RESEARCH SUPPORT FOR EVIDENCE-BASED DYSLEXIA/STRUCTURED LITERACY MATERIALS AND INSTRUCTIONAL PRACTICES

For more than 40 years, Neuhaus Education Center has been a trailblazer in solutions for overcoming obstacles to literacy, including dyslexia, and today is a nationally recognized leader in the implementation of the science of reading. Its professional instruction for educators, referral and resource services for families, and classes for adult learners unlock a brighter future of *Literacy for All.*

Laying the groundwork for sustainable change, Neuhaus Education Center equips teachers to be diagnostic and prescriptive in recognizing student literacy needs and how best to utilize the resources their district makes available to them. Our commitment to educators is to offer the highest quality instruction that is consistent with current research findings. With comprehensive professional development, teachers return to the classroom prepared to implement the new instruction. We are gratified with our role as professional intermediary, making current research accessible and useful to the classroom teacher. The National Commission on Teaching and America's Future (NCTAF) stated, "What teachers know and can do is one of the most important influences on what students learn" (Darling-Hammond, 1998, p. 6).

Neuhaus Education Center practice-based professional developments and curricula are based on a wide range of current and established, peer-reviewed, scientific research for evidence-based practices in structured literacy instruction. Materials are routinely reviewed to ensure they maintain the highest quality. Revisions are made regularly to address shifts in the field to include the most relevant practices to best serve students learning to read in English. In addition, Neuhaus Education Center programs are intended to be utilized by trained teachers to intervene for students with dyslexia and have been vetted through the International Multisensory Structured Literacy Education Council (IMSLEC) and the International Dyslexia Association (IDA), both highly respected entities in the field for the oversight of Dyslexia Specialists Preparation Programs.

As dyslexia varies in the way it presents in children, progress does not necessarily follow a consistent trajectory making it difficult to conduct efficacy studies with many participants. As a result, few efficacy studies exist for even the most popular Orton-Gillingham based programs (i.e., Wilson, Barton, Take Flight) across the United States (Ring et al., 2017; Sayeski & Zirkel, 2021). Specifically, Neuhaus Education Center programs rely heavily on evidence-based practices that have been studied and proven effective for students to have the highest opportunity for success. The National Reading Panel (2000) established the five components that should be included in classroom reading instruction: phonological/phonemic awareness; phonics; vocabulary; fluency; and comprehension. Standard dyslexia instruction goes a step further to include other components in which a student with dyslexia may require targeted instruction (i.e., syllabication, morphology, syntax, oral language, and written composition), as well as addresses the knowledge and skills required for the delivery of that instruction for these components.

Neuhaus Education Center programs, such as *Basic Language Skills* and the accompanying materials, provide evidence-based, multisensory structured literacy instruction for students with dyslexia. Standard dyslexia instructional programs must be explicit, systematic, and intentional in their approach.

This instruction is designed for all students with dyslexia and will often take place in a small group setting. Standard dyslexia instruction must be—

- evidence-based and effective for students with dyslexia;
- taught by an appropriately trained instructor; and
- implemented with fidelity.

These characteristics are foundational to all Neuhaus Education Center programs and materials and required in the development of any future courses.

[1] **References**

[1] National Reading Panel (US), National Institute of Child Health, Human Development (US), National Reading Excellence Initiative, National Institute for Literacy (US), & United States Department of Health. (2000). *Report of the National Reading Panel: Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction: Reports of the subgroups.* National Institute of Child Health and Human Development, National Institutes of Health.

Ring, J. J., Avrit, K. J., & Black, J. L. (2017). Take flight: The evolution of an Orton Gillingham-based curriculum. *Annals of Dyslexia, 67*(3), 383-400.

Sayeski, K. L., & Zirkel, P. A. (2021). Orton-Gillingham and the IDEA: analysis of the frequency and outcomes of case law. *Annals of Dyslexia, 71*(3), 483-500.

CRITICAL, EVIDENCE-BASED COMPONENTS OF DYSLEXIA INSTRUCTION

The goal of reading is to comprehend; however, there are requisite skills that must become automatic for students to shift cognitive attention to the act of understanding. A great deal of research supports interventions that target each of the required components that can be found throughout Neuhaus Education Center materials and professional development offerings. The following references provide evidence for the activities promoted in our trainings and materials.

ORAL LANGUAGE DEVELOPMENT[2]

Long before children learn to read, they need a great number of language and literacy experiences that will prepare them for later reading with print. Language learning and literacy learning are reciprocal – the relationship is dynamic and changes over time with each influencing the other at different developmental stages (Kamhi & Catts, 1989; Sawyer, 1991). When adults engage in purposeful and high-quality conversation with children, their vocabularies and world knowledge grow (Hart & Risley, 1999; Hoff & Naigles, 2002).

Teaching children to read requires teaching them language and providing experiences to acquire abstract linguistic skills necessary for reading such as rhymes, listening, discussing, and examining books. These lead to the development of much needed oral vocabulary and the verbal reasoning skills required for more complex tasks. Research has established that children with larger vocabularies typically become more proficient readers (Snow et al, 1998). Oral language development can be promoted in a variety of ways in a classroom through the reading aloud of books, classroom learning centers, games, or guided activities. Neuhaus Education Center materials include guided oral language units to ensure teachers have the information needed to promote rich classroom discussions that build vocabulary, background knowledge and verbal reasoning skills.

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[2] Hart, B., & Risley, T. R. (1999). *The social world of children learning to talk.* Paul H. Brookes Publishing Co.

Hoff, E., & Naigles, L. (2002). How children use input to acquire a lexicon. *Child Development, 73*(2), 418-433.

Kamhi, A. G., & Catts, H. W. (1989). Language and reading: Convergences, divergences, and development. In A. G. Kamhi & H. W. Catts (Eds.), *Language and reading disabilities* (3rd ed., pp. 1-23). Pearson.

Sawyer, D. (1991). Whole language in context: Insights into the great debate. *Topics in Language Disorders, 11*(3), 1-13.

Snow, C. burns M. S., & Griffin, P. (1998). *Preventing reading difficulties in young children.* National Academy Press.

Phonological/Phonemic awareness[3]— "Phonological awareness is the understanding of the internal sound structure of words. A phoneme is the smallest unit of sound in a given language that can be recognized as being distinct from other sounds. An important aspect of phonological awareness is the ability to segment spoken words into their component phonemes [phonemic awareness]." (Birsh, 2018, p. 26).

Sound-symbol Association and Phonics[4]—Sound-symbol association is the knowledge of the various speech sounds in any language to the corresponding letter or letter combinations that represent those speech sounds. Instruction in the correspondences between sounds and symbols is called phonics. The mastery of sound-symbol association (alphabetic principle) is the foundation for the ability to read (decode) and spell (encode) (Birsh, 2018, p. 26). "Explicit phonics refers to an organized program in which these sound symbol correspondences are taught systematically" (Berninger & Wolf, 2009, p. 53). They are also taught from simple to complex and include regular spiral and review of previously taught concepts.

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[3] Birsh, J., & Carreker, S. (2018). *Multisensory Teaching of Basic Language Skills* (4th ed.). Paul H. Brookes Publishing Co.

Ehri, L. C., Nunes, S. R., Willows, D. M., Schuster, B. V., Yaghoub-Zadeh, Z., & Shanahan, T. (2001). Phonemic awareness instruction helps children learn to read: Evidence from the National Reading Panel's meta-analysis. *Reading Research Quarterly, 36*(3), 250-287. https://doi.org/10.1598/RRQ.36.3.2

Melby-Lervåg, M., Lyster, S. A. H., & Hulme, C. (2012). Phonological skills and their role in learning to read: a meta-analytic review. *Psychological bulletin*, *138*(2), 322.

National Reading Panel (US), National Institute of Child Health, Human Development (US), National Reading Excellence Initiative, National Institute for Literacy (US), & United States Department of Health. (2000). *Report of the National Reading Panel: Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction: Reports of the subgroups*. National Institute of Child Health and Human Development, National Institutes of Health.

Rice, M., Erbeli, F., Thompson, C. G., Sallese, M., & Fogarty, M. (in press, 2022). Phonemic awareness: A meta-analysis for planning effective instruction. *Reading Research Quarterly.* https://doi.org;10.1002.rrq.473

Wanzek, J., Stevens, E. A., Williams, K. J., Scammacca, N., Vaughn, S., & Sargent, K. (2018). Current evidence on the effects of intensive early reading interventions. *Journal of Learning Disabilities, 51*(6), 612-624. https://doi.org/10.1177/00222198418775110

[4] Adams, M. J. (2002). Alphabetic anxiety and explicit, systematic phonics instruction: A cognitive science perspective. In S. B. N. Neuman & D. K. Dickinson (Eds.), *Handbook of early literacy research, 1*, 66-80. Guilford.

Berninger, V. W., & Wolf, B. J. (2009). *Teaching students with dyslexia and dysgraphia: Lessons from teaching and science.* Paul H. Brookes Publishing Co.

Birsh, J. R., & Carreker, S. (2018). *Multisensory Teaching of Basic Language Skills.* Paul H. Brookes Publishing Co.

Cox, A. R. (1992). *Foundations for literacy: Structures and techniques for multisensory teaching of basic written English language skills.* Educators Publishing Service.

Ehri, L. C. (2005). Learning to read words: Theory, findings, and issues. *Scientific Studies of Reading, 9*(2), 167-188.

Ehri, L. C. (2014). Orthographic mapping in the acquisition of sight word reading, spelling memory, and vocabulary learning. *Scientific Studies of Reading*, *18*(1), 5-21.

Ehri, L. C., & McCormick (2013). Phases of word learning: Implications for instructions with delayed and disabled readers. *Theoretical Models and Processes of Reading,* 339-361. https://doi.org/10.1598/0710.12

Kilpatrick, D. A. (2020). *Equipped for reading success: A comprehensive, step-by-step program for developing phoneme awareness and fluent word recognition.* Casey & Kirsch Publishers.

Neuhaus, G. F., Roldan, L. W., Boulware-Gooden, R., & Swank, P. R. (2006). Parsimonious reading models: Identifying teachable subskills. *Reading Psychology, 27,*37-58.

Treiman, R. (2006). Knowledge about letters as a foundation for reading and spelling. In R. M. Joshi & P. G. Aaron (Eds.), *Handbook of Orthography and Literacy* (pp. 581-599). Lawrence Erlbaum Associates.

Syllabication[5]— "A syllable is a unit of oral or written language with one vowel sound. Instruction must include 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" (Birsh, 2018, p. 26).

Orthography[6]—Orthography is the written spelling patterns and rules in a given language. Students must be taught the regularity and irregularity of the orthographic patterns of a language in an explicit and systematic manner. The instruction should be integrated with phonology and sound-symbol knowledge.

Vocabulary[7]—The National Reading Panel (2000) established vocabulary as an essential component of reading instruction and acknowledged its critical role in reading achievement. Vocabulary can be defined as the words of a language, put more simply, "the kind of words that students must know to read increasingly demanding text" for understanding (Kamil & Hiebert, 2005. p. 4). Vocabulary can be developed in many ways, and teachers must have strategies for developing the breadth, depth, and understanding of words that support skilled reading comprehension.

[5] Birsh, J. R., & Carreker, S. (2018). *Multisensory Teaching of Basic Language Skills.* Paul H. Brookes Publishing Co.

Henry, M. K. (2010). *Unlocking literacy: Effective decoding and spelling instruction* (2nd ed.). Paul H. Brookes Publishing Co.

Nippold, M. A. (2017). Reading comprehension deficits in adolescents: Addressing underlying language abilities. *Language, Speech, and Hearing Services in Schools, 48*(2), 125-131.

Toste, J. R., Williams, K. J., & Capin, P. (2016). Reading big words: Instructional practices to promote multisyllabic word reading fluency. *Intervention in School and Clinic*, 1-9. https://doi.org/10.1177/1053451216676797

[6] Birsh, J. R., & Carreker, S. (2018). *Multisensory Teaching of Basic Language Skills.* Paul H. Brookes Publishing Co.

Brady, S., & Moats, L. C. (1997). *Informed instruction for reading success: Foundations for teacher preparation.* The International Dyslexia Association.

Ehri, L. C. (2000). Learning to read, learning to spell: Two sides of a coin. *Topics in Learning Disorders, 20,* 19-49.

Henry, M. K. (2010). *Unlocking literacy: Effective decoding and spelling instruction* (2nd ed.). Paul H. Brookes Publishing Co.

McMurray, S., & McVeigh, C. (2016). The case for frequency sensitivity in orthographic learning. *Journal of Research in Special Educational Needs, 16*, 243-253. https://doi.org/10.1111/1471-3802.12079

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

Beck, I. L., Perfetti, C., McKeown, M. G. (1982). Effects of long-term vocabulary instruction on lexical access and reading comprehension. *Journal of Educational Psychology, 74*(4), 506-521.

Biemiler, A. (2012). Teaching vocabulary in the primary grades: Vocabulary instruction needed. In J. F. Baumann & E. J. Kame'enui (Eds.), *Vocabulary instruction: Research in practice* (2nd ed., pp. 28-40). Guilford.

Birsh, J. R., & Carreker, S. (2018). *Multisensory Teaching of Basic Language Skills.* Paul H. Brookes Publishing Co.

Hennessy, N. E. (2018). Working with word meaning. In J R. Birsh & S. Carreker (Eds.). *Multisensory Teaching of Basic Language Skills* (pp. 558-595). Paul H. Brookes Publishing Co.

Kamil, M. L., & Hiebert, E. H. (2005). The teaching and learning of vocabulary. In E. H. Hiebert & M. L. Kamil (Eds.), *Teaching and learning vocabulary: Bringing research to practice* (pp. 1-26). Lawrence Erlbaum Associates.

Li, M., & Kirby, J. M. (2014). The effects of vocabulary breadth and depth on English reading. *Applied Linguistics, 36*(5), 611-634.

Moats, L. C. (2009). *The mighty word: Building vocabulary and oral language* (2nd ed.). Sopris West Educational Services.

Perfetti, C., & Satfura, J. (2014). Word knowledge in a theory of reading comprehension. *Scientific Studies of Reading, 11*(4), 357-383.

Morphology[8]— "Morphology is the study of how morphemes are combined to form words. A morpheme is the smallest unit of meaning in the language" (Birsh, 2018, p. 26). The English language comes from a rich history that includes Anglo-Saxon, Latin, and Greek origin. "The spellings of many words are a compromise between the conflicting demands of the alphabetic and morphological principles" (Seidenberg, 2017. P. 133). Understanding the history and structure of written English can facilitate improved word reading, spelling, and reading comprehension, as well as written expression.

Syntax[9]— "Syntax is the set of principles that dictate sequence and function of words in a sentence in order to convey meaning. This includes grammar, sentence variation, and the mechanics of language" (Birsh, 2018, p. 26). Students should understand the grammatical features of a language, parts of speech and how they work together to make phrases and sentences. Syntactical knowledge is significant to reading fluency and comprehension later in reading development. Knowledge of syntax allows readers to make predictions about what word might be coming next and is essential for written composition.

Fluency[10]—Fluency is the bridge between decoding and reading comprehension (Chall, 1983) and is an ongoing process that develops over time with practice. Fluency is marked by a smooth expressive tone,

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[8] Adams, M. J. (1990) Beginning to read: Thinking and learning about print. The MIT Press.

Berninger, V. W., Abbott, R. D., Nagy, W., & Carlisle, J. (2010). Growth in phonological, orthographic, and morphological awareness in Grades 1 to 6. Journal of Psycholinguistic Research, 39, 141-163.

Birsh, J. R., & Carreker, S. (2018). Multisensory Teaching of Basic Language Skills. Paul H. Brookes Publishing Co.

Bowers, P. N., & Kirby, J. R. (2010). Effects of morphological instruction on vocabulary acquisition. Reading and Writing: An Interdisciplinary Journal, 23, 515-597.

Bowers, P. N., Kirby, J. R., & Deacon, S. H. (2010). The effects of morphological instruction on literacy skills: A systematic review of the literature. Review of Educational Research, 80(2), 144-179.

Crystal, D. (2012). Spell it out: The curious, enthralling, and extraordinary story of English spelling. Picador.

Foorman, B. R., Schatschneider, C. (1997). Beyond alphabetic reading: Comments on Torgeson's prevention and intervention studies. Journal of Academic Language Therapy,1, 59-65.

Goodwin, A. P., Petscher, Y., Carlisle, J. F. & Mitchell, A. M. (2017). Exploring the dimensionality of morphological knowledge for adolescent readers. Journal of Research in Reading, 40(1), 91-117. https://doiorg/10.1111/1467-9817.12064

Henry, M. K. (2010). Unlocking literacy: Effective decoding and spelling instruction (2nd ed.). Paul H. Brookes Publishing Co.

McCutchen, D., Stull, S., Herrera, B., Lotas, S., & Evans, S. (2014). Putting words to work. Effects of morphological instruction on children's writing. Journal of Learning Disabilities, 47(1), 86-97.

Nippold, M. A. (2017). Reading comprehension deficits in adolescents: Addressing underlying language abilities. Language, Speech, and Hearing Services in Schools, 48(2), 125-131.

Seidenberg, M. (2017). Language at the speed of sight. Basic Books.

Toste, J. R., Williams, K. J., & Capin, P. (2016). Reading big words: Instructional practices to promote muyltisyllabic word reading fluency. Intervention in School and Clinic, 1-9. https://doi.org/10.1177/1053451216676797

[9] Birsh, J. R., & Carreker, S. (2018). *Multisensory Teaching of Basic Language Skills.* Paul H. Brookes Publishing Co.

Cain, K. (2007). Syntactic awareness and reading ability: Is there any evidence for a special relationship? *Applied Psycholinguistics, 28*(4), 679-694. https://doi.org/10.1017/S0142716407070361

Hochman, J. (2009). *Teaching basic writing skills: Strategies for effective expository writing instruction.* Sopris West Educational Services.

Scarborough, H. (2001). Connecting early language and literacy to later reading (dis)abilities: Evidence, theory, and practice. In S. Neuman& D. Dickinson (Eds.), *Handbook of early literacy research* (pp. 97-110). Guilford.

[10] Chall, J. (1983). Stages of reading development. McGraw-Hill.

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consistent tempo, and appropriate phrasing. To achieve fluency reading, coaching and much practice are required. Students who lack the word reading skills to become fluent readers will struggle to comprehend what they read; therefore, fluency instruction is imperative to skilled reading and teachers must utilize coaching and assessment to appropriately address a student's fluency needs.

Reading Comprehension[11]—Comprehension depends on accurate, fluent decoding skills and incorporates all the other skills previously discussed for ultimate reading success. Readers who have strong comprehension skills can identify key ideas from a text and text structures that assist in their comprehension. They monitor their comprehension using metacognitive skills and typically have strong background knowledge and vocabulary. These skills must be taught and practiced along with strategies that students

Fern-Pollak, L., & Masterson, J. (2014). Literacy development. In D. Mareschal, B. Butterworth, & A. Tolmie (Eds.), Educational Neuroscience. Wiley-Blackwell

Garnett, K. (2018). Fluency in learning to read: Conceptions, misconceptions, learning disabilities, and instructional moves. In J. R. Birsh & S. Carreker (Eds.), Multisensory Teaching of Basic Language Skills (pp. 467-500).

Hasbrouck, J. (2010). Developing fluent readers white paper. Read Naturally.

Hudson, A., Koh, P. W., Moore, K. A., & Binks-Cantrell, E. S. (2020). Fluency interventions for elementary students with reading difficulties: A synthesis of the research from 2000-2019. Education Sciences, 10(52). 1-28.

Rasinski, T. (2017). Readers who struggle: Why many struggle and a modest proposal for improving their reading. The Reading Teacher, 70(5), 519-524.

Rasinski, T., & Nageldinger, J. K. (2016). The fluency factor: Authentic instruction and assessment for reading success in the common core classroom. Teachers College Press.

Rasinski, T. V., Reutzel, R., Chard, D., & Linan-Thompson, S. (2010). Reading fluency. In M. L. Kamil, P. D. Pearson, E. B. Moje, & P. Afflerbach (Eds.), Handbook of reading research (Vol. 4), Lawrence Erlbaum Associates.

Samuels, S. J. (2006). Toward a model of reading fluency. In S. Samuels & A. Farstrup (Eds.), What research has to say about fluency instruction (pp 24-46). International Reading Association.

Torgeson, J. K., & Hudson, R. (2006). Reading fluency: Critical issues for struggling readers. In S. J. Samuels & A. Farstrup (Eds.), Reading fluency: The forgotten dimension of reading success (pp. 130-158). International Reading Association Monograph of the British Journal of Educational Psychology.

[11] Beerwinkle, A. L., Wijekumar, K., Walpole, S., & Aguis, R. (2018). An analysis of the ecological components within a text structure intervention. *Reading and Writing*, *31*(9), 2041-2064.

Birsh, J. R., & Carreker, S. (2018). *Multisensory Teaching of Basic Language Skills.* Paul H. Brookes Publishing Co.

Cain, K., Oakhill, J. V. (1999). Inference making ability and its relation to comprehension failure in young children. *Reading and Writing: An Interdisciplinary Journal, 11*, 489-503.

Hoover, W. A., & Gough, P. B. (1990). The simple view of reading. *Reading and Writing: An Interdisciplinary Journal*, *2*(2), 127-160.

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). Guilford.

Meyer, B. J., & Ray, M. N. (2011). Structure strategy interventions: Increasing reading comprehension of expository text. *International Electronic Journal of Elementary Education*, *4*(1), 127-152.

Marzola, E. S. (2018). Strategies to improve reading comprehension in the multisensory classroom. In J. R. Birsh & S. Carreker (Eds.), *Multisensory Teaching of Basic Language Skills.* Paul Brookes Publishing Co.

Wijekumar, K. K., Beerwinkle, A. L., Harris, K. R., & Graham, S. (2019). Etiology of teacher knowledge and instructional skills for literacy at the upper elementary grades. *Annals of dyslexia*, *69*(1), 5-20.

Wijekumar, K., Beerwinkle, A., McKeown, D., Zhang, S., & Joshi, R. M. (2020). The "GIST" of the reading comprehension problem in grades 4 and 5. *Dyslexia*, *26*(3), 323-340.

Williams, J. P. (2018). Text structure instruction: the research is moving forward. *Reading and Writing: An Interdisciplinary Journal*, *31*(9), 1923-1935.

Willingham, D. (2006). How knowledge helps. *American Educator, 30,* 30-37.

Willingham, D. (2006/2007). The usefulness of brief instruction in reading comprehension strategies. *American educator, 30*, 39-45, 50.

can turn to when they struggle to understand what they read. The Simple View of Reading (Hoover & Gough, 1990) involves both decoding and language comprehension to achieve reading comprehension, therefore teachers must have knowledge of all the requisite skills to properly identify what area is preventing a child's success with reading comprehension.

Written Composition[12]—Writing is the most difficult of the language arts both to teach and to learn due to the complex demands required to complete a writing task. Writing instruction should be incorporated into all content areas so that students receive ample opportunities for practice. "When students write about what they are learning, they gain more knowledge that if they are taught writing as a separate activity" (Hochman & MacDermott-Duffy, 2018. p. 647). Instruction in writing should include practice with three modes – narrative, expository, and argumentative – with activities that allow for self-expression. As writing to explain or inform is most utilized in academics and the workplace, time should be spent focused on developing skills for this type of writing.

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[12] Bangert-Drowns, B. L., Hurley, M. M., & Wilkinson, B. (2004). The effects of school-based writing-to-learn interventions on academic achievement: A meta-analysis. *Review of Educational Research, 74*(1), 29-58.

Birsh, J. R., & Carreker, S. (2018). *Multisensory Teaching of Basic Language Skills.* Paul H. Brookes Publishing Co.

Graham, S., & Hebert, M. A. (2010). *Writing to read: Evidence for how writing can improve reading.* Carnegie Corporation of New York.

Hebert, M. Gillespie, A., & Graham, S. (2013). Comparing effects of different writing activities on reading comprehension: A meta-analysis. *Reading and Writing: An Interdisciplinary Journal, 26,* 111-138.

Hochman, J. (2009). *Teaching basic writing skills: Strategies for effective expository writing instruction.* Sopris West.

Hochman, J. C., & MacDermott-Duffy, B. (2018). Composition: Evidence-based instruction. In J. R. Birsh & S. Carreker (Eds.), *Multisensory Teaching of Basic Language Skills* (pp. 646-675). Paul H. Brookes Publishing.

Hochman, J., & Wexler, N. (2017). *The writing revolution: A guide to advancing thinking through writing in all subjects and grades.* Jossey Bass.

National Association for the Education of Young Children. (NAEYC). (1998). *Learning to read and write: Developmentally appropriate practices for young children.* Author.

INSTRUCTION FOR STUDENTS WITH DYSLEXIA[13]

While it is necessary that students are provided instruction in the above areas, it is also critical that the way in which the content is delivered be consistent with research-based practices. Professional development is one of the key components of Neuhaus Education Center's mission to promote *Literacy for All.* There is no substitute for a knowledgeable and effective teacher which requires a great deal of training and practice.

Principles of effective intervention for students with dyslexia should include all the following:

- **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" (Birsh, 2018, p. 26). "Children are actively engaged in learning language concepts and other information, often by using their hands, arms, mouths, eyes, and whole bodies while learning" (Moats & Dakin, 2008, p. 58). 43

- **Systematic and cumulative**— "Multisensory language instruction requires that the organization of material follow order of the language. The sequence must begin with the easiest concepts and most basic elements and progress methodically to more difficult material. Each step must also be based on [elements] already learned. Concepts taught must be systematically reviewed to strengthen memory" (Birsh, 2018, p. 26).

- **Explicit instruction**— "Explicit instruction is explained and demonstrated by the teacher one language and print concept at a time, rather than left to discovery through incidental encounters with information. Poor readers do not learn that print represents speech simply from exposure to books or print" (Moats & Dakin, 2008, p. 58). Explicit Instruction is "an approach that involves direct instruction: The teacher demonstrates the task and provides guided practice with immediate corrective feedback before the student attempts the task independently" (Mather & Wendling, 2012, p. 326).

- **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" (Birsh, 2018, p. 27). "This teacher knowledge is essential for guiding the content and emphasis of instruction for the individual

[13] Berninger, V. W., & Wolf, B. (2009). Teaching students with dyslexia and dysgraphia: Lessons from teaching and science. Baltimore, MD: Paul H. Brookes Publishing.

Birsh, J. R. (2018). Connecting research and practice. In J. R. Birsh, Multisensory teaching of basic language skills (4th ed., pp21–34). Baltimore, MD: Paul H. Brookes Publishing.

Henry, M. K. (2010). Unlocking literacy: Effective decoding and spelling instruction (2nd ed.). Baltimore, MD: Paul H. Brookes Publishing.

The International Multisensory Structured Language Council. (2013). Multisensory structured language programs: Content and principles of instruction. Retrieved from https://www.imslec.org/directory.asp?action=instruction.

Birsh, J. R., & Carreker, S. (2018). *Multisensory Teaching of Basic Language Skills.* Paul H. Brookes Publishing Co.

Mather, N., & Wendling, B. J. (2012). Essentials of dyslexia assessment and intervention. Hoboken, NJ: John Wiley & Sons. Moats, L. C, & Dakin, K. E. (2008). Basic facts about dyslexia and other reading problems. Baltimore, MD: The International Dyslexia Association.

Moats, L. C., & Dakin, K. E. (2008). *Basic facts about dyslexia & other reading problems.* International Dyslexia Association.

student" (Moats & Dakin, 2008, p. 58). "When a reading skill becomes automatic (direct access without conscious awareness), it is performed quickly in an efficient manner" (Berninger & Wolf, 2009, p. 70).

- **Synthetic instruction**— "Synthetic instruction presents the parts of the language and then teaches how the parts work together to form a whole" (Birsh, 2018, p. 27).

- **Analytic instruction**— "Analytic instruction presents the whole and teaches how this can be broken into its component parts" (Birsh, 2018, p. 27). When appropriate intervention is provided, students with dyslexia can make significant gains in reading. Effective instruction is highly structured, systematic, and explicit, and it lasts for a sufficient duration. Regarding explicit instruction, Torgesen (2004) states, "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" (p. 353). In addition, because effective intervention requires highly structured, direct, and systematic delivery, it is imperative that those providing intervention for students with dyslexia are trained in the program used and that the program is implemented with fidelity.

PRACTICE-BASED PROFESSIONAL DEVELOPMENT[14]

Practice-based professional development is a hallmark of Neuhaus Education Center's approach in developing Dyslexia Specialists and teachers of reading. Our programs employ Desimone's (2009) framework of professional learning where all our courses include the following features:

- **Content focus**: Professional development activities focus on specific subject matter content and how students best learn that content.

- **Active learning**: Teachers are provided with ample opportunities to observe and receive feedback, analyze student work, and make presentations, as opposed to passively sitting through lectures.

- **Coherence**: Teachers learn information that is consistent with other professional development related to structured literacy and the Science of Reading.

- **Duration**: Professional development activities are spread over a semester and include 20 hours or more of contact time. A teacher completing the Basic Language Skills program completes 200 coursework hours with accompanying assignments, lesson practicum, practice hours, and a student case study.

- **Collective participation**: Opportunities are provided for groups of teachers from the same grade, subject, or school to participate in professional development activities together to build an interactive learning community within a campus or district setting.

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[14] Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? *Journal of Teacher Education*, *59*(5), 389-407.

Cohen, D. K., & Ball, D. L. (1999). Instruction, capacity, and improvement. *CPRE Research Report Series RR-43.* Consortium for Policy Research in Education.

Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational researcher*, *38*(3), 181-199.Garet, Porter, Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American educational research journal*, *38*(4), 915-945.

Grossman, P., & McDonald, M. (2008). Back to the future: Directions for research in teaching and teacher education. *American Educational Research Journal, 45*(1), 184-205. https://doi.org/10.3102/0002831207312906

RESEARCH SUPPORTING THE EFFECTIVE IMPLEMENTATION OF NEW KNOWLEDGE AND CURRICULA[15]

Recently, research has begun to include information on best practices for the implementation of new programs and knowledge in education. Implementation science is the study of the components necessary to promote the adoption of evidence-based interventions that increase their effectiveness for teacher-student outcomes. NEC seeks to incorporate these practices by assessing the "readiness to benefit" of those interested in implementing new curricula and providing coaching as teachers carry new knowledge and practices into their classroom environments. Often, within-school initiatives are not implemented with the same quality as initially intended by designers, resulting in poor outcomes. Therefore, it is imperative that schools begin to consider frameworks of implementation to ensure the highest benefit from new materials (Moir, 2018). Implementation frameworks typically include the following stages:

- current situation exploration;
- consideration of change, or installation phase;
- preparation for change, or initial implementation phase;
- full implementation, where change is being engaged in;
- innovation, where after practicing interventions with pure fidelity, subtle adaptations are made to best fit the user; and
- maintenance of procedures to ensure sustainability.

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[15] Cook, B. G., & Odom, S. L. (2013). Evidence-based practices and implementation science in special education. Exceptional Children, 79(2), 135-144.

Cook, B. G., Smith, G. J., & Tankersley, M. (2012). Evidence-based practices in education. In K. R. Harris, S. Graham, & T. Urdan (Eds.), APA educational psychology handbook (Vol. 1; pp. 495–528). American Psychological Association.

Lyon, A. R., Cook, C. R., Brown, E. C., Locke, J., Davis, C., Ehrhart, M., et al. (2018). Assessing organizational implementation context in the education sector: Confirmatory factor analysis of measures of implementation leadership, climate, and citizenship. Implement. Sci. 13:5. https://doi.org/ 10.1186/s13012-017- 0705-6

Moir, T. (2018). Why is implementation science important for intervention design and evaluation within educational settings? Frontiers in Education, 3(61), 1-9. https://doi.org/10.3389/feduc.2018.00061
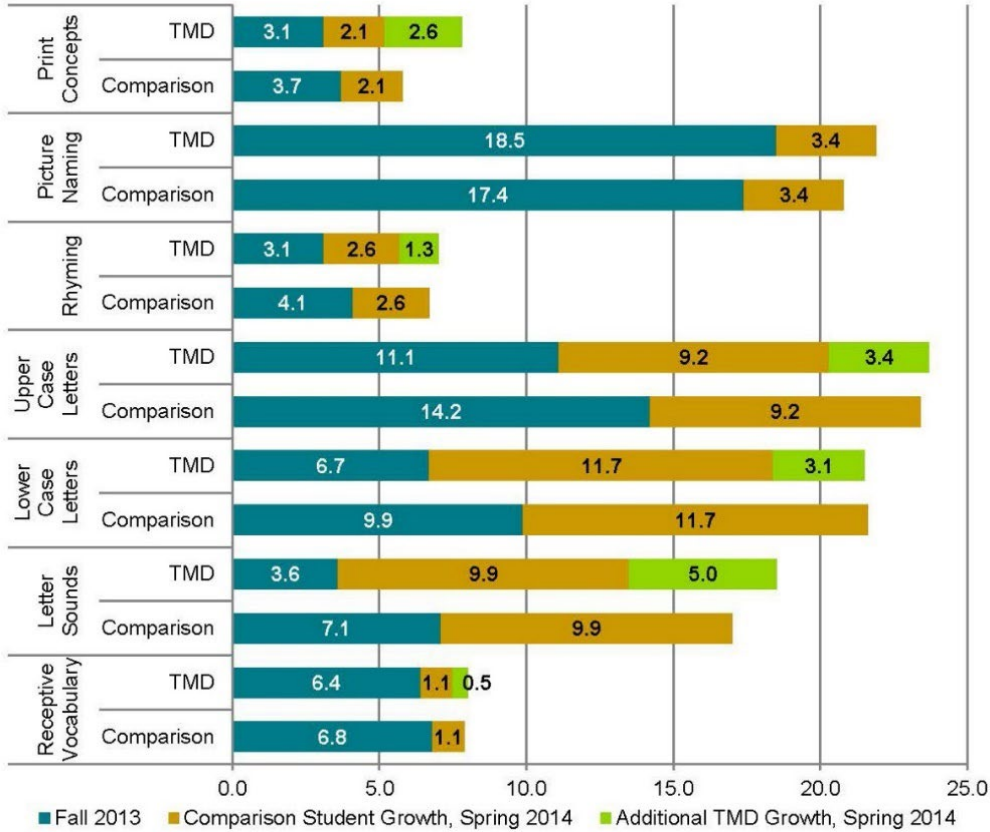
RESEARCH STUDIES AND PUBLICATIONS

Teachers Make the Difference (2013–2014)[16]

Does evidence-based professional development and coaching improve the knowledge and classroom practice of early childhood educators, and subsequently improve student outcomes? That is what Neuhaus Education Center sought to answer in the evaluation of the Teachers Make the Difference (TMTD) program for prekindergarten (PreK) teachers working with disadvantaged students in traditionally lower performing schools in the Houston Independent School District (HISD).

Neuhaus Education Center engaged 68 PreK teachers (TMTD teachers) in a year-long professional development program that sought to improve educator's skills in teaching four areas of early literacy— oral language, phonological awareness, letter recognition, and concepts of print. Did students of teachers who received TMTD achieve at higher levels compared to students whose teachers did not receive TMTD?

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[16] Underwood, S., Roccograndi, A., & Cox, M. (2014). *Neuhaus Education Center Teachers Make the Difference: 2013–2014 Evaluation Report*. Portland, OR: Education Northwest.

Figure 1
Student Outcomes Fall to Spring, by Subtest and Teacher Group

Legend: ■ Fall 2013 ■ Comparison Student Growth, Spring 2014 ■ Additional TMD Growth, Spring 2014

Subtest	Group	Fall 2013	Comparison Student Growth, Spring 2014	Additional TMD Growth, Spring 2014
Print Concepts	TMD	3.1	2.1	2.6
Print Concepts	Comparison	3.7	2.1	
Picture Naming	TMD	18.5	3.4	
Picture Naming	Comparison	17.4	3.4	
Rhyming	TMD	3.1	2.6	1.3
Rhyming	Comparison	4.1	2.6	
Upper Case Letters	TMD	11.1	9.2	3.4
Upper Case Letters	Comparison	14.2	9.2	
Lower Case Letters	TMD	6.7	11.7	3.1
Lower Case Letters	Comparison	9.9	11.7	
Letter Sounds	TMD	3.6	9.9	5.0
Letter Sounds	Comparison	7.1	9.9	
Receptive Vocabulary	TMD	6.4	1.1	0.5
Receptive Vocabulary	Comparison	6.8	1.1	

In fall 2013 (blue bars), the average ELQA scores of students of TMTD teachers were significantly lower than those of students of comparison teachers on every subtest, except for Picture Naming (Figure 1). By spring 2014 (tan and green bars), this pattern was reversed and average scores of students of TMTD teachers were higher than those of students of comparison teachers on every subtest, except for Lowercase Letters. From fall to spring, the average rate of change in ELQA scores among TMTD teacher's students was significantly higher than that of comparison teachers' students on all subtests except Picture Naming.

Demonstration School Initiative (2013-2014)

In collaboration with Houston Independent School District's (HISD) elementary chiefs, school support officers, and director of literacy, Neuhaus Education Center sought to provide job-embedded professional development through coaching at two HISD schools. The schools were chosen by the chief School Officer. The purpose of this partnership was to ensure that evidenced-based reading instruction was put into action and sustained throughout the school year. Over the course of the 2013-2014 school year, Neuhaus Education Center coaches and Houston ISD administrators, embarked on a journey to create sustainable change within Houston ISD schools. Coaching served to develop instructional plans that were evidenced-based and fostered the development of highly trained teachers. The coaching support ranged on a continuum from coaching groups of teachers through the facilitation of Professional Learning Communities (PLCs) and school-based instructional rounds to the support of individual teachers as needed. Demonstration schools were provided with support using various coaching techniques that included, but were not limited to, observations and feedback, filming and conferencing, demonstration lessons, and the establishment of teacher leaders. The expected outcomes were the introduction and refinement of instructional strategies and increased student achievement.

Results

Additionally, a sample group of demonstration school and comparison school students were administered beginning and end of year assessments using the Gates-MacGinitie Reading Test. This test was administered to determine the extent of students reading ability before and after support was provided at their campus. Normal Curve Equivalent (NCE) scores were analyzed at the end of the year. These scores describe students' level of achievement in relation to the achievement of other students in the same grade. The results indicate an increase in overall reading outcomes for students at schools that were supported by Neuhaus Education Center coaches. Schools that did not have the support of Neuhaus Education Center coaches had a drop in overall reading outcomes, even though their scores at the beginning of the year were significantly higher than those from the demonstration schools. It should be noted that the decline in scores for the two comparison schools was not attributable to fewer correct answers than those on the pretest, but that their spring raw scores did not gain compared to the original norming group.

Demonstration Schools	Beginning of Year	End of Year	Change
Hobby Elementary	41.61	51.11	+9.5
Jefferson Elementary	42.65	51.00	+8.35
Comparison Schools*	**Beginning of Year**	**End of Year**	**Change**
Windsor Village Elementary	69.00	64.06	-4.94
Browning Elementary	56.95	49.72	-7.23

Not supported by NEC coaches

Conclusion

The overall results of the coaches' findings indicated definite strengths throughout the coaching initiative. Administrators were able to continuously refine the details of what evidence-based instruction should look like on their campus and disseminate that information to school teams. The support was documented both qualitatively by the coaches and quantitatively through the collection of pre- and post-tests. Both provided evidence for a positive impact of coaching and allowed Neuhaus to move forward with the knowledge that Neuhaus had been able to bring improved student achievement to the individual campuses.

Language and Literacy for Young Readers in Kansas (2003-2004)

Neuhaus Education Center's *Language and Literacy for Young Learners (LLYL)* curriculum was used in a major early education project in Kansas. Topeka Family Guidance and Service Center, The University of Kansas, and School District 501 in Topeka were the recipients of a three-year, 2.7-million-dollar Early Reading First grant. The goal of the Early Reading First program, authorized by the No Child Left Behind law, was to improve the school readiness of our nation's youngest learners, especially those from low-income families.

Michele Berg, Ph.D., director of the Topeka Family Guidance and Service Center, and her colleagues studied LLYL at NEC and provided professional development and support for the 15 teachers who were part of the grant. Preliminary results showed that the preschool children who were taught by teachers using LLYL were flagged at a lower at-risk rate than other children entering kindergarten. Of note, only 15.7% of children using LLYL were flagged at-risk on standardized measures of oral language, compared to 58% of children using a standard preschool curriculum and 33% of the children entering kindergarten with other preschool experiences. Many of America's children face daunting challenges as they enter kindergarten lacking the necessary skill to learn how to read. The study demonstrated that LLYL prepared the preschoolers entering kindergarten for success. Results are presented in Figure 4.
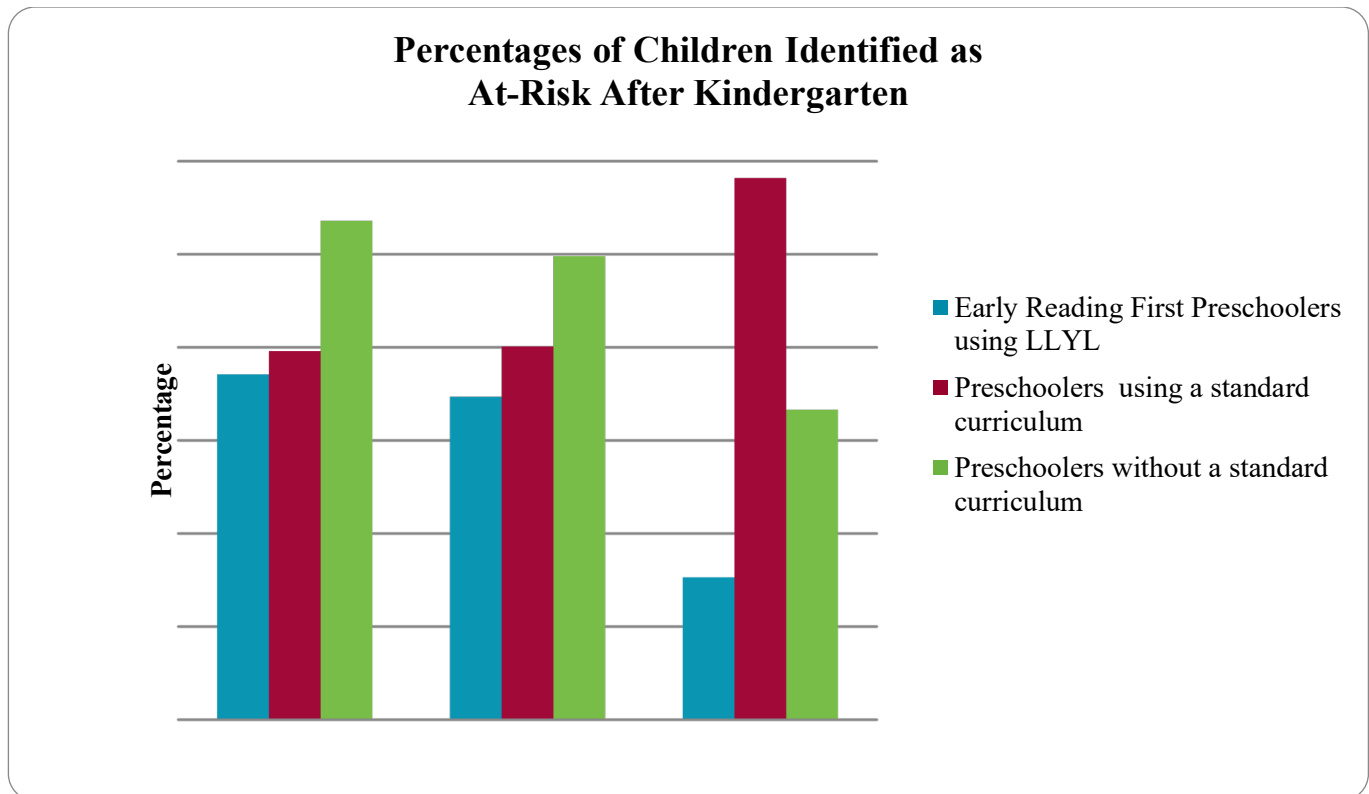

Figure 4. Percentages of children identified as at-risk after kindergarten.

Teachers Succeed with *Reading Readiness* and *Language Enrichment* (2005-2006)

An independent longitudinal study reported that students whose teachers augmented state-adopted basal reading series with Neuhaus Education Center's *Reading Readiness (RR)* and *Language Enrichment (LE)* curricula made greater gains on standardized tests than students in a comparison group who were instructed from only the basal reading series. The 18-month study demonstrated that kindergarten students who received RR instruction were better able to successfully blend word parts, name more letters, and identify more letter-sound correspondences at the end of the year than the comparison group. When RR was followed by LE in the first-grade, students performed better than the comparison group in word reading, reading comprehension, and fluency. The difference between the two groups was statistically significant.

Two groups of students in a school district in southwestern U.S. participated in the study. A comparison group (n = 94) received classroom literacy instruction from the state-adopted basal reading series in kindergarten and first grade. The treatment group (n = 96) received RR in kindergarten and LE in first grade, in addition to the basal reading series. RR and LE were used as part of the 90-minute language arts block and did not constitute additional time in reading instruction. Each group was followed from the middle of kindergarten through the end of first grade.

Measures for the kindergarten and first-grade treatment and comparison groups included the Texas Primary Reading Inventory (TPRI). Analysis of the data indicated that the treatment group outperformed the comparison group on kindergarten TPRI measures of phonological awareness, letter naming, and letter-sound correspondences. The treatment group also performed better than the comparison group on first grade TPRI reading comprehension, fluency, and end-of-year word reading. The present study supported the use of RR and LE in addition to a basal reading series in kindergarten and first grade to improve phonological awareness, letter knowledge, letter-sound knowledge, word reading, fluency, and reading comprehension.

For further information, contact Emily O. Dean, Ph.D., assistant professor at McMurry University, at emilyodean@gmail.com.

District-wide Longitudinal Study of *Language Enrichment*

Results of this longitudinal study were reported in:

Carreker, S., Neuhaus, G. F., Swank, P. R., Johnson, P., Monfils, M. J., & Montemayor, M.L. (2007). Teachers with linguistically-informed knowledge of reading subskills are associated with a Matthew effect in reading comprehension for monolingual and bilingual students. Reading Psychology, 28, 187-212.

Carreker, S., Swank, P. R., Tillman-Dowdy, L., Neuhaus, G. F., Monfils, M. J., Montemayor, M. L., & Johnson, P. (2005). Language enrichment teacher preparation and practice predicts third-grade reading comprehension. Reading Psychology, 26, 401-432.

In 1997, Neuhaus Education Center began a three-year collaboration with Brownsville Independent School District (BISD) in Brownsville, Texas, to provide 60 hours of professional development and ongoing follow-up for teachers in Grades 1 and 2. Neuhaus Education Center's *Language Enrichment (LE)* curriculum was chosen as the vehicle for providing scientifically validated information on reading, writing, and spelling.

Brownsville, Texas, is located on the Texas-Mexico border, 350 miles south of Houston. It was not economical for the teachers to travel to Houston, nor were there sufficient NEC staff members to send to Brownsville. As a result, the professional development was provided to the BISD teachers through Interactive Video Conferencing (IVC). Teachers attended professional development classes in cohorts of 35-50 throughout the three-year collaboration. Ultimately, 478 first- and second-grade teachers received professional development in LE via IVC.

During the first year of the collaboration, NEC staff members observed each teacher via IVC or on-site visits. During the second year of the collaboration, each school appointed a facilitator who was charged with the responsibility of providing materials and support for the teachers. Neuhaus Education Center staff members worked closely with the facilitators, furthering their knowledge of the curriculum and developing their skills in mentoring teachers.

The state-mandated reading test scores of 522 third-grade students from 13 BISD elementary schools were analyzed. The results demonstrated that third-grade students who received LE in second grade performed at statistically significantly higher levels of proficiency on the test than third-grade students who did not receive LE in second grade. Furthermore, students who received LE from teachers who had participated in the professional development early in the school year performed better than students whose teachers participated in the professional development later in the year.

The results indicated that (1) early instruction in LE enhanced performance on the third-grade state-mandated reading test, (2) the students who had longer exposure to LE significantly higher on the reading test, and (3) this achievement was demonstrated by a majority of students whose primary language is not English.

The trend continued past third grade. Continued achievement in reading for students who received LE in second grade was demonstrated with an analysis of their performance on the fifth-grade state-mandated reading test. Figure 2 shows the gains made over time by students whose second-grade teachers had no or varied levels of experience with LE.
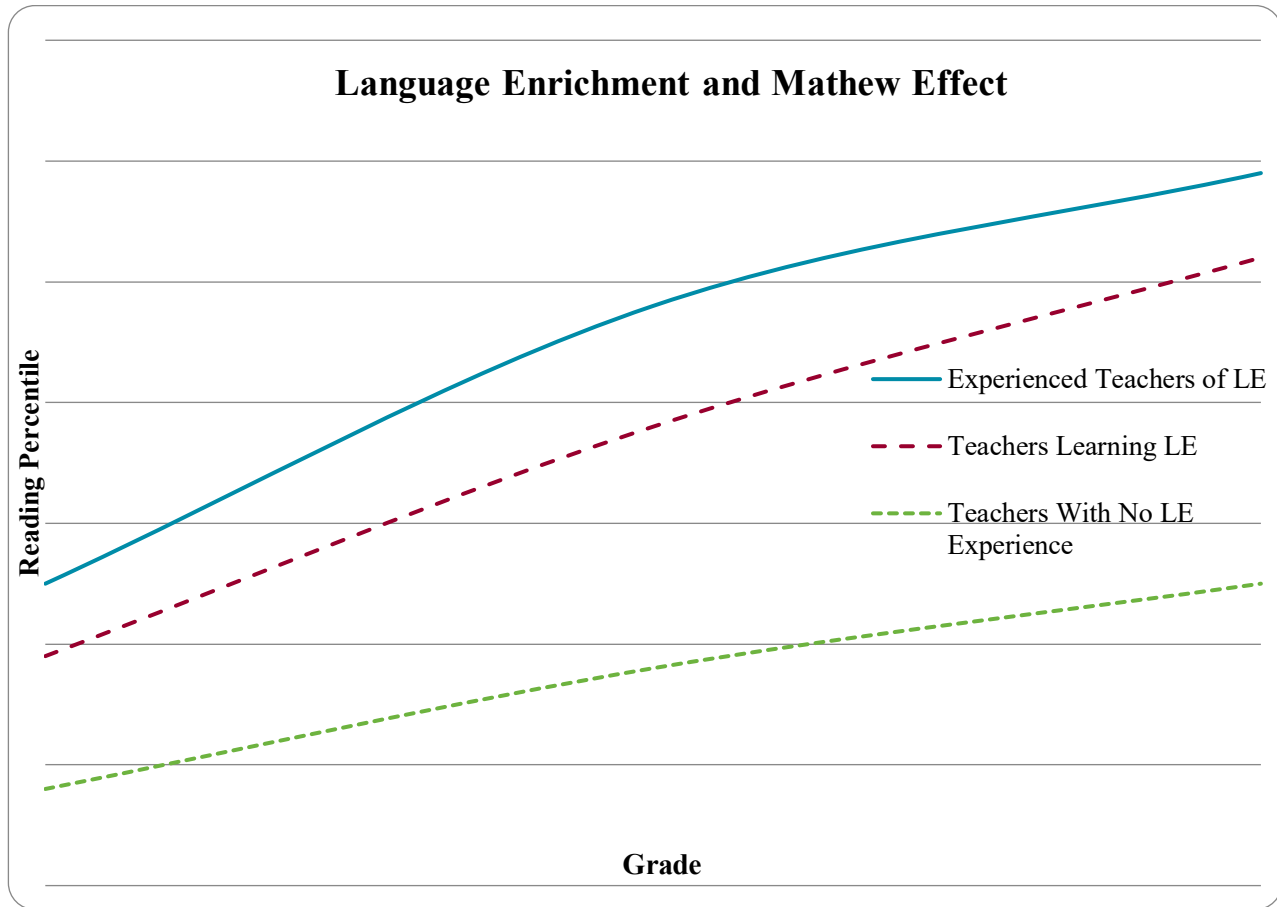
Language Enrichment and Mathew Effect

- Experienced Teachers of LE
- Teachers Learning LE
- Teachers With No LE Experience

Reading Percentile

Grade

Figure 2 Reading gains for students whose second-grade teachers had no or varying levels of experience teaching *Language Enrichment* (LE); *n* = 522.

Note: The Matthew Effect (Stanovich, 1986) poses that "the rich get richer and the poor get poorer." Students who have the requisite skills for beginning reading continue to gain requisite skills for proficient reading. Students without the requisite skills for beginning reading do not gain proficiency and fall further and further behind in reading and all academic areas that require reading.

Developing Metacognitive Skills

Results of this study were reported in:

Boulware-Gooden, R., Carreker, S., Thornhill, A., & Joshi, R. M. (2007). Instruction of metacognitive strategies enhances reading comprehension and vocabulary of third-grade students. The Reading Teacher, 61(1), 70-77.

Data from an intervention study conducted by Neuhaus Education Center with third-grade students suggested that the addition of metacognitive strategies to daily comprehension lessons boosted students' comprehension and spelling by 20% and vocabulary by 40% on standardized and criterion reference measures. In the study, 130 third graders in two schools were given 30-minute comprehension lessons daily over a five-week period. Students in one school received metacognitive strategies that the students in the other school did not receive. Metacognitive strategies help students to "think about their thinking" before, while, and after they read. Strategies used in the study were taken from Neuhaus Education Center's *Developing Metacognitive Skills* curriculum and included vocabulary word webs, identification of the elements of expository (informational) text, and summary activities.

In the first school, students were given expository passages of approximately 300 words to read. The passages were from a commercially published comprehension program. Before reading the passages, the teacher set a purpose for reading and activated students' background knowledge. Students discussed new vocabulary words and copied the words, their definitions, and sentences that illustrated the meanings of the words from the board. After reading the passages, students answered questions that were generated by the teacher. Students answered half the questions orally and half the questions in written form. The final activity was for students to read and answer six questions that were specifically designed by the publisher to accompany each of the passages.

In the second school, the students read the same passages and were taught metacognitive strategies. Before reading the passages, the teacher set a purpose for reading and activated background knowledge. Students discussed the same vocabulary words. Rather than copy the definitions, students discussed the origins and meanings of the words, generated synonyms, antonyms, and other words related to the new vocabulary words, and recorded the information on vocabulary webs. As students read, they were encouraged to think about the elements of expository text. After reading the passages, students were asked to identify the subject, main idea, supporting ideas, and details and generate a summary paragraph that contained ⅓ the number of words of the original passages. Students then orally answered the same teacher-generated questions and read and answered the six questions that accompanied the passages.

Figure 1 shows the pretest scores of experimental group in blue and the control group in green. Gains for the experimental group are in maroon and gains for the control group are in yellow. The gains for the experimental group in vocabulary ($p = .001$, $h^2 = .161$) and reading comprehension ($p = .041$, $h^2 = .041$) were statistically significant.
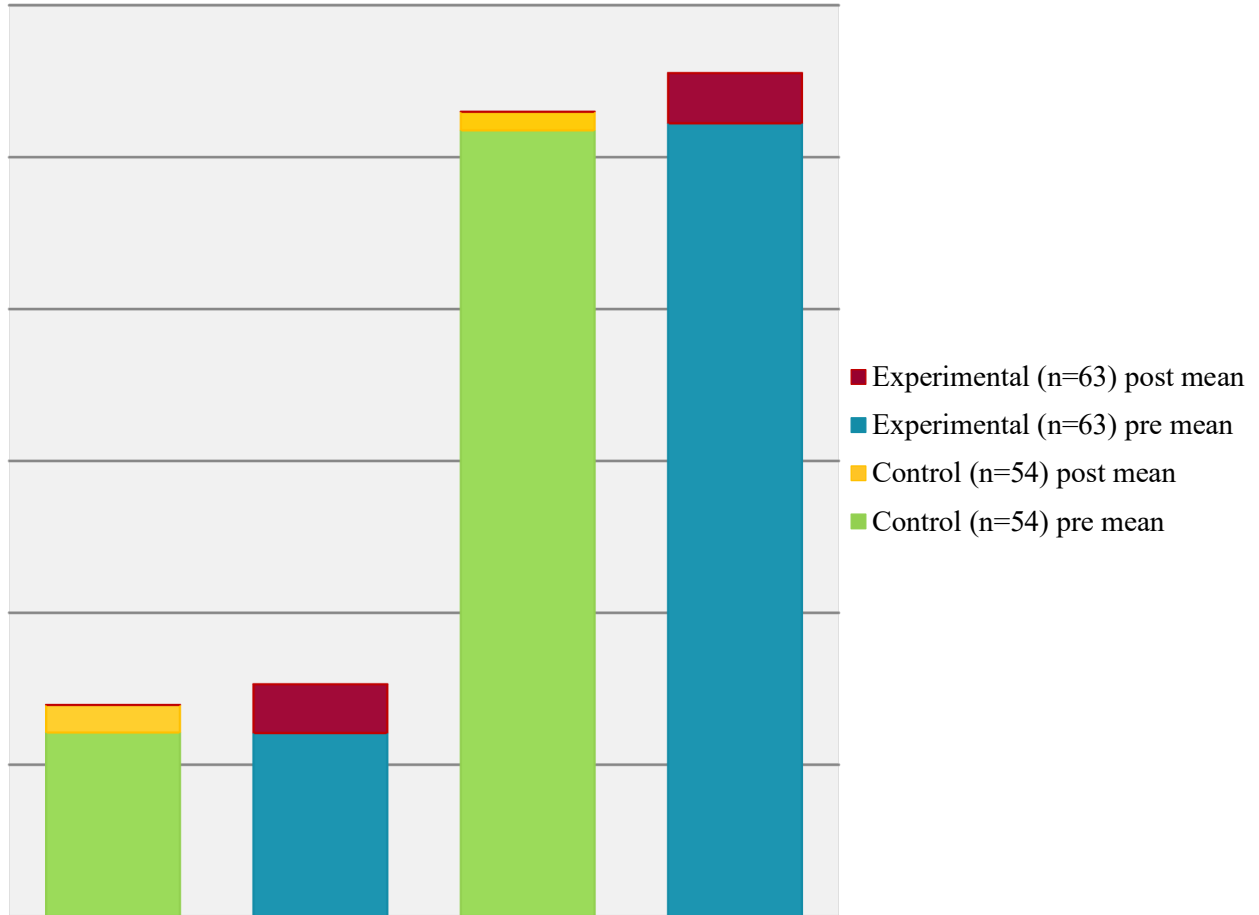
Figure 1. Five-week third-grade comprehension intervention in two schools.

Note: Three months after the initial post-testing, the vocabulary measure was re-administered to the two groups. Gains in vocabulary for the experimental group held. The reading comprehension measure was not re-administered.

Middle School Study with *Developing Metacognitive Skills* (2004-2005)

Neuhaus Education Center's *Developing Metacognitive Skills* was implemented in a middle school in a large urban school district. The sample was 98% Hispanic and 2% Black. The school grouped students in clusters for instructional purposes. One cluster was randomly assigned as the treatment group and one was randomly assigned as the control group. Science and social studies classes were targeted for instruction because many students have difficulties in comprehending expository text (Hacker and Tennet, 2002).

Students in Grades 6 and 7 received metacognitive strategies that focused on activating background knowledge, vocabulary webs, text organization, summarizing, and questioning. Students in Grade 6 received the metacognitive strategies in science and social studies classes twice a week; therefore, these students received a total of 40 hours of instruction. Students in Grade 7 received the metacognitive strategies twice a week in social studies classes only for a total of 20 hours of instruction.

The teachers received professional development in the summer and implemented the curriculum at the beginning of the school year. Prior to implementation, students were pretested on the Gray Silent Reading Test and a criterion vocabulary test. A master reading specialist observed each classroom once a week to verify fidelity of implementation and provide feedback to the teachers. At the end of the ten weeks, students were post-tested. Fifty-three students completed the study: 16 Grade 6 experimental students; 20 Grade 7 experimental students, and 17 Grade 6 and 7 comparison students.

Students in Grade 7 who received 20 hours of *Developing Metacognitive Skills* demonstrated statistically significant gains over the comparison group ($F(1,34) = 4.84$, $p = .035$, $h^2 = .067$). There was no difference between groups in vocabulary. Students in Grade 6 who received 40 hours of instruction demonstrated statistically significant gains over the comparison group ($F(1, 31) = 10.77$, $p = .003$, $h^2 = .227$). Students in Grade 6 also demonstrated statistically significant gains in vocabulary ($p = .016$, $h^2 = .231$).

In sum, exposure to metacognitive strategies (i.e., 20 hours vs. 0 hours) boosted student achievement in reading comprehension. Greater exposure to metacognitive strategies (i.e., 40 hours vs. 20 hours) produced greater gains in both reading comprehension and vocabulary.

Even though sample sizes were small, the gains should be considered noteworthy. Students from this middle school were low SES and qualified for free or reduced lunch. Additionally, students were not precluded from the study if they were classified as learning disabled.

The Impact of Professional Development on Teacher Knowledge[17]

Spelling-related content teacher knowledge includes awareness of phonemes, syllables, and morphemes. Teachers who possess this knowledge should be better able to assess student needs and design appropriate instruction. In Study 1, 36 preservice teachers and 38 in-service teachers completed measures to evaluate their spelling-related content knowledge and their ability to choose appropriate activities for spelling instruction. Overall, the in-service teachers demonstrated greater knowledge and were better able to identify appropriate instructional activities. In Study 2, the spelling-related content knowledge of 157 teachers completing varying hours of professional development was analyzed to determine the effect of professional development on spelling-related content knowledge. In general, the in-service teachers' knowledge was positively correlated with the number of hours of professional development.

Professional Development: Comparison of Online and Onsite Delivery[18]

Spelling is often taught as a rote memory skill. However, spelling is a cognitive linguistic skill that can be learned with thorough knowledge of English speech sounds and patterns. Teachers who are knowledgeable about speech sounds and frequent and reliable patterns of English can promote students' spelling achievement through explicit instruction of the sounds and patterns. Professional development can increase teacher knowledge of spelling.

The current paper presented a study of two groups of in-service teachers ($n = 126$) who received professional development workshops on spelling via two different venues. One group received a workshop presented by two master instructors, and the second group received an online workshop. The content of the workshops was identical. Both groups made statistically significant gains in spelling knowledge. The results suggested that teachers can increase their knowledge of spelling through online professional development, which is flexible, convenient, and does not require teachers to give up valuable instructional time.

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[17] Carreker, S., Joshi, R. M., & Boulware-Gooden, R. (2010). Spelling-related teacher knowledge and the impact of professional development on Identifying appropriate instructional activities. *Learning Disabilities Quarterly, 33*, 148-158.

[18] Carreker, S., Boulware-Gooden, R., & Slania, M. L. (unpublished manuscript). *Is online professional development on spelling an effective alternative to onsite professional development on spelling?* Retrieved from www.readingteachersnetwork.org

PUBLICATIONS BY NEUHAUS STAFF AND ASSOCIATES

Allen, K. A., **Neuhaus, G.** F., & Beckwith, M. (2011). In J. R. Birsh (Ed.), *Multisensory teaching of basic language skills* (3rd ed.). Baltimore, MD: Paul H. Brookes Publishing Co.

This chapter offers a rationale for letter recognition and naming. The chapter includes principles of effective classroom teaching and instructional activities for teaching letter names, sequencing, alphabetizing, and dictionary work.

Carreker, S. (2012). Beginning handwriting, spelling, and written composition instruction. In M. Hougen & S. Smartt (Eds.), *The fundamentals of literacy assessment and instruction.* Baltimore, MD: Paul H. Brookes Publishing Co.

Carreker, S. (2012). Teaching the structure of the language through seeing, hearing and doing. In L. C. Moats, K. E. Dakin, & R. M. Joshi (Eds.), Expert perspectives on interventions for reading: A collection of best-practice articles from the International Dyslexia Association (pp. 55-65). Baltimore, MD: The International Dyslexia Association.

Carreker, S. (2012). The parts of speech: Foundation of writing. In L. C. Moats, K. E. Dakin, & R. M. Joshi (Eds.), Expert perspectives on interventions for reading: A collection of best practice articles from the International Dyslexia Association (pp. 229-236). Baltimore, MD: The International Dyslexia Association.

Carreker, S. (2011). Teaching reading: Accurate decoding and fluency. In J.R. Birsh (Ed.), *Multisensory teaching of basic language skills* (3rd ed.). Baltimore, MD: Paul H. Brookes Publishing Co.

For students to become fully literate, the components of reading – decoding and comprehension – and all other elements of literacy instruction must be directly taught. The focus of this chapter is the explicit, systematic instruction of decoding, which leads to efficient comprehension and reading achievement.

Carreker, S. (2011). Teaching spelling. In J. R. Birsh (Ed.), *Multisensory teaching of basic language skills* (3rd ed.). Baltimore, MD: Paul H. Brookes Publishing Co.

Spelling is a more difficult skill than reading. Spelling instruction enhances reading proficiency through the reinforcement of phonemes and letter patterns. Learning to spell requires explicit instruction, which is the focus of this chapter.

Carreker, S. & Birsh, J. R. (2011). *Multisensory teaching of basic language skills activity book* (2nd ed.). Baltimore, MD: Paul H. Brookes Publishing Co.

This workbook is a supplement to the textbook, Multisensory Teaching of Basic Language Skills*, and contains activities that reinforce and extend the information presented in the textbook. The activities are designed to target and refine the necessary linguistics skills and insights about language structures that teachers need to help all students learn to read.*

Carreker, S., & **Boulware-Gooden, R**. (2015). *Personal competencies through the eyes of the classroom teacher.* Center on Innovations in Learning, Temple University, Philadelphia, PA. http://www.centeril.org/resources/PCs_and_the_Teacher.pdf

Joshi, R. M., & **Carreker, S**. (2009). Spelling: Development, assessment, and instruction. In G. Reid, (Ed.), *Routledge companion to dyslexia* (pp. 113-125)*.* London, UK: Routledge.

This chapter presents the importance of spelling instruction and instruction that is effective for students with dyslexia.

Joshi, R. M., Hoien, T., Xiwu-Feng, Chengappa, R., & **Boulware-Gooden, R.J**. (2005). Learning to spell by ear and by eye: A cross-linguistic comparison. In R. M. Joshi and P. G. Aaron (Eds), *Handbook of orthography and literacy*. New York: Lawrence Erlbaum.

Zhang, S., Han, B., Hudson, A., **Moore, K. A.,** & Joshi, R. M. (2022). John Effect in Literacy Acquisition: The Role of Morphological Awareness in Literacy Acquisition in Different Orthographies. In A Festschrift in honor of Dorit Ravid. (In press).

PUBLICATIONS IN PEER-REVIEWED JOURNALS

Aaron, P.G., Joshi, R. M., **Boulware-Gooden, R**., & Bentum, K. (2008). Diagnosis and treatment of reading disabilities based on the Component Model of reading: An alternative to the Discrepancy Model of Learning Disabilities. *Journal of Learning Disabilities, 41*, 5-28.

Binks-Cantrell, E., Hudson, A., Han, B., **Moore, K. A**., Koh, P. W., & Joshi, R. M. (2020). The rock foundation of the big five of reading instruction: Teacher preparation. *The Reading League Journal, 1*(3), 41-44.

Boulware-Gooden, R., **Carreker, S**., Thornhill, A., & Joshi, M. (2007). Is teaching metacognitive strategies effective for third grade readers? *The Reading Teacher, 61*, 70-71.

Boulware-Gooden, R., Joshi, R. M., Gregorinko, E. (2015). The role of phonology, morphology, and orthography in English and Russian spelling. *Annals of Dyslexia*, *21*(2), 142-161.

Carreker, S., & Joshi, R. M. (2010). Response to intervention: Are the emperor's clothes really new? *Psicothema*, *22*, 943-948.

Carreker, S., Joshi, R. M., & **Boulware-Gooden, R**. (2010). Spelling-related teacher knowledge and the impact of professional development on identifying appropriate instructional activities. *Learning Disabilities Quarterly*, *33*, 148-158.

Carreker, S., **Neuhaus, G. F**., Swank, P. R., Johnson, P., Monfils, M. J., & Montemayor, M. L. (2007). Teachers with linguistically informed knowledge of reading subskills are associated with a Matthew effect in reading comprehension for monolingual and bilingual students. *Reading Psychology, 28*, 187-212.

Carreker, S., Swank, P. R., Tillman-Dowdy, L., **Neuhaus, G. F**., Monfils, M. J., Montemayor, M. L. et al. (2005). *Language Enrichment* teacher preparation and practice predicts third-grade reading comprehension. *Reading Psychology, 26*, 401-432.

Hudson, A., Han, B., **Moore, K. A**., Koh, P. W., & Binks-Cantrell, E. (2020). Fluency interventions for elementary students with reading difficulties: A synthesis of research from 2000-2019. *Education Sciences, 10*(3), 52.

Hudson, A., **Moore, K. A.**, Han, B., Koh, P.W., Joshi, R.M., Binks-Cantrell, E. (2021). Teacher knowledge: The missing piece of the puzzle in the science of teaching reading. *Reading Research Quarterly,* 1-29.

Hudson, A. K., Owens, J., **Moore, K. A**., Lambright, K., & Wijekumar, K. (2021). "What's the Main Idea?": Using Text Structure to Build Comprehension. *The Reading Teacher*, *75*(1), 113-118

Joshi, R. M., Aaron, P.G., Hill, N., Ocker-Dean, E., **Boulware-Gooden, R**., & Rupley, W.H. (2008). Drop Everything and Write (DEAW): An innovative program that improves literacy skills. *Learning Inquiry*, *2*, 1-12.

Joshi, R., Binks, E., Graham, L., Dean, E., Smith, D. & **Boulware-Gooden, R**. (2009). Do textbooks used in university reading education courses conform to the instructional recommendations of the National Reading Panel? *Journal of Learning Disabilities*, *42*(5), 458-463.

Joshi, R., Dahlgren, M., & **Boulware-Gooden, R.** (2002). Teaching reading in an inner-city school through multisensory approach. *Annals of Dyslexia*, *52*, 129-137.

Joshi, R. M., Treiman, R., **Carreker, S**., & Moats, L. C. (2008/2009). How words cast their spell: Spelling instruction focused on language, not memory, improves reading and writing. *American Educator, 32*(4), 6-43.

Moore, K.A. (2020). Considering the emotional needs of students in a computer-based learning environment. *Educational Technology, Research, & Development.* https://doi.org/10.1007/s11423-020-09891-1

Neuhaus, G., Roldan, L., & **Boulware-Gooden, R**. (2006). Parsimonious reading models: Identifying teachable subskills. *Reading Psychology*, *27*, 37-58.

Post, Y. V., & **Carreker, S**. (2002). Orthographic similarities and phonological transparency in spelling. *Reading and Writing: An Interdisciplinary Journal, 15,* 317-340.

Post, Y. V., **Carreker, S**., & Holland, G. (2001). The spelling of final letter patterns: A comparison of instruction at the level of the phoneme and the rime. *Annals of Dyslexia*, *51,* 121-146.

Sadoski, M., Willson, V. L., Holcomb, A., & **Boulware-Gooden, R**. (2005). Verbal and nonverbal predictors of spelling performance. *Journal of Literacy Research*, *36*, 461-478.

PUBLICATIONS IN PROGRESS

Hudson, A., **Moore, K. A.,** Quiñonez, J., Lai, J., & Joshi, R. M. (2022). Spelling in various orthographies. *Handbook of Visual-motor skills, handwriting, and spelling: Theory, Research, and Practice.* [accepted, in press].

Hungerford-Scott, C. (2022). The influence of structured literacy on primary reading: A Case Study. [Dissertation study; in preparation].

Moore, K. A. (2022). The Identification and Prevalence of Dyslexia for English Learners. [Dissertation Study; in press].

Moore, K. A., Lai, J., Quiñonez, J., & Joshi, R. M. (2022). A cross-linguistic view of dyslexia identification. *Journal of Cultural Cognitive Science* [special issue, Under review].

Peck, A. (2022). The Importance of Oral Language in Literacy and the Impact on Third-Grade Student Writing. [Dissertation Study; in preparation].

Tolson, R. (2020). The implementation of federal and state policies for students identified with dyslexia. [Dissertation Study; in preparation].