gov/fulltext/ED510743.pdf>
- Learning First Alliance. (2000). *Every child reading: A professional development guide*. Washington, DC: Author.
- Lerner, J. (1989). Educational interventions in learning disabilities. *Journal of the American Academy of Child and Adolescent Psychiatry*, 28, 326–331.
- Lyon, G.R. (Ed.). (1994). *Frames of reference for the assessment of learning disabilities: New view of measurement issues*. Baltimore, MD: Paul H. Brookes Publishing Co.
- Lyon, G.R. (1996, Spring). Learning disabilities. *The Future of Children*, 6(4), 54–76.
- Lyon, G.R. (1999). The NICHD research program in reading development, reading disorders, and reading instruction: A summary of research findings. In *Keys to successful learning: A national summit on research in learning disabilities*. New York, NY: National Center for Learning Disabilities.
- Lyon, G.R. (2004). *The NICHD research program in reading development, reading disorders, and reading instruction initiated: 1965*. Paper presented at the 31st annual conference of the New York Branch of the International Dyslexia Association.
- Lyon, G.R., & Chhabra, V. (2004). The science of reading research. *Educational Leadership*, 61(6), 13–17.
- Lyon, G.R., Shaywitz, S.E., & Shaywitz, B.A. (2003). A definition of dyslexia. *Annals of Dyslexia*, 53, 1–14.
- McCardle, P., Chhabra, V., & Kapinus, B. (2008). *Reading research in action: A teacher's guide for student success*. Baltimore, MD: Paul H. Brookes Publishing Co.
- McIntyre, C.W., & Pickering, J.S. (1995). *Clinical studies of multisensory structured language education for students with dyslexia and related disorders*. Salem, OR: International Multisensory Structured Language Education Council.
- Moats, L.C. (1999). *Teaching reading is rocket science: What expert teachers of reading should know and be able to do* (No. 372). Washington, DC: American Federation of Teachers.
- Moats, L.C. (2003). *Language Essentials for Teachers of Reading and Spelling (LETRS)*. Longmont, CO: Sopris West Educational Services.
- Moats, L.C., & Brady, S. (1997). *Informed instruction for reading success: Foundations for teacher preparation*. Baltimore, MD: The International Dyslexia Association.
- Moats, L.C., & Foorman, B.R. (2003). Measuring teachers' content knowledge of language and reading. *Annals of Dyslexia*, 53, 23–45.
- Morris, R.D., Stuebing, K.K., Fletcher, J.M., Shaywitz, S.E., Lyon, G.R., Shankweiler, D.P., . . . Shaywitz, B.A. (1998). Subtypes of reading disability: Variability around a phonological core. *Journal of Educational Psychology*, 90, 347–373.
- National Center for Education Statistics. (2017). *The nation's report card: Reading 2017*. Washington, DC: U.S. Department of Education.

- National Institute of Child Health and Human Development (NICHD). (2000). *Report of the National Reading Panel: Reports of the subgroups. Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction* (NIH Pub No. 00-4754). Washington, DC: Government Printing Office.
- No Child Left Behind Act of 2001, PL 107-110, 115 Stat. 1425, 20 U.S.C. §§ 6301 *et seq.*
- Olson, R.K. (2004). Environment and genes. *Scientific Studies of Reading*, 8(2), 111–124.
- Partnership for Reading. (2003, June). *Put reading first: The research building blocks for teaching children to read. Kindergarten through grade 3* (2nd ed.). Washington, DC: Author.
- Piasta, S.B., Connor, C.M., Fishman, B.J., & Morrison, F.J. (2009). Teachers' knowledge of literary concepts, classroom practices, and student reading growth. *Scientific Studies of Reading*, 13(3), 224–248.
- Pressley, M. (2002). *Reading instruction that works* (2nd ed.). New York, NY: Guilford.
- Ramus, F., Rosen, S., Dakin, S.C., Day, B.L., Castellote, J.M., White, S., & Frith, U. (2003). Theories of developmental dyslexia: Insights from a multiple case study of dyslexic adults. *Brain*, 126, 841–865.
- Rasinski, T. (2017). Readers who struggle: Why many struggle and a modest proposal for improving their reading. *The Reading Teacher*, 70(5), 519–524.
- Reyna, V.F. (2004). Why scientific research? The importance of evidence in changing educational practice. In P. McCardle & V. Chhabra (Eds.), *The voice of evidence in reading research* (pp. 47–58). Baltimore, MD: Paul H. Brookes Publishing Co.
- Schochet, P., Cook, T., Deke, J., Imbens, G., Lockwood, J.R., Porter, J., & Smith, J. (2010). *Standards for regression discontinuity designs*. Retrieved from https://ies.ed.gov/ncee/wwc/Docs/ReferenceResources/wwc_rd.pdf
- Seidenberg, M. (2017). *Language at the speed of sight: How we read, why so many can't, and what can be done about it*. New York, NY: Basic Books.
- Shaywitz, B.A., Shaywitz, S.E., Blachman, B.A., Pugh, K.R., Fulbright, R.K., Skudlarski, P., . . . Gore, J.C. (2004). Development of left occipitotemporal systems for skilled reading in children after a phonologically-based intervention. *Biological Psychiatry*, 55(9), 926–933.
- Shaywitz, S.E. (1998). Current concepts: Dyslexia. *New England Journal of Medicine*, 338(5), 307–312.
- Shaywitz, S. (2003). *Overcoming dyslexia: A new and complete science-based program for reading problems at any level*. New York, NY: Alfred A. Knopf.
- Shaywitz, S.E., & Shaywitz, B.A. (2004). Neurobiologic basis for reading and reading disability. In P. McCardle & V. Chhabra (Eds.), *The voice of evidence in reading research* (pp. 417–442). Baltimore, MD: Paul H. Brookes Publishing Co.
- Shaywitz, S.E., Shaywitz, B.A., Fletcher, J.M., & Escobar, M.D. (1990). Prevalence of reading disability of boys and girls: Results of the Connecticut Longitudinal Study. *Journal of the American Medical Association*, 264(8), 998–1002.
- Snow, C.E. (2004). Foreword. In P. McCardle & V. Chhabra (Eds.), *The voice of evidence in reading research* (pp. xix–xxv). Baltimore, MD: Paul H. Brookes Publishing Co.
- Snow, C.E., Burns, M.S., & Griffin, P. (Eds.). (1998). *Preventing reading difficulties in young children*. Washington, DC: National Academies Press.
- Spear-Swerling, L., Brucker, P., & Alfano, M. (2005). Teachers' literacy-related knowledge and self-perception in relation to preparation and experience. *Annals of Dyslexia*, 55, 266–293.
- Torgesen, J.K. (2004). Lessons learned from research on interventions for students who experience difficulty learning to read. In P. McCardle & V. Chhabra (Eds.), *The voice of evidence in reading research* (pp. 355–382). Baltimore, MD: Paul H. Brookes Publishing Co.
- Torgesen, J.K., Houston, D.D., Rissman, L.M., Decker, S.M., Roberts, G., Vaughn, S., . . . Lesaux, B. (2007). *Academic literacy instruction for adolescents: A guidance document from the Center on Instruction*. Portsmouth, NH: RNC Research Corporation, Center on Instruction.
- Torgesen, J.K., Wagner, R.K., & Rashotte, C.A. (1994). Longitudinal studies of phonological processing and reading. *Journal of Learning Disabilities*, 27, 276–286.
- U.S. Department of Education, Institute of Education Sciences. (2008). *WWC procedures and standards handbook: Version 3.0*. Retrieved from https://ies.ed.gov/ncee/wwc/Docs/referenceresources/wwc_procedures_v3_0_standards_handbook.pdf
- Vaughn, S., & Linan-Thompson, S. (2003). Group size and time allotted to intervention: Effects for students with reading difficulties. In B.R. Foorman (Ed.), *Preventing and remediating reading difficulties: Bringing science to scale* (pp. 299–324). Timonium, MD: York Press.

- Walsh, K., Glaser, D., & Wilcox, D.D. (2006). *What education schools aren't teaching about reading and what elementary teachers aren't learning*. Washington, DC: National Council on Teacher Quality.
- Williamson, G.L. (2008). A text readability continuum for postsecondary readiness. *Journal of Advanced Academics, 19*(4), 602–632.
- Wolf, M., Bowers, P., & Biddle, K. (2000). Naming-speed processes, timing, and reading: A conceptual review. *Journal of Learning Disabilities, 33*, 322–324.
- Woodcock, R.W., & Johnson, M.B. (1989). *The Woodcock-Johnson–Revised Tests of Achievement*. Itasca, IL: Riverside.