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# THE BEACON 2024

THE WINDWARD INSTITUTE JOURNAL



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# THE BEACON

# USHERING IN A NEW ERA WITH A REIMAGINED BEACON

This issue, dedicated to the science of reading (SoR), marks a significant milestone in the Institute's commitment to synthesizing the latest research on reading and language-based learning disabilities; sharing the expertise of The Windward Institute and School with the broader educational community; and offering thought leadership pieces that inform discussion, spark action, and inspire meaningful change.

Within these pages, we hope to offer readers a comprehensive understanding of the multifaceted aspects of reading and the science behind evidence-based instruction. We delve into the complex workings of the reading brain; elucidate the controversy at the heart of the reading wars; untangle the intricacies of phonemic awareness and reading comprehension; highlight the power of the reading-writing connection; and explore the individual nature of reading development through a comprehensive lens.

This year's feature, a thought-provoking article by Executive Director of The Windward Institute and Head of The Windward School Jamie Williamson, critically examines the state of teacher education programs today and serves as the catalyst for the continuing story that unfolds throughout the pages of this journal. What do educators, parents, and other stakeholders need to know about reading development and instruction? Why is our country so divided over best practice, and why has such a heated and vigorous debate yielded so little growth in reading proficiency? How can we leverage science to best teach and remediate reading skills efficaciously and efficiently?

With a focus on sharing the latest developments in the field of reading science, Special Projects Advisor to The Windward Institute and Associate Director of the Global Literacy Hub at the Yale Child Study Center Dr. John J. Russell had the privilege of interviewing Dr. Fumiko Hoeft. A distinguished neurophysiologist and neuroscientist, Dr. Hoeft has made significant contributions to our understanding of literacy development, dyslexia, and the developing brain. Their conversation sheds light on significant findings, emerging trends, and future considerations in the science of reading.

We invite you to immerse yourself in the wealth of knowledge and expertise presented in this issue as we embark on this journey together. Whether you are an educator, parent, student, or science of reading enthusiast, we believe that the content within these pages will resonate with your commitment to promoting effective instruction for all.

As stated by Dr. Hoeft, "There's increasing science that shows the power of a team. As we know, working as a team is a productive and creative process. I don't think any single person works in isolation these days." Thank you for joining us in our collective mission to increase childhood literacy rates and make a lasting impact on the lives of learners around the world. Together, let's turn the page on a brighter future in which books bring a smile to the face of every child in full recognition of the power that lies within.

Warm regards,

Alexis Pochno

Alexis Pochna Director of The Windward Institute

# **STATE OF THE UNION:** TEACHER PREPARATION PROGRAMS IN THE U.S.

By Jamie Williamson, EdS, Head of The Windward School and Executive Director of The Windward Institute

# Dan Corcoran finally learned to read at age 54.

As told to Emily Hanford in the podcast Sold a Story (2022): In his public school in Michigan, he was held back to repeat first grade, but then he kept advancing, graduating high school, going on to serve in the Navy, all the while never having been taught how to read. Instead, as an adult he found ways to compensate, finding work at factories and construction companies, in any position that didn't require reading. "For Dan, reading used to be like a detective game. Most words were puzzles and he was searching for clues. He had strategies. Look at some of the letters, make a good guess" (Hanford, 2022). What Dan couldn't have known, and what his public school teachers didn't know, was that these strategies were based on deeply flawed research about how children learn to read.

And although this approach to reading instruction—surround students with high-quality literature, encourage them to use context clues and pictures to guess a word they don't know, focus on comprehension and word recognition will follow—was thoroughly debunked more than 50 years ago, it persists today in many classrooms. In 2020, when special education and K-2 teachers were surveyed by Education Week, a staggering 72% of respondents indicated that they employ literacy instructional methods that were proven ineffective decades ago.

The fault here does not lie with these teachers; they have simply been practicing what they were taught by professors who purported to be experts in the field. The hard fact to swallow is this: "Too many teachers are not trained in scientifically based reading instruction during their teacher preparation programs, so they unknowingly enter the classroom well-intentioned but inadequately prepared to teach kids to read" (Ellis et al., 2023, p. 4).

There are myriad reasons for this lack of preparation at the university level, beginning with a core belief that emerged in the early 1960s and spread like wildfire in the ensuing decades: This belief was that people learn to read in the same way they learn to talk, and that reading skills develop organically with exposure to books. This theory took root in New Zealand, through work conducted by Marie Clay, and

it gradually made its way to the U.S. Eventually, proponents of this wholelanguage approach were embedded in prestigious programs at The Ohio State University, Columbia University's Teachers College, and many more. The theory, and the researchers who advanced it, such as Lucy Calkins, Irene Fountas, and Gay Su Pinnell, took on a cultlike status; while, in parallel, neuroscientists like Reid Lyon were conducting studies on tens of thousands of children and adults and reaching a very different conclusion: Human brains are not inherently designed to read. Rather, "our brains have to change for us to become good readers. And sounding out written words is a key part of this process" (Hanford, 2022; see also Castles et al., 2018). Despite the fact that the science of reading has revealed that all the components cited in the National Reading Panel report (2000) contribute to literacy development, many adherents to the whole-language model of reading have clung to these old beliefs, unwittingly spreading them to new generations of teachers.

For an in-depth look at the history behind the reading wars, see Dr. Russell's article on p. 39 of this issue. Human brains are not inherently designed to read.

So, in spite of a flurry of interest in recent years by legislators and policymakers to embrace the body of research known as the science of reading, with the goal of improving literacy outcomes nationwide, change at the university level has been slow to take hold. The National Council on Teacher Quality (NCTQ) regularly reviews reading coursework from more than 700 elementary teacher preparation programs in the U.S.; its 2023 report illuminates both how far educators have come in aligning with the science as well as the long path ahead to ensuring that new teachers nationwide are prepared with the most efficacious methods to serve their students and, by extension, society at large.

To assess university-level programs in its Teacher Prep Review, the NCTQ gathers a team of reading experts to seek evidence that programs teach aspiring educators about each of the five core components of scientifically based reading instruction-phonemic awareness, phonics, fluency, vocabulary, comprehension—by evaluating syllabi and related course material across four instructional approaches: (1) background materials, or assigned reading, (2)instructional time, (3) assessments, or objective measures of knowledge, and (4) opportunities for practice (Ellis et al., 2023).

Programs are scored on a letter-grade scale based on depth of coverage for each component across these four approaches; critically, programs lose a letter grade if teacher candidates are instructed in at least four practices running contrary to the research. Although it does not affect a program's grade, NCTQ also assesses whether programs provide instruction on supporting struggling readers, English learners, and students speaking language varieties other than mainstream English.

# RESULTS: THE STELLAR, THE SO-SO, AND THE SUBSTANDARD

The encouraging news is that there are stellar teacher preparation programs that have fully embraced the science, offering comprehensive coverage across all four approaches measured by the NCTQ. Among the 186 programs that earned an A grade by the panel-that is, they address all five components of reading instruction without including teaching practices running contrary to research-are 60 exemplary programs that are leading the way in teacher preparation. Of the twenty states housing these programs, the NCTQ cites nine states with three or more university programs scored as exemplary: Alabama, Colorado, Louisiana, Mississippi, North Carolina, Ohio, Texas, Utah, and Virginia.



(Use the QR code to view syllabi and resources shared by six programs scored as exemplary in the Teacher Prep Review.)

## WHAT CONSTITUTES COMPREHENSIVE COVERAGE?

### Recommended minimum instructional hours by component

		Phonemic awareness	Phonics	Fluency	Vocabulary	Comprehension
	Expert panel	7 hours	8 hours	4 hours	6 hours	9 hours
	Survey (average)	6.2 hours	7.1 hours	5.1 hours	6.3 hours	7.4 hours
	Survey (modal response)	4 to 5; 6 to 7 hours	8 to 9 hours	4 to 5 hours	6 to 7 hours	10 or more hours
	Reading Foundations instructional hour target	7 hours	8 hours	4 hours	6 hours	9 hours

Source: Ellis, C., Holston, S., Drake, G., Putman, H., Swisher, A., & Peske, H.
(2023). Teacher prep review: Strengthening elementary reading instruction.
Washington, DC: National Council on Teacher Quality.

One of the key elements setting the exemplary programs above the others that NCTQ reviewed was opportunities for practice.

Some programs, like Lenoir-Rhyne University (Undergraduate, NC), lead the way by dedicating a single course to practicing specific skills related to the components that candidates learned in reading content courses. Over the duration of the course, candidates have diverse opportunities for applied practice—from administering phonics and spelling inventories to planning and demonstrating lessons in vocabulary and comprehension. These varied opportunities are essential to providing teacher candidates with the practical experience they need to enter the classroom prepared. (Ellis et al., 2023, p. 21)

At Windward, we align our pedagogy with established research in the field by elevating the importance of translating theory into practice. It's the reason all our teachers begin as teachersin-residence and undergo robust inservice training before they ever lead a classroom of students. As Chief Executive Officer of the National Center for Learning Disabilities Jacqueline Rodriguez noted in a recent webinar produced by The Windward Institute: Ideally, teacher candidates should have six years of engagement in preparation programs, two years of which would occur within an apprenticeship model, wherein these students would be residents in classrooms under master teachers. The mentors would relinquish their reins gradually, but not until apprentice teachers were absolutely ready. "There would be no expectation on day one [for] everything they're supposed to know and feel and be able to do at competency," she said. "We don't ask that of doctors, and teaching is just as critical a profession." Sadly, for each of the five core components of reading, the majority of programs assessed by the NCTQ included no opportunities for practice; and nearly one-third of programs offered no practice for any of the components.

"There would be no expectation on day one [for] everything [teachers are] supposed to know and feel and be able to do at competency. We don't ask that of doctors, and teaching is just as critical a profession." - Jacqueline Rodriguez



#### **Opportunities to Practice for Each Component**

 Source: Ellis, C., Holston, S., Drake, G., Putman, H., Swisher, A., & Peske, H. (2023).
 Teacher prep review: Strengthening elementary reading instruction. Washington, DC: National Council on Teacher Quality. Updated stats presented at IDA Conference, October 2023.

#### Percent of Programs with Adequate Coverage



Source: Ellis, C., Holston, S., Drake, G., Putman, H., Swisher, A., & Peske, H.
 (2023). *Teacher prep review: Strengthening elementary reading instruction*.
 Washington, DC: National Council on Teacher Quality. Updated stats presented at IDA Conference, October 2023.

In fact, only 28% of programs examined were found to have adequate coverage across all four instructional approaches for the five core components, while 22% of programs did not have adequate coverage of *any* of the five components. The least-addressed component across the board was phonemic awareness, with 61% of teacher preparation programs failing to address it adequately. The NCTQ report authors noted that in the last decade of reviewing university-level programs, they found that phonemic awareness consistently received the least attention in teacher preparation programs. This is a major miss on the part of these programs, as a strong skillset in phonemic awarenessisolating, blending, segmenting, and manipulating phonemes-underpins the development of phonics skills, and it is these two elements that are so necessary in decoding words. An understanding of both phonemic awareness and phonics sets the foundation of the other three components of reading: fluency, vocabulary, and comprehension (Ehri et al., 2001).

A scant 17% of programs offer teacher candidates the seven instructional hours recommended as a minimum under the Reading Foundations Standard. About half of the programs allocated less than one week of instructional time to phonemic awareness. Assessing students' knowledge and providing opportunities for practice also came up short, with 69% of programs demonstrating adequate assessments (tests, quizzes, written assessments) and only 12% mandating practice opportunities in teaching phonemic awareness (Ellis et al., 2023).

More concerningly, programs teaching multiple practices contrary to wellestablished research make up 40% of the sample. Topping the list of debunked practices were misaligned assessment strategies. These included running records, which studies have shown produce inconsistent results and may use miscue analysis to uncover reasons for student errors, an approach often anchored in three-cueing models of instruction (Stouffer, 2021).

See Nikki Hertz's article on p. 45 of this issue for a detailed breakdown on the importance of phonemic awareness.

More concerningly, programs teaching multiple practices contrary to well-established research make up 40% of the sample.

It is also worth noting, despite the fact that program scores were not affected by this category, that the majority of teacher preparation programs reviewed lacked sufficient instruction in supporting struggling readers; 57% of programs allotted fewer than two total instructional hours to this area, while 80% did not offer teacher candidates any opportunities for practice in supporting this population of students.

> Aspiring teachers must be able to assess and identify which specific foundational reading skills a student is struggling with, what interventions to deploy to address this deficit (including knowing when to bring in a reading specialist or the help of a reading coach), and how to monitor progress based on research-based methods. Furthermore, teachers need to be empowered to recognize the profile of children who are at-risk, or struggling readers. This includes the ability to not only recognize the signs of dyslexia, but also appreciate the intensity and explicitness of the instruction a student may need to become a skilled reader. (Ellis et al., 2023, p. 32)

It is clear that systemic change must occur to prepare our nation's future educators in ways that will enable them to effectively teach reading from day one in the classroom, which necessitates a top-down approach at multiple levels. We do a grave disservice to our teachers when we fail to equip them with proven instructional methods grounded in decades of research. Thankfully, there are states that are doing it right, and they serve as models for what is possible when legislators, universities, school boards, K-12 educators, and community members collaborate to advance literacy outcomes.

### A PATH FORWARD

According to Education Week, 37 states and the District of Columbia have passed laws since 2013 elevating evidence-based practices as the standard for reading instruction (2023). This movement gained traction after Mississippi passed legislation in 2013 with the aim of overhauling its approach to reading instruction (The state's reading scores skyrocketed by 10 points between 2013 and 2019.). In a rush to replicate what came to be known by many as the "Mississippi miracle," a number of states followed suit, with mixed results. Although an in-depth analysis of statelevel legislation passed in recent years is beyond the scope of this article, it's important to note that legislation is not a panacea. To truly move the needle on reading outcomes, states must engage stakeholders at every level of the system, coordinating their efforts and implementation processes at each turn. To truly move the needle on reading outcomes, states must engage stakeholders at every level of the system, coordinating their efforts and implementation processes at each turn.

Mississippi's State Literacy Director Kristen Wynn described her state's comprehensive approach to implementation on a recent READ Podcast episode, where she highlighted their focus on teacher training programs early in the implementation process: "[As of 2016,] teacher candidates must earn a passing score on our foundations of reading assessment, [a rigorous test of research-based reading instruction, intervention, and data-based decisionmaking principles,] to receive their initial elementary education license" (Scorrano, 2021).

In examining the process undergone in Mississippi, the NCTQ report authors made specific mention of the state's invitational approach with its universities, stating, "The state provided professional development training via Language Essentials for Teachers of Reading and Spelling (LETRS) to elementary teachers and leaders, as well as included faculty from institutes of higher education on a voluntary basis, to begin to create a common language across the entire education system" (Ellis et al., 2023, p. 24). Ms. Wynn said, "We want teachers coming out of teacher prep programs to be prepared the first day to work with struggling students and to work with differentiated groups of students on varying reading levels. We want them to be able to provide structured literacy instruction to students" (Scorrano, 2021). Mississippi's success underscores how critical it is for states to view teacher preparation programs as fundamental in implementing policy changes around reading.

Colorado has transformed its system for training educators since it passed the READ act in 2012, which shifted reading instruction statewide to focus on evidence-based practices (Neuman, Quintero & Reist, 2023). By 2016, universities were required to align their course content with the new literacy standards. The state stood out in this year's NCTQ Teacher Prep Review for having made dramatic gains in its programs' scores since 2020, after the state revamped its entire process for approving universities' teacher preparation programs.

"First, the [Colorado Department of Education] created a detailed matrix for programs to complete prior to its site visit to determine not only if the standards were being taught, but also whether candidates had opportunities to practice and receive feedback on these skills through aligned clinical experiences" (Ellis et al., 2023, p. 25). The agency invited literacy experts to participate in its review process, who then conduct site visits to gauge course content's alignment with state standards (Ellis, et al., 2023). In working through this new process with the first cohort of programs the state applied it to in 2018, reviewers discovered that its binary system of review needed an overhaul; programs would either be approved or placed on probation, the latter instance necessitating a halt on accepting new candidates to a program. They needed a third category: conditional reauthorization.

### **12** TEACHER PREPARATION

Mississippi's success underscores how critical it is for states to view teacher preparation programs as fundamental in implementing policy changes around reading.

In 2023, one-third of the programs submitted by Colorado earned an A+ by the review board; of 15 programs reviewed, all but two earned an A or a B.

When a program was granted conditional reauthorization, the state provided a list of specific changes to be made within the year, such as embedding state standards on scientifically based reading instruction into clinical experiences for teacher candidates. To help programs, [the Colorado Department of Education] began offering monthly calls with each program granted conditional reauthorization to support its progress in making needed changes. Depending on the identified weaknesses, programs can be required to make a range of changes, from updating course materials to retraining all faculty in scientifically based reading instruction. (Ellis et al., 2023, p. 26)

These changes resulted in rapid improvement in the state's grade by the NCTQ. In 2023, one-third of the programs submitted by Colorado earned an A+ by the review board; of 15 programs reviewed, all but two earned an A or a B. None of the courses assessed by the NCTQ earned below a C grade. Tellingly, the reviewers noted nearly no evidence of contrary practices in Colorado's teacher preparation programs that they reviewed. Compare this to 2020, when only five programs in Colorado earned an A or a B, and six programs submitted that year earned a D or an F. (Ellis et al., 2023).

Systemic change to fully embrace the science of reading is clearly possible, but it requires buy-in from those at the state, district, and community levels, working in concert to ensure our educators have the tools they need to effectively teach our students. The role of teacher preparation programs in this process cannot be overstated.

## For Dan Corcoran,

whose story appeared at the beginning of this article, it wasn't until he came across an ad for tutoring in a local newspaperone that he couldn't read, but he recognized enough words to understand the gist-that he found someone who could teach him in a way he could learn. He actually bartered his skills as a house painter in exchange for reading lessons. While it's admirable to witness Mr. Corcoran's tenacity in seeking the education he never received as a child, this never should have happened. He deserved better, our nation's students deserve better, and our nation's teachers deserve better.





Use this QR code to explore READ, WATCH, LISTEN resources.

## -READ 🛄

Ellis, C., Holston, S., Drake, G., Putman, H., Swisher, A., & Peske, H. (2023). *Teacher Prep Review: Strengthening Elementary Reading Instruction*. Washington, DC: National Council on Teacher Quality.

Schwartz, S. (2023, July). Which States Have Passed 'Science of Reading' Laws? What's in Them? Education Week.

# WATCH

The Windward Institute. (2023, October 27). Dyslexia in Focus: Empowering Change Webinar [Video]. YouTube.



# LISTEN |||| -

Scorrano, D. (Host). (2022). *Beyond the NAEP: Mississippi's Literacy Growth with Kristen Wynn* (No. 24) [Audio podcast episode]. In READ Podcast. The Windward Institute.

Scorrano, D. (Host). (2023). Kristen Wynn and Literacy Leadership in Mississippi (No. 40) [Audio podcast episode]. In LEAD on READ Podcast. The Windward Institute.

Scorrano, D. (Host) (2023). *Reaching More Readers, Training More Teachers with Katie Pace Miles, PhD* (No. 46) [Audio podcast episode]. In LEAD on READ Podcast. The Windward Institute.

# A DEEPER LOOK AT THE DEVELOPMENT OF THE READING BRAIN

By Danielle Gomez (née Scorrano), EdD, Research and Outreach Director at The Windward Institute

"Behind its mundane façade, reading is an extraordinarily complex act." (Seidenberg, 2017, p. 187)

The identification and study of the reading brain is a tale of human curiosity, a story of invention, and an illustration of human evolution to a remarkable magnitude. While the concept of the reading brain stands as its own cultural and scientific discovery, our understanding of it spans across centuries of learning and ingenuityfrom the development of writing systems to more recent technological advances that precisely illustrate how the brain has evolved to read written words. Learning about the reading brain is important for educators, caregivers, and other stakeholders in education to

- understand how brains work as children develop reading skills.
- implement effective reading and literacy instruction across ages and content areas.
- expand advocacy and social justice efforts for literacy around the world.
   (Gotlieb et al., 2022)

The following translation of the wide and deep body of research on the reading brain aims to primarily inform those invested in the academic and personal lives of children as they develop the fundamental life skill of reading.

#### THE BIRTH OF OUR READING BRAIN

The irony of the reading brain-that "we were never born to read" (Wolf, 2007, p. 3)-underlies a complex story. Centuries of research and decades of findings in cognitive neuroscience demonstrate that the human brain is innately programmed for oral language at birth but not for reading written text. What does this mean? While our brain has regions that recognize sounds and visual objects, it must adapt over time to use these regions to connect the sounds-symbols that represent words. Researchers have explored the development of reading and language across scientific disciplines such as cognitive psychology, a field that studies the brain's behavior; and neuroscience, a field that examines the brain's structure and physical processes (Gotlieb et al., 2022). This rigorous interdisciplinary examination has resulted in a body of findings in the science of reading, including the following:

While our brain has regions that recognize sounds and visual objects, it must adapt over time to use these regions to connect the sounds-symbols that represent words. **1**. The human brain is innately structured for language.

Seidenberg (2017) summarizes that humans are born with the abilities for spoken language, explaining, "the capacity for spoken language evolved in humans well before writing was invented" (p. 15). These areas are foundational as children learn to understand the form of language, how it is used, and the content that is shared.

The language skills that develop are important in early, pre-reading stages of childhood. For example, even before children connect sounds to print, they are developing phonological awareness, or the ability to recognize sounds in spoken language, and alphabetic knowledge, or the ability to identify print letters and connect to their sounds (Lonigan et al., 2018). Furthermore, strong language skills in early childhood have been shown to support and mitigate future challenges associated with reading comprehension (Catts et al., 2015). There's a difference, however, between how humans naturally learn spoken language and the processes required to translate oral sounds into-and connect meaning with-written symbols (Castles et al., 2018; Seidenberg, 2017).

**2.** The reading brain develops over time: It does not mark a single event.

The reading brain must evolve to connect sounds with their written representations: letters, syllables, and words. At birth, our brains are wired with groups of neurons, or nerve cells that send and receive information between our brain and nervous system. These groups of neurons form our neural code. Our brain develops skills for reading in our neural code through a process of neuronal recycling, according to neuroscientist Stanislas Dahaene (2009). Neuronal recycling occurs when some circuits within the visual systems in our brain adapt to the environment.

In reading, the parts of our brain that initially recognize faces and objects evolve to connect letter representations to sound and meaning (Seidenberg, 2017). This process is one example of the incredible power of the brain's neuroplasticity; that is, it can rewire or change over time. Neuroplasticity makes it possible for readers to leverage pre-existing structures of the brain to recognize letters in print and tie them to sounds. It is important to remember that this plasticity is usually a result of continued efforts, such as learning through explicit instruction, not a single event or simple flick of a switch. In fact, a 2015 study conducted by McCandliss and colleagues showed that children who were explicitly taught word-reading skills through phonics had greater activation in the areas of the brain that promoted effective and efficient reading, compared to children taught using other approaches (such as whole language). In other words, "children need to learn (and be taught) to analyze the printed forms of words and map these onto meaning" (Castles et al., 2018).

Neuroplasticity makes it possible for readers to leverage pre-existing structures of the brain to recognize letters in print and tie them to sounds. dorsal/decoding pathway ventral/sight recognition pathway

# MAPPING OUR READING BRAIN

Scientists have studied the reading brain for over a century. In more recent decades, neuroscientists have used brain-imaging technology (e.g., functional Magnetic Resonance Imaging, or fMRI) to map the regions and networks in the brain associated with proficient reading. As our brain evolves for reading, its networks build connections between sounds, their spellings or representations, and meanings of units of written language (Seidenberg & McClelland, 1989; Seidenberg, 2017). Basic facts about our reading brain include the following:



- Reading connects orthography (visual representation), phonemes (sounds), and semantics (meaning), which has been described as the "triangle" framework (Seidenberg & McClelland, 1989).
- At a basic structural level, our brain has four lobes: the frontal, temporal, parietal, and occipital lobes.
- Reading involves the coordination of regions and networks across these lobes and layers of our brain.
- While reading involves a network of pathways that connect its regions, the two main areas are the dorsal (decoding) and ventral (sight recognition).
- The reading process moves from the back of the brain, starting from a visual stimulus, to the "Visual Word Form" area, to networks and regions of our brain responsible for sight, sound, and meaning.
- The brains of people with dyslexia differ from those of typically developing readers. Maryanne Wolf explains, "The reality is that the study of dyslexia helps reveal the complexity of reading itself...weaknesses in the brain and genetic makeup were there well before [children] ever entered the kindergarten door" (Scorrano, 2021).

(Dehaene, 2009; Kearns et al., 2019; Seidenberg, 2017)

#### Source:

*The Reading Brain.* Reprinted from "The Neurobiology of Dyslexia," by D.M. Kearns, R. Hancock, F. Hoeft, K.R. Pugh, and S.J. Frost, 2019, Teaching Exceptional Children, 51(3), p. 180. Reprinted with permission.

The infographic *The Reading Brain* depicts a coordinated process of reading (Kearns et al., 2019).

## CONCLUSIVE EVIDENCE, REMAINING QUESTIONS

Centuries of research supporting the reading brain demonstrate clear implications for education:

- The reading brain evolves over years so that humans can connect sounds of language with written text and meaning.
- Learning to read is the behavioral manifestation of our brain structure and neural structure changing.
- Instruction is a key environmental factor that can reshape the brains of young readers as they learn the written code. The most effective and efficient way to teach word reading is through explicit, systematic instruction.

With conclusive evidence about reading, other key areas of further research exploration remain related to

- the small subset of struggling readers who are slow responders to evidence-based reading intervention.
- the role of language, background knowledge, and other factors related to reading comprehension.
- whole child (Darling-Hammond & Cook-Harvey, 2018) and ecological models that inform other factors contributing to reading development and difficulty/failure (See "Integrated Approaches to Reading Development: Implications for Education" on page 65 of this issue.).
- continued investment, collaboration, and engagement across scientific and education disciplines from basic (lab) settings to translation and implementation.

(Petscher, 2020)

#### GLOSSARY/TERMS TO KNOW

(Seidenberg, 2017)

**Neurons:** nerve cells that send and receive information between our brain and nervous system

#### Neural code:

groups of neurons that fire to complete brain/cognitive processes

**Neuroplasticity:** the brain's ability to change or adapt over time

#### Neuronal recycling:

process identified by neuroscientist Stanislas Dehaene when some circuits within the visual systems in our brain adapt to the environment for reading

**Phonemes:** smallest units of sound in oral language

**Orthography:** written/spelling systems of language

Semantics: meaning of language With centuries of examination of the reading brain and the continued investment to connect research with educational practice, it remains critical that educators and caregivers understand the inner workings of our reading brain and foster an educational environment that targets the needs of students for their reading and overall life success.

# READ

Gotlieb, R.G., Rhinehart, L., & Wolf, M. (2022). The "reading brain" is taught, not born: Evidence from the evolving neuroscience of reading for teachers and society. *The Reading League Journal*, 3(3). 11-19.

Wolf, M. (2007). Proust and the squid: The story and science of the reading brain. HarperCollins.

## WATCH

The Windward Institute. (2023, September 27). *The Reading Brain Across Languages with Elsa Cárdenas Hagan, EdD* [Video]. YouTube.



The Reading Brain across languages

# LISTEN (||||-

Scorrano, D. (Host). (2021). *The Beauty and Science of The Reading Brain with Maryanne Wolf, PhD* (No. 21) [Audio podcast episode]. In READ Podcast. The Windward Institute.



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# A CONVERSATION WITH DR. FUMIKO HOEFT AND DR. JOHN J. RUSSELL

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By Jana Cook (Editor), Associate Director of Marketing and Communications and John J. Russell, EdD, Special Projects Advisor to The Windward Institute

## Q: Tell us about your journey as a medical doctor focused on psychiatry. How did that take place? What were the motivators?

Dr. Hoeft received her MD and PhD in Neuroscience from Keio University School of Medicine. She did her pre-doctorate fellowships at Harvard, Caltech, and UCLA, and post-doctorate fellowship at Stanford. She was the director of the Brain Imaging Research Center at UConn until the fall of 2023 and is currently the campus dean and CAO of UConn Waterbury and the director of the Laboratory for Learning Engineering and Neural Systems at UConn/University of California San Francisco (UCSF). She also is a professor in the Departments of Computer Science and Engineering, Educational Psychology, Mathematics, Neuroscience, Pediatrics, and Psychiatry at UConn, and serves as an adjunct faculty member at Keio University in Japan and UCSF.

# **A:** always w

I always wanted to be a physician. My childhood dream was to be a physician, to go to a developing country and work in the field. When I became a doctor, I first studied public health and tropical medicine. I actually did my internships in internal medicine as well as emergency medicine so I could pursue that career.

But then along the way, I had an opportunity to visit the Department of Psychiatry at Mayo Clinic; I was fascinated by the brain, by the mind, and about how intact the brains of a disorder like schizophrenia or depression are with the naked eyes. However, when you study the brain quantitatively, you see tremendous deviations or variations in their brains that can at least partially explain their symptoms.

So, I went into psychiatry, and after I had been a clinician for a couple of years, what I felt was the lack of evidencebased practice. This was in Japan in the late 1990s. For example, I would read the latest papers from medical journals, go to a senior psychiatrist, and say, "There's a published paper on this, so I think we should try this new medication for these kinds of patients."

Then the senior psychiatrist would say, "No, this other way is what I've been doing for decades. And it's worked all the time, so we should stick with it." I thought that it was very archaic and experience based. Experience is helpful and important, but I just felt like we needed to be incorporating more evidence-based practices. So, that's how I got interested in brain science, started reading papers, and went back to get my PhD in neuroscience.

When I look back, it's not too different from some of the educators who go back and do a PhD and become a researcher, or those who pursue professional development to learn more about the brain. There's a big synergy between what I've done and my journey and what many other educators do—we all want to learn, understand, and act based on best evidence.

# Q:

You have research interests in the neurobiology of brain development, how we learn to read and how nature and nurture interact. What would you consider to be your most significant findings, related to the acquisition of literacy skills?

When I worked with John Gabrieli at Stanford as a postdoc, we looked at whether dyslexia is a neurobiological condition; the way people did research up until then was to use functional MRI comparing research participants to their same-aged peers. For example, if you're looking at fifth-graders, you'll look at fifth-graders who are reading without problems and then compare them with those who are struggling, examining the differences in their brains.

What we did in addition was look at reading-matched controls, meaning that we took younger kids who are two or three years younger but reading at a similar level as dyslexic individuals. If you just look at the superficial level of reading, they're about the same, and the only differences between these individuals are that one group has dyslexia and the other does not, and one group is younger. When we looked at their brains, to our surprise, we still saw critical differences in a lot of the brain regions that people talk about that could be characteristic of individuals with dyslexia. At the time, we concluded that these are the "likely neurobiological signatures of dyslexia."

We decided to do a second study along this line of work, because often people have asked, "So if you're reading poorly and if your other abilities are much higher, it is much easier to say that you likely have dyslexia. But if you take people who are good readers but have exceptionally high cognitive abilities, then do you call them 'typical readers,' because they read 'normally'; or do you call them 'dyslexic readers,' because there is still this gap and they're struggling in reading relative to their other abilities?''

And it was interesting because we posed that question to a professional organization's listserv, the scientific studies of reading (SSSR). Half the people said that it is not dyslexia, because they're reading within the typical range. The other half said that if you look at the error characteristics and patterns and how they're struggling, they show characteristics of dyslexia. It may be masked by the other cognitive abilities, but they still have dyslexia.

So, we again used MRI-based neuroimaging to test which one is more likely true based on their brain patterns. The short answer is that we did see some neurobiological characteristics of dyslexia even in those who 'read normally' but had exceptionally high cognitive abilities. It was a neat study, because it was still controversial at the time even amongst professionals. And it had potential implications for real-world practice. Also, we were probably the first to publish a study back in 2011 applying machine learning approaches to create a model using brain imaging and behavioral assessment scores to predict individual outcomes for those with dyslexia. And our work in dyslexia was what some may say the beginning of a precision learning type approach, which is to take lots of different types of data to optimize intervention for each individual.

My first postdoc, Jessica Black, who at the time had just graduated from the Stanford School of Education and is now a department head at Boston College, was the person who really got me interested in the socio-emotional aspects, the whole-child approach, and biopsychosocial models of learning differences about 15 years ago. Even though it is not directly related to the neuroscience of literacy acquisition, I see it as an important area of work when we consider the whole child (especially given that I am a psychiatrist by training). We continued this line of work first by looking at mental health aspects, then motivation, resilience, mindset, and the positive effects of mentoring. Most recently, we performed research looking at stereotype and bias and if, in those cases, there are negative impacts on individuals with learning differences. We did what is known as a systematic review and meta-analysis,

# Q:

I think you would agree that we've come a long way since the initial identification of dyslexia as congenital word blindness that was coined by Victorian physicians, but I think we still have a lot to learn. What do you consider the key areas of focus for future research in dyslexia?

collecting all published work to identify an overall trend in findings, and what we found was, yes, there are negative biases, stereotype threat, and these do impact self-esteem.

And the final area of work I want to talk about is interventions. Looking at past research, reading interventions have not been shown necessarily to rework the brain in the direction where it becomes a typical brain, but it seems like a compensatory mechanism is more at work; we believe that there are alternative pathways and alternative mechanisms that all kick in to try to help. For example, when you break a bone, it might heal, but it's not going to look brand new. And if you look closely with the right techniques, you will see where there was a bone fracture in the past. I think there's something like that going on in the brain as well. So, we are studying this using neuroimaging and neuromodulation techniques in young adults who learned to compensate for their reading challenges.

I think some of the major discoveries over the past couple of decades have to do with the genetic basis of dyslexia. There have been a number of genetic risk genes that have been identified. I think what has become clear is that much more research needs to happen in order to understand the causes and mechanisms of dyslexia.

Genetic research is not just about identifying risk genes. Everyone thought that in this age of the Human Genome Project, if you decode the genes, then you'll find out what the problem is for all human traits and disorders; but we know that it's much more complicated. For example, there's gene environment interactions and correlations; and gene expression, which means that the DNA might not be impaired, but the expression and the proteins that it produces might be, and that this could be impacted by environment.

Another area deals with the neurobiological basis. We've come a long way and made progress in identifying the brain patterns; now, a lot of people are reporting that it's not replicable, and it might be that we need a bigger sample size and better techniques. It also could be that there's true heterogeneity and differences, but somehow they all show up as having reading problems at the end. Of course, a reading problem itself is not uniform, and the brain is also not uniform, even under one umbrella of dyslexia or reading disabilities or learning differences. A lot more nuanced research trying to really capture that kind of heterogeneity is needed. Finally, going in the opposite direction of heterogeneity, the universality of the neural mechanisms underlying dyslexia despite their differences in language and writing systems is worthy of future research, which is a cornerstone of Haskins Labs. If you take an individual with dyslexia from China versus Spain versus the U.S., you see some differences, but there's a fundamental core universality between languages and writing systems and that also supports the biological basis of dyslexia.

# Q

I'd like to go back to our friends in the Victorian age. I came across a passage that fascinated me. It was written by James Hinshelwood, who was a Scottish ophthalmologist and considered at the time to be the foremost thinker on dyslexia in the Victorian period.

Here's what he had to say: "It's a matter of the highest importance to recognize the cause and true nature of this difficulty in learning to read, which is experienced by these children. Otherwise, they may be harshly treated as imbeciles, incorrigibles, and even neglected or flogged for a defect which they are in no way responsible. The recognition of the true character of the difficulty will lead parents and teachers to treat them differently."

Unfortunately, in our experience at Windward, children and parents come to us with really horrible stories about how their children were treated. Even the adult parents of dyslexics, who were also dyslexic (going back to that genetic link) can relate exactly what happened to them as children in classrooms and in social situations when their reading became obvious to other people as problematic.

What do you believe are the effects on children's social and emotional well-being when they're miseducated, mistreated, or misdiagnosed as dyslexics?



There are many challenges that children with dyslexia face, and a large portion of these can be attributed to social-emotional challenges. One is, if they're not identified young, or if they go undiagnosed, for example, then the child will always think, "What's wrong with me? Am I broken? People tell me I'm stupid or lazy, but I don't think so. I'm trying hard, but I'm really struggling." And that often leads to issues with motivation, stress, anxiety, and depression, which we know heavily impacts their learning overall and their experiences at schools.

Sometimes families worry that there's going to be a stigma around it and social labels applied. But I think, and there is some research that points in a different direction, that it's better to lay it out there; children are much more mature and able to understand things than we think, and the friends, caregivers, and teachers are much more able to help when they can pinpoint the issue.

Parents might also worry about the social-emotional outcome if they identify the child with dyslexia. But in fact, it's probably the other way around. There's still stigma, and we have a long way to go; there's stereotype threat wherein if there is stigma and people are aware of it, then it could lead to underperformance of that child, even though they're perfectly able to do certain things. By letting children know of their dyslexia, it could help students with their self-esteem, motivation, grit, and mindset, as well as other, more negative social-emotional consequences such as anxiety and depression. I think all these are important things to consider.

# Q:

I know that the social-emotional piece is a critical ingredient to getting kids to change their positive or negative mindset about their own ability, their own perception about their ability to read.

We talked about how science and evidence are eventually integrated into practice. Recently, Emily Solari and her colleagues published a paper called "Translational Science, a Roadmap for Science of Reading," in which a host of prominent reading researchers decried the profound gap that exists between empirical findings and implementation evidence based on practices in assessment and instruction of reading in school settings.

Mark Seidenberg has decried this particularly in his recent book. As a physician, in the health sciences, translation, dissemination, and implementation sciences are widely recognized and advocated as a means to resolve some of the challenges to translating research evidence into everyday practice.

What can reading researchers and educators do, to achieve even better results than we see in the medical profession? How can translational science be implemented in a way that allows for the evidence discovered by researchers to be implemented in classroom?

Do you see a mechanism that might expedite that?

A:

It's a really hard question, and the short answer is, I don't really have a good answer. And the other short answer, that's also not a good answer is, the people in the field—whether they're parents, children, families, educators, or policymakers—are putting in great efforts and doing all the right things in a way that is moving us forward towards the translation of research into practice. People are doing this in terms of building awareness, advocacy, and destigmatizing.

I had breast cancer last fall, and I had surgery and radiation and so on. So, it's close to my heart, but I was just thinking about the Cayman Foundation, a breast cancer foundation. When people see a pink ribbon, they definitely think of breast cancer; and that also is linked to people thinking, "Oh, I better get my annuals done; I didn't go during COVID. I should get it done." And that's how I discovered my breast cancer at a very early stage. It would be fantastic if we can get to that level of early identification and intervention, just like breast cancer screening.

With learning differences such as dyslexia, I hope we can acknowledge, be aware, accept, do early identification interventions, and acknowledge the strengths that individuals possess and not just their challenges. It would be wonderful if we had an [instantly recognizable] ribbon of dyslexia awareness. 26

One of the advantages has been the establishment of a dialogue between researchers and practitioners. As a case in point, Nicole Landi is working with Windward teachers in our EEG labs, and one of the things that I saw happen directly was the impact of conversations between our teachers and Nicole. These conversations were influencing both Nicole and the teachers; the teachers began to understand the more powerful position they have to actually be able to produce changes using evidence-based practices, changes in the brain that were detectable.

How do you feel about that dialogue? Do you think it's progressing? Is it important, and should there be more of it?

I think that is really key. And I wish we could do that in every single school; students can experience brain research, teachers can also experience brain research, and researchers could be exposed to the actual schools, teachers, and students, and I think that would change the world really rapidly.

When you get to work in these kinds of environments, it's rewarding to see the immediate responses in students' and families' and teachers' and researchers' eyes, their interest and engagement, and their desire to do more. I've never seen someone who's done partnerships between practice and research say, "Okay, I'm done. No more." It's kind of addictive.

And I applaud Windward for doing this. It's one of the VERY few schools in the country now that's working on this. By the time you get to this point, you've done a lot of the work already by talking to stakeholders, convincing them that this is important, thinking through the issues, and what benefits it might have to the community.

It does have an amazing impact, and I think something like that could really expedite this translational piece. Bidirectional co-creation is really key, and through these kinds of initiatives, that can happen, and it always has to be a win-win.

Nicole and I co direct an NSF PhD training grant that we got funded by the National Science Foundation in 2022, and it's called TRANSCEND. It's focused on neurodiversity, educational neuroscience, and how to co-create by talking and working with stakeholders so that research doesn't stay in the ivory tower; it needs to be a cyclical process. At Windward, we've seen the immediate impact on the teachers and students working with Nicole. They understood the neuroplasticity of the brain and their ability to affect that. It was transformational. So, it's great to hear someone of your stature confirm that this is in fact a very powerful mechanism for changing the way teachers conceptualize disabilities and for the way children themselves understand their own ability to control it to some degree.

What else would you like to us to know?

There's increasing science that shows the power of a team. As we know, working as a team is a productive and creative process. I don't think any single person works in isolation these days. I think there's more and more acknowledgement that diverse teams make more creative products or outcomes. I really want to emphasize here: Embracing diversity and individual differences, whether it's dyslexia, whether it's attention challenges, or whether it's other differences, will have a positive impact on society.



For an in-depth synthesis of findings from more than 30 leading researchers and practitioners in the field of dyslexia, explore the READ resource below.

## READ 🛄

Galaburda, A., Gaab, N., Hoeft, F., & McCardle, P. (Eds.) (2017). *Dyslexia and Neuroscience: The Geschwind-Galaburda Hypothesis 30 Years Later.* Brookes Publishing.

# **CUTTING THROUGH THE CLAMOR:** KEY CONSIDERATIONS IN THE SCIENCE OF READING

By Alexis Pochna, EdM, Director of The Windward Institute

# The science of reading is a continuously evolving body of knowledge that spans decades.

The term "science of reading" has infiltrated the mainstream media, and consequently, the national consciousness. While it feels as though a tsunami of information is pouring in at every turn, there are rising concerns that the language used to define a body of validated scientific knowledge is morphing into a misleading label and catchy sales phrase.

The science of reading (SoR) is a large, interdisciplinary body of research on reading processes, reading development, and instructional practices linked to reading gains. It is a continuously evolving body of knowledge that spans decades. SoR is not a prescriptive methodology for improving reading scores on nationally-normed tests or reading proficiency rates, which these tests purport to indicate. In its most aspirational state, the science of reading can help guide instructional choicesfrom curriculum to pedagogical techniques and practices-in order to advance reading progress at scale among large and diverse communities of learners. At its worst, it becomes a misunderstood buzzword used to sell products that lack sufficient evidence as to their efficacy.

Understanding the science alone will not yield the impactful results we need, but it is a critical first step, which should not be underestimated. Well-informed teachers plan and deliver more effective instruction, assess learning gains and challenges with greater precision, and employ a deeper understanding of diverse learning needs. Well-informed parents are more critical consumers and better advocates. When communities of educators, administrators, parents, caregivers, legislators, and other stakeholders invested in reading achievement join together under an umbrella of shared knowledge and goals, they can effect real and profound change.

#### THE KNOWLEDGE BASE: READING MODELS AND FRAMEWORKS

Reading models and frameworks provide a foundation for understanding the complex skills, processes, and factors that enable skilled reading. Although there are many insightful models worthy of close examination, four warrant specific highlighting due to the evolution in our understanding of reading that, when looked at sequentially, they illustrate.

The Simple View of Reading (SVR) (Gough & Tunmer, 1986) is a wellvalidated, widely acknowledged model that defines skilled reading as the product of two components: decoding and linguistic comprehension. In this view, decoding is defined as efficient word recognition (WR), and linguistic comprehension (LC) is the ability to comprehend language and interpret lexical information. Reading comprehension (RC) is a product of these two factors, and if either factor is zero, reading comprehension cannot occur (Gough & Tunmer, 1986; Hoover & Gough, 1990).

## WR X LC = RC



*Source:* Used with permission of Guilford Press, from *Handbook of Early Literacy Research*, Scarborough, 2001; permission conveyed through Copyright Clearance Center, Inc.

The Scarborough Reading Rope (2001) expanded upon the SVR by highlighting specific "strands" that are woven together as reading develops. The component skills, or strands, of language comprehension include background knowledge, vocabulary, language structures (e.g., syntax), verbal reasoning (e.g., inference), and literacy knowledge (e.g., print concepts). Phonological awareness, decoding, and sight recognition constitute the mechanisms of word recognition. As readers become increasingly strategic and automatic, the weave among the component strands tightens into a dense rope representative of skilled reading.



*Source:* Aaron, P & Joshi, R Malt & Gooden, Regina & Bentum, Kwesi. (2008). Diagnosis and Treatment of Reading Disabilities Based on the Component Model of Reading: An Alternative to the Discrepancy Model of LD. *Journal of Learning Disabilities*. 41. 67-84. 10.1177/0022219407310838.

The Componential Model of Reading (Aaron et al., 2008; Joshi, 2019; Joshi et al., 2012) expands upon the SVR even more broadly by including three domains: cognitive, psychological, and ecological. While the cognitive domain largely refers to decoding and language comprehension as identified in the SVR, the psychological and ecological domains acknowledge a constellation of influences on a reader's development, including motivation, gender, teacher expectations, home environment, parental involvement, dialect, classroom environment, and peer influences. Recognizing the impact that all three domains have on reading development adds to a more comprehensive and compassionate understanding of a child's reading progress or difficulties (Joshi, 2019).

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This is a reader model. Reading is also impacted by text, task, and sociocultural context.

#### ACTIVE SELF REGULATION

Motivation and engagement Executive function skills Strategy use (word recognition strategies, comprehension strategies, vocabulary strategies, etc.)

An even more recent model, the Active View of Reading (Duke & Cartwright, 2021) highlights the overlap between word recognition and language comprehension and the factors involved in skilled reading that bridge both major constructs, such as the development of vocabulary knowledge, reading fluency, and morphological knowledge. The Active View of Reading also highlights self-regulation skills, and it states that executive function (EF) is "so important to reading that there is reason to believe that for some students, limited EF skills are the primary cause of reading disability" (p. 531). Motivation, engagement, and the effective application of strategies all play a role in skilled reading and are also included in this promising model.

#### WORD RECOGNITION

Phonological awareness (syllables, phonemes, etc.) Alphabetic principle Phonics knowledge Decoding skills Recognition of words at sight

#### BRIDGING PROCESSES

Print concepts Reading fluency Vocabulary knowledge Morphological awareness Graphophonological-semantic cognitive flexibility (letter-sound-meaning flexibility)

#### LANGUAGE COMPREHENSION

Cultural and other content knowledge Reading-specific background knowledge (genre, text features, etc.) Verbal reasoning (inference, metaphor, etc.) Language structure (syntax, semantics, etc.) Theory of mind

Taken together, these increasingly complex frameworks elevate the primacy of word recognition and language skills in reading development while recognizing the more comprehensive inventory of skills and factors that influence skilled reading. Understanding these models and frameworks can help educators better plan for instruction, evaluate curriculum and materials, conduct task analyses, manage instructional time, evaluate reading progress and potential barriers to that progress, scaffold instruction, and support readers at all levels.

## READING

#### Source:

Duke, N. K., & Cartwright, K. B. (2021). The Science of Reading Progresses: Communicating Advances Beyond the Simple View of Reading. *Read Res Q*, 56(S1), S25– S44. https://doi.org/10.1002/rrq.411 Such an understanding also keeps the complexity of the reading process top of mind, which is critical to ensuring that specific aspects of reading development do not take on an outsized function in reading instruction. For example, the science of reading shows that reading is not acquired naturally in the same way as oral language. Rather, students must be taught that letters, a convention of written language, represent sounds, the building blocks of oral language. Explicit, systematic phonics instruction is the key to this cipher and critical to early reading development. While we acknowledge, and even celebrate, this awareness, it should not come at the expense of the other skills, processes, and components that factor into skilled reading. Phonic knowledge is foundational, not an end in itself, and must be understood as such (Castles et al., 2018).

Although reading development should not be viewed as a strictly linear progression, developmental models, such as the stages outlined by Jeanne Chall (1983), provide another useful framework. The skill hierarchy outlined by Chall begins with the prereading stage (stage 0) and progresses through five additional stages, from initial reading and decoding to construction and reconstruction at the college level and beyond. Such a model highlights the foundational skills necessary to develop higher-level reading skills and includes the experiences of adult readers who read for their own purposes, actively integrate and synthesize information and ideas from a range of sources, and use text to build new understandings and knowledge. Chall's model was not meant to reflect inflexible, strictly sequential phases of development; rather, it points to the acquisition of reading skills as being a process, its "stages dependent on the reader, the type of text, and the reading purpose" (Semingson & Kerns, 2021, p. 162). Text and task analyses are therefore critical when planning lessons in order to tailor instruction and interventions more effectively.

Such an understanding also keeps the complexity of the reading process top of mind, which is critical to ensuring that specific aspects of reading development do not take on an outsized function in reading instruction.

# **STAGES OF READING DEVELOPMENT**



Source: Adapted from Chall, J. S. (1983). Stages of reading development. New York, NY: McGraw-Hill.

Just as Chall's stages of reading should not be conceived of as rigid, nor should reading models and frameworks or the science of reading as a whole. SoR is an evolving body of work that changes as studies reveal new findings and evidence brings causal mechanisms and effective instructional practices and materials into clear focus. Additionally, there is much work to be done regarding translation and implementation science to bridge the gap between research findings and the delivery of effective evidence-based instruction in schools.
#### THE ROAD AHEAD: TRANSLATION AND IMPLEMENTATION SCIENCE

The goals of translation and implementation science for reading education are to make research accessible, applicable, and impactful; to create structures for communication and learning among researchers, educators, and other invested groups; and to identify, implement, and evaluate the evidence-based practices that lead to the greatest reading gains for students in authentic instructional contexts as well as the consequent long-term learning outcomes.

If the science of reading is to be applied in a manner resulting in achievement for all learners, the field must increase its focus on processes supporting implementation of evidence-based reading practices in schools. The field can leverage its considerable evidence base to systematically investigate, with replication, both the effectiveness of reading instructional practices with diverse learners and the processes that facilitate or prevent adoption, implementation, and sustainability of these practices. (Petscher et al., 2020, p. 276)

#### THE BIG PICTURE: LOOKING BEYOND THE SCIENCE

In a society that values education enough to have compulsory education laws, reading should not be a privilege. It should be a guaranteed outcome of years of schooling. We are, however, far from achieving this fundamental objective. The recent National Assessment of Educational Progress fourth grade reading achievement scores reveal a gap in reading proficiency rates of more than 20 percentage points between students who identify as Black and Hispanic with those who identify as White. The gap between students who identify as Black and Hispanic compared to students who identify as Asian is even greater (NAEP, 2022). This is not a one-time anomaly but rather a persistent pattern of systemic inequities. As the science of reading

continues to evolve and develop, it must reckon with the bigger picture, which extends far beyond the classroom and involves a myriad of influences that shape students' school and learning experiences. "In order for the field of reading and research to adequately respond to the needs of the nation's learners, it will have to grapple with the barriers to achievement that Black and Brown children and children growing up in poverty are disproportionately more likely to encounter on the pathway to reading and school success" (Terry, 2021, p. 85). The bold, expansive, and non-negotiable ambition for reading in this country must be achievement for all.

SoR is an evolving body of work that changes as studies reveal new findings and evidence brings causal mechanisms and effective instructional practices and materials into clear focus. The bold, expansive, and non-negotiable ambition for reading in this country must be achievement for all.

## AN URGENT APPEAL

Reading reform is incredibly complex, and our efforts, however well-intentioned, continue to fall short. Redressing this societal failure is a moral imperative. While by no means an end in itself, the sizable and growing body of evidence that is the science of reading provides a framework for evaluating and developing educational practices and materials; shaping policy to ensure access and quality; and training teachers to deliver effective instruction that supports all learners. Any efforts still expended on debating this point should be redirected to making the science readily available, to measuring the impact of evidence-based instructional choices, and to ensuring that proven practices are identified and implemented at scale with a commitment to equity and sustainability.

## READ

Semingson, P., & Kerns, W. (2021). Where Is the Evidence? Looking Back to Jeanne Chall and Enduring Debates About the Science of Reading. *Reading Research Quarterly*, 56 (S1), S157-S169.

Terry, N. P. (2021). Delivering on the promise of the science of reading for all children. *The Reading Teacher*, 75 (1), 83-90.



Use this QR code to explore READ, WATCH, LISTEN resources.

## WATCH

The Windward Institute. (2023, October 10). *The Scarborough Reading Rope: Let us explain* [Video]. YouTube.



The Windward Institute. (2023, July 19). What Is Structured Literacy? Science of Reading Instructional with Dr. Molly Ness [Video]. YouTube.



## LISTEN

Scorrano, D. (Host). (2021). *Translating Reading Practices, Transforming Education Policies with Emily Solari, PhD* (No. 20) [Audio podcast episode]. In READ Podcast. The Windward Institute.

Scorrano, D. (Host). (2022). From Translation to Implementation with Nicole Patton Terry, PhD (No. 31) [Audio podcast episode]. In READ Podcast. The Windward Institute.

# THE LAST GASPS IN THE READING WARS

By John J. Russell, EdD, Special Projects Advisor to The Windward Institute In simplest terms, the reading wars pit passionate advocates of differing views about how best to teach children to read: whole language/balanced literacy advocates versus proponents of phonics-based instruction and the science of reading. While the seeds of the seemingly never-ending reading wars were sown in the early 1800s, there is a strong argument to be made that the reading wars began in earnest in 1967 with the publications of Jeanne Chall's Learning to Read: The Great Debate and Kenneth Goodman's *Reading: A psycholinguistic guessing* game and continue unabated to the present. The reading wars were based on competing claims of authenticity by these two camps.

#### THE BATTLELINES ARE DRAWN

The battlelines for the reading wars were actually set more than 200 years ago when Horace Mann argued against teaching the relationship between letters and sounds, referring to letters as "skeleton-shaped, bloodless, ghostly apparitions," asserting, "It is no wonder that the children look and feel so death-

like, when compelled to face them" (Adams, 1990, p. 22). Since it had been standard practice at that time to teach children to read so that they learned the relationship between letters and sounds explicitly, Mann's comments can be viewed as one of the earliest salvos in the reading wars (Castles et al., 2018). The modern phase of the reading wars pit those advancing a phonics approach, in which the sounds that letters make are taught explicitly (Chall, 1967), against advocates of a whole-language approach, which stresses the creation of meaning through a child's experiences in a literacy-rich environment (Goodman, 1967). More specifically, in Learning to Read (1967), Chall's review of research studies clearly demonstrated that teaching children to decode produced better outcomes in word reading and comprehension than instructional practices that taught students to read whole words and whole sentences, aka whole language, while Goodman (1967) considered reading a "psycholinguistic guessing game" in which readers use their graphic, semantic, and syntactic knowledge to guess the meaning of a printed word.

The modern phase of the reading wars pit those advancing a phonics approach, in which the sounds that letters make are taught explicitly, against advocates of a wholelanguage approach, which stresses the creation of meaning through a child's experiences in a literacy-rich environment.

#### WHOLE LANGUAGE ADVANCES INTO CLASSROOMS

Initially, this debate remained largely an academic one, until 1971 when Frank Smith published Understanding Reading: A Psycholinguistic Analysis of Reading and Learning to Read, which-along with the works of Goodman (1967), Marie Clay (1991, 2001), Reggi Routman (1991), and a host of others-moved whole language philosophy from colleges and universities into classrooms across the United States. Proponents of whole language theorized that learning to read occurs naturally in the same way that children learn to speak (Smith, 1971). Based on this philosophy, essentially all teachers had to do was surround children with good literature in an encouraging environment, and they would learn to read. In very short order, many colleges and universities made whole language a core component of their pre-service education programs. Publishers quickly recognized the potential windfall profits that could be made by supplying schools with engaging, "good literature" and soon joined the fray, inundating schools with reading programs based on whole language.

## THE SCIENCE OF READING ADVANCES

As whole language became nearly ubiquitous in classrooms across the United States, researchers in cognitive science, psychology, neuroscience, and linguistics slowly began to chip away at its faulty premises. To resolve the question of how best to teach children to read, in 1997 Congress convened the National Reading Panel (NRP), a group of experts in the fields of psychology, education, and reading, to evaluate research on the teaching of reading and to make recommendations for improving literacy instruction in schools. The NRP found that effective reading instruction requires attention to scientific evidence about how children learn to read and the most effective methods for teaching reading (National Reading Panel, 2000). The scientific studies cited by the NRP

confirmed Chall's assertions that, contrary to the beliefs of whole language advocates, skilled readers rely more heavily on decoding skills (knowledge of letter-sound correspondence) than contextual cues when learning to read new words (National Institute of Child Health and Human Development, 2000).

The research that makes up the science of reading builds on the findings of the National Reading Panel. Like the report issued by the NRP, the science of reading is anchored by research in cognitive psychology, communication sciences, developmental psychology, education, special education, implementation science, linguistics, neuroscience, and school psychology. As whole language became nearly ubiquitous in classrooms across the United States, researchers in cognitive science, psychology, neuroscience, and linguistics slowly began to chip away at its faulty premises.

## THE SMOKESCREEN OF BALANCED LITERACY

In an effort to counteract the overwhelming criticism that whole language programs were incurring, many simply adopted the misleading label "balanced literacy" (Moats, 2000). Chester Finn (2000) of the Fordham Institute described how the term "balanced literacy" was deceptive:

Yet whole language persists, despite efforts by policymakers and reading experts to root it out. Today, though, it often disguises itself, not using the term "whole language" but, rather, wearing the fig leaf of "balanced" instruction. A lot of people who have a casual acquaintance with the research have persuaded themselves that balanced reading instruction means a little of this, a little of that. Take a cup of phonics from one cupboard, add a half-pint of whole language from the fridge, and the resulting blend will succeed with children while avoiding the battles and conflicts of the "reading wars." (Finn, 2000, p. 1)

Even after the publication of the National Reading Panel's exhaustive study and despite whole language being refuted by research studies that clearly and unequivocally identified scientifically based instructional practices as the most effective method for teaching reading, ineffective instructional practices remained embedded in many schools (Moats, 2007). Mark Seidenberg lamented schools' failure to heed the overwhelming evidence refuting whole language and balanced literacy:

The persistence of the [whole language] ideas despite the mass of evidence against them is most striking at this point. In normal science, a theory whose assumptions and predictions have been repeatedly contradicted by data will be discarded. That is what happened to the Smith and Goodman theories within reading science, but in education they are theoretical zombies that cannot be stopped by conventional weapons such as empirical discomfirmation, leaving them to roam the educational landscape. (Seidenberg, 2017, p. 271)

## THE SCIENCE OF READING PREVAILS

The research behind the science of reading has been around for over fifty years, yet its emergence as a national movement is recent, due in part to the work of journalists like Emily Hanford (2022), whose reporting shines a light on ineffective reading instruction across the nation. Recent developments indicate that the tide is changing; instructional practices based on the science of reading are making significant advances throughout schools in the United States, while teaching strategies rooted in whole language/balanced literacy are in retreat. Since 2013, 37 states and the District of Columbia have passed laws or implemented regulations requiring schools to use instructional methods based on the science of reading. In 2023, New York City Public Schools announced it is switching its 32 school districts, encompassing hundreds of schools and almost one million students, from balanced literacy approaches to the science of reading to teach students (Lonas, 2023).

Notably, after nearly four decades, Teachers College, Columbia University has announced that it is abandoning its past adherence to a flawed reading program, Units of Study/ Teachers College Reading and Writing Project, which was developed by Professor Lucy Calkins, one of the pillars of the balanced literacy movement (Goldstein, 2022). The announcement dissolving the Teachers College Reading and Writing Project stated, "TC [Teachers College] will ensure that its professional development programs are informed by the latest research and evidence and that the College continually finds new ways to translate faculty scholarship into timely assessments, interventions, and research-based practices" (Goldstein, 2023).

Recent developments indicate that the tide is changing; instructional practices based on the science of reading are making significant advances throughout schools in the United States, while teaching strategies rooted in whole language/balanced literacy are in retreat.

## MAINTAINING THE ADVANCES

With the authenticity of the science of reading clearly established and whole language/balanced literacy debunked, many researchers and practitioners see these seismic changes as conclusive indication that the reading wars are finally coming to an end, but there is much to be done to safeguard that future students are taught to read using practices that are scientifically based:

- States must ensure that the laws and regulations that they have passed requiring the adoption of the science of reading are implemented with fidelity in the schools in their jurisdiction.
- Colleges and universities must commit to preparing the next generation of teachers with a program of study grounded in the science of reading.
- Researchers must embrace translational science promoting dialogue among researchers and practitioners.
- School districts must provide current faculty with professional development based on the science of reading.

The casualties of the reading wars are many: the dedicated teachers who were "sold a story" (Hanford, 2022) about how to teach children to read, the taxpayers who sunk billions of dollars into an education system that produced decades of dismal results, and, most tragically, the millions of students who never learned the skills that they needed to become proficient readers, severely limiting their ability to lead fulfilled lives. We cannot continue to ignore the research-based instructional practices that are supported by the science of reading nor can we afford a continuation of the reading wars; the price in human capital is simply too high.

## READ 🛄

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# PHONEMIC AWARENESS: MICRO BUT MIGHTY KEY TO EARLY LITERACY SUCCESS

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By Nikki Hertz, MS

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Both phonological awareness and phonemic awareness are sometimes confused with phonics, which is print focused: It matches the sounds of spoken language to letters or groups of letters.

In 1997, Congress established the National Reading Panel (NRP) in preparation for the reauthorization of the Elementary and Secondary Education Act. According to the National Institute of Child Health and Human Development (2019), the purpose was to "review all research available on how children learn how to read [to] determine the most effective evidence-based methods... [and] suggest a plan for additional research in reading development and instruction." A 14-member panel, which included teachers, researchers, and school leaders, was formed to review research; the panel considered more than 100,000 reading studies published over the course of decades for the committee's metaanalysis. Within the report released in 2000, the panel outlined that a combination of phonemic awareness, phonics, fluency, vocabulary, and comprehension instruction were effective elements to develop a child's reading ability (U.S. Department of Education, 2001). While the National Reading Panel acknowledges the importance of the contributions that each of these factors make in developing literate students, phonemic awareness deserves specific attention, because it is a vital component of early literacy development. Although

the report has been out for more than 20 years, research has continued to confirm the panel's findings (Rehfeld et al., 2022; Suggate, 2016).

## WHAT IS PHONEMIC AWARENESS?

Both phonological sensitivity and phonemic awareness fall under the umbrella of phonological awareness, "the broad class of skills that involve attending to, thinking about, and intentionally manipulating the phonological aspects of spoken language" (Scarborough & Brady, 2002, p. 312). According to Brady, phonological sensitivity involves larger units of language, such as words, rhyme pairs, onsets, and syllables (2020). Phonemic awareness relates to the smallest, individual speech sounds, or phonemes, and encompasses both noting them and manipulating them within words and syllables (Scarborough & Brady, 2002). Phonemic awareness can include blending, segmenting, substituting, deleting, and manipulating phonemes (Schatschneider et al., 1999). Both phonological awareness and phonemic awareness are sometimes confused with phonics, which is print

focused: It matches the sounds of spoken language to letters or groups of letters (Scarborough & Brady, 2002).

Phonemic awareness can be complex for students, because when we speak, we don't speak in individual speech sounds. A student must develop the understanding that spoken words are made up of discrete phonemes and, later, that letters in the words they see connect to these speech sounds. This awareness helps prepare students for phonics instruction, which supports literacy acquisition (Ehri et al., 2001). Additionally, the National Reading Panel (2000) notes that "teachers should recognize that acquiring phonemic awareness is a means rather than an end. Phonemic awareness is not acquired for its own sake but rather for its value in helping learners understand and use the alphabetic system to read and write" (pp. 2-6).

Phonemic awareness is most effective in the early grades, and that effectiveness decreases as students learn how to decode.

#### WHERE PHONEMIC AWARENESS FITS INTO THE BIG FIVE OF READING

Though all the elements of effective literacy instruction mentioned in the National Reading Panel are important to literacy acquisition, the panel was able to determine that explicit phonemic awareness instruction had a positive correlation with students acquiring phonemic awareness, word reading, comprehension, and spelling skills. In addition, phonemic awareness instruction has been shown to be most effective when one or two phonemic awareness skills are taught at once, as opposed to several, and when instruction is between 5 to 18 hours total, instead of longer (Ehri et al., 2001). Phonemic awareness is most effective in the early grades, and that effectiveness decreases as students learn how to decode (Rice et al., 2022).

There has been a lot of discourse surrounding the idea of teaching phonemic awareness with and without the use of letters. Both the National Reading Panel (2000) and a recent meta-analysis on phonemic awareness (Rehfeld et al., 2022) found that incorporating letters into phonemic awareness instruction is supportive for students. However, both reports also state that phonemic awareness instruction that only integrates verbal practice could also be helpful. Others argue that the use of letters may or may not be considered phonemic awareness instruction. Instead, after oral phonemic awareness work, letters can be applied (Kilpatrick, 2015), which can serve as a bridge to phonics. Both appear to be helpful, and neither appear to be harmful. The panel additionally concluded that phonemic awareness helped all types of children improve their reading, including students across grades and socioeconomic status. This was also true for students acquiring English as a new language and for students with significant learning needs (National Reading Panel, 2000). Teaching phonemic awareness should be a staple in all early literacy classrooms, as it does not take up a lot of instructional time, and it benefits a wide variety of learners.

#### GLOSSARY/TERMS TO KNOW

#### Phonics:

An approach to, or type of, reading instruction that is intended to promote the discovery and understanding of the alphabetic principle, the correspondences between phonemes and graphemes, and phonological decoding. For decades, many methods have been used for phonics instruction. Advocates of phonics maintain that the spelling patterns of English are largely predictable and that teaching children about phonological, orthographic, and morphemic regularities makes reading and writing easier to learn.

#### Phonological awareness:

The broad class of skills that involve attending to, thinking about, and intentionally manipulating the phonological aspects of spoken language, especially the internal phonological structure of words

#### Phonemic awareness:

The particular kind of phonological awareness that involves attending to, thinking about, and intentionally manipulating the individual phonemes within spoken words and syllables Curriculum companies—as well as teachers—should focus attention specifically on phonemic awareness skills instead of phonological sensitivity skills.

#### UNPACKING THE PHON TERMS

Phonemic awareness can be improved through both instruction and intervention (Ehri et al., 2001). There can sometimes be confusion around the *phon* terms: phonological awareness, phonological sensitivity, phonemic awareness, phonemes, and phonics (Scarborough & Brady, 2002); this can impact classroom instruction.

Although phonological awareness can develop in an illiterate society (Morais et al., 1979), phonemic awareness does not always organically develop and needs to be taught explicitly (Bentin et al., 1991). Phonological skills do not need to be taught in any order, since phonological sensitivity skills can develop without explicit instruction (Morais et al., 1979). Further, phonemic awareness skills can develop without phonological sensitivity skills (Cary & Verhaege, 1994). Based on this, Brady argues that curriculum companies-as well as teachers-should focus attention specifically on phonemic awareness skills instead of phonological sensitivity skills (2020).

Phonemic awareness instruction can include isolating, identifying, segmenting, blending, manipulating, and deleting phonemes (Brady, 2020), though blending and segmenting have been found to be most effective (Rice et al., 2022). Teachers should use orthographic and reading data from students to guide phonemic awareness instruction, instead of strictly following a prescriptive sequence (Brady, 2020). Lastly, according to Yopp & Yopp (2000), "phonemic awareness instruction for young children should be playful and engaging, interactive and social, and should stimulate curiosity and experimentation with language" (p. 132). Some recommended activities include songs, chants, word games, rhymes, general exposure to text, storytelling, riddles (Adams & Bruck, 1995; Beck & Juel, 1995; Mattingly, 1984) and the use of mouth gestures to connect body to sound (Ehri, 2022).

#### **Phonemes:**

The smallest units into which speech can be divided to make up words. For example, the spoken words *miss* and *mist* differ because the latter contains an additional phoneme; bird differs from word because the first phoneme is different in each; the order of the last two phonemes of clasp is reversed in the word claps.

#### Phonological sensitivity:

Often used as a synonym for phonological awareness. Sometimes used more narrowly to refer only to nonphonemic awareness (i.e., only to an appreciation of rhymes, syllables, and/or subsyllabic elements such as onsets and rimes); when used this way, phonological sensitivity and phonemic awareness are treated as contrasting (and developmentally sequenced) subsets of phonological awareness.

	Pre-K		Kindergarten	Grades 1 and 2
skill	Phonological Sensitivity		Early Phoneme Awareness	Advanced Phoneme Awareness
Phonological Awareness Skill	Awareness of larger speech sounds in spoken words: rhymes, onsets, syllables	Awareness of individual phonemes in spoken words using words with simple syllable patterns: CV, VC, CVC Initial → Final → Medial		Awareness of individual phonemes in spoken words using words with complex syllables that have consonant blends: CCVC, CVCC, CCVCC
		Ĵ	Alphabetic Principle Insight/understanding that printed letters represent phonemes in spoken words	
Letter-Sound / Phonics Skill	Pre-Phonics	Beginning Phonics		Building Phonics, Spelling, & Word Recognition
	Students begin to learn letter names and some letter sounds.	Students learn and practice grapheme- phoneme correspondences for single letter graphemes and three digraphs: <i>sh, ch, th</i> .		Students learn and practice remaining phoneme-grapheme correspondences for all speech sounds in English.
				with strategies to recognize vowel patterns by the vowel (See Moats, 2020).
			Morphemes are introduced (e.g., -s, -ed, -ing).	Advanced Phonics: Syllable division strategies, additional common spelling patterns, and morpheme knowledge. Beyond Grade 2, continue advanced phonics (e.g., final syllables, rule breakers, spelling rules, morphemes).

#### Figure 1

An Outline for Phonological Awareness and Phonics Instruction in Pre-K Through Grade 2 (by Kari Kurto & Susan Brady)

*Source:* Brady, S. (2020). A 2020 Perspective on Research Findings on Alphabetics (Phoneme Awareness and Phonics): Implications for Instruction. *The Reading League Journal (1)*3, 1-25.

# PHONEMIC AWARENESS AT THE TEACHER PREP LEVEL AND BEYOND

We have a wide body of research spanning decades that supports the efficacy of phonemic awareness instruction and its relationship to literacy acquisition; so, why do we not always see it happening correctly (or at all) in schools? In *Teacher prep review: Strengthening elementary reading instruction*, the National Council of Teacher Quality (NCTQ) reviewed teacher preparation programs across the country.

For an in-depth analysis of the 2023 report, see State of the Union: Teacher Preparation Programs in the U.S. in this issue on p. 5. It is imperative that standards, teacher preparation programs, and even legislation shift to align with research in prioritizing phonemic awareness instruction.

As noted in Jamie Williamson's article, the report found that phonemic awareness was addressed the least in teacher preparation programs, as compared to phonics, fluency, vocabulary, and comprehension. Additionally, two out of three teacher preparation programs failed to adequately address phonemic awareness (Ellis et al., 2023).

Aside from their teacher preparation programs, teachers need continued professional development in the teaching of phonemic awareness skills as well as knowledge development in the body of research known as the science of reading. Piasta et al. (2019) found that educators with greater levels of pedagogical and content knowledge were more effective teachers. Additionally, teachers may lack awareness as to why it's important to teach phonemic awareness, be focused on other literacy priorities, have limited training, and even have curricular constraints.

To explore the complete list of references for this article, see p. 75.

In a meta-analysis from Rice (2022), it was found that families and computer programs can also be effective in teaching phonemic awareness, and that before the age of four, children have capacity for this understanding (Kenner et al., 2017). This shows that phonemic awareness support can happen at home and even prior to formal school. According to Catts (2016), "children with a deficit in phonological awareness in kindergarten were found to be five times more likely to have dyslexia in second grade than those without such a deficit" (p. 613). It is imperative that standards, teacher preparation programs, and even legislation shift to align with research in prioritizing phonemic awareness instruction.



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# INVESTIGATING THE INTRICACIES OF COMPREHENSION

By Alexis Pochna, EdM, Director of The Windward Institute



When it comes to comprehension, however, there is no magic elixir and no one-size-fits-all approach.

#### **GUIDING FRAMEWORKS**

Reading is powerful. A single sentence can impart new knowledge, and sentences woven together into a meaningful whole can quickly grow and enhance one's experience of the world. An academic definition is not required to know that understanding what one reads is necessary for a comprehensive experience of text that engages the reader in the construction and integration of mental representations, knowledge building, reflection, and growth. Given the current state of reading progress, as evidenced by consistently disappointing NAEP scores (U.S. Department of Education, 2022), it is not surprising that educators have found themselves searching for cure-all solutions.

When it comes to comprehension, however, there is no magic elixir and no one-size-fits-all approach. Reading comprehension involves a myriad of skills and processes, and it is influenced by a variety of factors (Catts, 2019, 2022). By understanding the complexities and demands involved in comprehending text, teachers will be equipped to assess and monitor learning with greater accuracy and formulate instruction that is diagnostic and impactful. Comprehending printed language is more complex than reading words and sentences as they are laid out on the page and extracting information from their literal meanings. Several models elucidate this complex process and are highlighted here. In the influential Construction-Integration Model (CI) by Walter Kintsch (1988, 1998), the reader constructs a system of mental representations, from the onedimensional to complex. Ultimately, a situation model is created wherein the reader integrates the text base with prior knowledge to interpret the text and develop greater, more accurate, and more meaningful depths of understanding.

This progression exists within a broader context and involves a number of skills and processes. The RAND Reading Study Group (Snow, 2002) identified three critical elements involved in reading comprehension as represented in its widely recognized and cited heuristic: the reader, text, and activity or purpose for reading.



Source: RAND Corporation. (2002).

## 52 INVESTIGATING THE INTRICACIES OF COMPREHENSION



#### Source:

Pearson, P. & Cervetti, Gina. (2015). Fifty years of reading comprehension theory and practice. These elements exist and operate within a larger sociocultural context—such as cultural norms, values, and beliefs which shapes the way individuals experience the world around them as well as their understanding of written texts. The interplay of all these elements is what makes comprehension so complex, as individual readers bring their own background knowledge and experiences to a text, making each reader's interaction with the text inherently different.

Underlying the theoretical premise of the Construction-Integration Model and occurring within the system represented by the RAND heuristic,

## READING COMPREHENSION

a constellation of skills and processes exist that are hierarchically ordered and interactive. The Direct and Indirect Effects Model of Reading, or DIER (Kim, 2017, 2020), describes this hierarchy of skills as well as the dynamic and interactive relationships among the component processes involved in reading comprehension. Skills and knowledge include the broad, overarching categories of word reading and linguistic comprehension as outlined by the simple view of reading (Gough & Tunmer, 1986; Hoover & Gough, 1990) as well as subcomponent skills such as phonology, orthography, morphology, vocabulary, syntax, fluency, background knowledge, higher-order cognition (e.g., inference), and executive function (e.g., working memory). The DIER model further highlights the direct and indirect influence that these requisite skills have on comprehension, such as the direct influence of word reading and listening comprehension and the indirect influence of working memory and attention (Kim, 2017, 2020).

These elements exist and operate within a larger sociocultural context—such as cultural norms, values, and beliefs—which shapes the way individuals experience the world around them as well as their understanding of written texts.





While a curriculum aligned with the science of reading is essential, we cannot look to a packaged curriculum or a prescribed set of comprehension strategies to solve our comprehension woes.

## BEYOND STRATEGY INSTRUCTION

In 2000, the National Reading Panel (NRP) highlighted multiple comprehension strategies in their comprehensive report (National Institute of Child Health and Human Development, 2000), such as comprehension monitoring, graphic and semantic organizers, question answering and generation, and summarization. More than two decades have passed since this seminal report, and while the strategies stand, we know that the depth and scope of the complex processes involved in reading comprehension reach well beyond strategy instruction. For example, while the NRP addressed prior knowledge, substantial evidence has accumulated since the panel's publication was released regarding the correlation between background knowledge and comprehension (Pearson et al., 2020; Smith et al., 2021).

While a curriculum aligned with the science of reading is essential, we cannot look to a packaged curriculum or a prescribed set of comprehension strategies to solve our comprehension woes. Teachers, not curriculums, assess, diagnose, and pivot flexibly in the moment to meet individual student needs. Building reading comprehension skills requires varied and authentic reading experiences and the guidance of well-trained teachers who understand the multifaceted nature of reading comprehension and the myriad of choices involved when planning lessons, delivering instruction, and supporting learners before, during, and after reading. Although the complex nature of reading comprehension makes the challenge of remedying the reading crisis in this country particularly daunting, this same complexity points to the incredible richness of the reading experience and should only strengthen our resolve to ensure that proficient reading is accessible to and attainable by all.

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# IMPLEMENTING THE READING-WRITING CONNECTION – ABOUT TIME?

By Betsy MacDermott-Duffy, MSEd, Director of Language Arts and Instruction at The Windward School

# On schools that separate reading and writing:

"These folks sound like the type of people that would separate Romeo and Juliet...Yin and Yang... Lennon and McCartney... love and marriage...Bert and Ernie...spaghetti and meatballs...You get the idea." - Tim Shanahan

Until education stepped into the 21st century, writing, if included at all beyond fundamentals, was taught as a separate subject, and it still is in many schools. Historically, teachers have essentially used writing probes in order for students to demonstrate learning. It is time for an about-face: The utilization of writing needs to move on from the simple assessment of knowledge. The importance of writing and the skills and strategies needed to write well must be taken advantage of to facilitate students' ability to deeply process and learn about a topic. This specific revelation needs more attention within instruction.

#### On learning through writing:

"The best way to become acquainted with a subject is to write about it." - Benjamin Disraeli

Many educators and researchers have pointed out that reading and writing skills draw upon the same shared knowledge base, and connecting writing instruction to reading improves academic achievement (Graham et al., 2020; Graham & Hebert, 2011; Hochman & MacDermott-Duffy, 2018; Shanahan, 2015). In the vein of the science of reading, the reading-writing connection is on the receiving end of a lot of academic attention in publications. Although the reading-writing connection strategies are being duly highlighted, there should be more urgency in implementation considering the long history of research behind the model.

The reading-writing connection is not new news! Tim Shanahan, a valuable resource for all that's education related, has been writing about this topic for more than 35 years. In the late 1980s, his article—*The Reading-Writing Relationship: Seven Instructional Principals*—included recommendations such as emphasizing the importance of teaching lessons with connected reading and writing activities; understanding the power of explicit instruction; discussing text content, product, and process; and writing for real purposes, considering type of audience, varying genres, and text structures (1988). Also underscored in the article was the importance of introducing writing instruction in the earliest grades and planning with the understanding that writing develops over time. Clearly, a literacy curriculum that is designed to support students in meeting the specialized demands of both reading and writing in the content areas is the key to literacy success throughout the grades (Shanahan & Shanahan, 2008).

Shanahan's early research and publications on literacy along with his leadership role on the National Reading Panel (NRP) took aim at the request of Congress to assess best practices for teaching children to read. The panel included many well-known educators and researchers, such as Gloria Correro, Linnea Ehri, Michael L. Kamil, Donald Langenberg, Cora Bagley Marrett, S.J. Samuels, Timothy Shanahan, Sally Shaywitz, Thomas Trabasso, Joanna Williams, and Dale Willows. Thus, it seemed unexpected that the integration of writing into literacy instruction was neglected by the panel. The panel at the time emphasized that the omission of important topics—such as writing—and their impact on reading was not to be interpreted as these topics being deemed ineffective or unimportant.

It is now over 10 years since Steve Graham and Michael Hebert released a meta-analysis reflecting many research studies that emphasize a teacher's need to recognize the power behind having students write about content, making that connection between reading and writing (2010, 2011). This report provided robust evidence in three major areas: Writing about material students read enhances their reading comprehension; teaching writing strengthens students' reading skills; and increasing how much students

#### On the sciences of reading and writing becoming more fully integrated:

"Advancements in the study of reading and writing cannot be maximized if the sciences of reading and writing continue to operate in largely separate fashions."

- Steve Graham

write improves how well they read. This study also conveyed the evidence that learning and comprehension greatly improve when students read multiple sources about a topic; when they reflect, analyze, and critically think about the content; and when they then synthesize the concepts, or link their ideas to organize and write about them in their own words.

In addition, the evidence on the effectiveness of this reading-writing connection has grown even more striking with the publication of the book *Writing and Reading Connections: Bridging Research and Practice* (Graham & Philippakos, 2022). Within the book, there are many practical applications supported by years of validated research. Many of the strategies and models are reflected in the Expository Writing Program at The Windward School.

Purposefully, here at Windward, we concentrate on foundational skills such

as decoding, spelling, handwriting, and sentence structure. But while students are developing these basic skills, they are also becoming more fluent by reading and writing with more challenging texts and topics in carefully scaffolded lessons. The teacher leads these scaffolded lessons with the eventual release of responsibility to students when they are ready. All this work-the concepts, the skills, and the strategies taught through the Windward expository course based on the program-translates into teachers learning how to transform students into better writers as well as better readers.

While teaching the writing process in our program, we encourage our teachers to have students handwrite their outlines and drafts. Even for our older middle school students proficient in keyboarding, we stress the importance of handwriting ideas on outlines. Why does Windward emphasize students handwriting their ideas from the content that they have read? This is because research has shown that the act of keyboarding information encourages simple verbatim notes without really processing or giving much thought to the information. Handwriting, on the other hand, is highly valued because according to all the evidence, handwriting—pencil to paper—forces the brain to process and engage in a deeper way with content to improve literacy, reading comprehension, and memory.

In addition to the research supporting the reading-writing connection, the Common Core State Standards also emphasize the integration of reading and writing. To meet these new standards, teachers must write across the curriculum and content areas rather than departmentalize writing. Unfortunately, many elementary and secondary programs do not always take full advantage of the benefits of cross-curricula writing as a tool to facilitate comprehension and learning. Writing across the content areas saves the amount of time spent on rote memorization and review because writing about content results in better processing of concepts, improved comprehension, and improved results in retrieval exercises and recall. We as educators don't have time not to teach using this approach.

Beyond the reading-writing connection, language, thinking, reading, and writing are all inextricably linked. Recently, the big buzz is on the science of reading (SoR), but we as educators must think about this term more as the science of literacy, as we do at The Windward School. The science of reading reflects decades of converging evidence of a vast body of scientifically based research about applying structured literacy instruction.

At Windward, the reading-writing connection is emphasized across subjects. Texts for reading are chosen with a specific learning goal, and the writing tasks match the purpose for learning. To teach writing effectively, educators must (1) define the purpose and goal for a reading-writing activity; (2) build background information and vocabulary; (3) motivate students; and (4) teach using diverse types of texts, while modeling and collaborating with students to organize the content onto a graphic organizer reflecting the various text structures. The teacher and students brainstorm and organize ideas to create summary sentences and organize an outline prior to writing a draft. In some programs, writing tasks are often assigned without direct instruction on how to plan and complete a composition or research paper.

At Windward, teachers learn how to scaffold application of the above practices for students through systematic instruction. Systematic, explicit instruction leaves no room for guessing how to complete a task. Instead, instruction includes direct explanations, modeling, practice, and gradual release of responsibility to the student. This is the prescription for student success. The end game is this: Students who own information and can formulate ideas become more fluent and proficient readers and writers.

To explore the complete list of references for this article, see p. 77

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# CONNECTING THE DOTS BETWEEN READING AND WRITING: STRATEGIES FOR INSTRUCTION

By Betsy MacDermott-Duffy, MSEd, Director of Language Arts and Instruction at The Windward School

More than 20 years ago, the National Reading Panel (NRP) released a report outlining the five pillars of literacy: phonemic awareness, phonics, fluency, vocabulary, and comprehension. As noted in my previous article on p. 56, writing was not explicitly addressed within the panel's findings. However, if one looks at the Report of the Subgroup on Comprehension and examines the eight identified strategies that offered a strong scientific basis for improving reading comprehension, one could conclude from supporting studies that these are strategies that overlap into other areas for effective instruction, including the reading-writing connection model.

This subgroup analyzed 203 studies on instruction of text comprehension, which ultimately led to the identification of **eight** highly effective strategies. These strategies offered a firm scientific basis that implementation would lead to improved comprehension (Report of the National Reading Panel, 2000).

Those eight types of effective instruction that are most promising for classroom reading instruction are numerically listed here and are followed by closely related examples of research integrating learning with a writing connection. *Comprehension monitoring* in which the reader learns how to be aware or conscious of their understanding during reading and learns procedures to deal with problems in understanding as they arise

*Writing connection:* The same type of monitoring for understanding, where student writers become aware of effective strategies through the teacher modeling metacognitive strategies needed to write about a text, has been found to be efficacious (Englert et al., 1991; Graham et al., 2016; Graham & Perin, 2007). *Cooperative learning* in which readers work together to learn strategies in the context of reading

Writing connection: Teacher-directed, collaborative writing benefits developing writers. With instruction in cooperative working and learning skills—such as equal participation, valuing contributions, respectfully challenging ideas, and providing effective feedback—teachers establish a welcoming environment, where students learn to work in partnership to master important writing strategies (Philippakos & Graham, 2022; Tweed, 2009; Yarrow & Topping, 2001).

#### On the forgotten 'R':

"Writing is often labeled as the 'forgotten R,' because the other R's—reading and 'rithmetic seem to garner so much attention from educators, policymakers, and researchers. Yet, we know writing is a critical skill for communication and for success in school and in career."

- B. McGill-Wilkinson, National Center for Education Research, and S. Brasiel, National Center for Special Education Research, Inside Institute for Educational Science Research 

## 3

*Graphic and semantic organizers* that allow the reader to represent graphically (write or draw) the meanings and relationships of the ideas that underlie the words in the text

*Writing Connection*: Students can benefit by mapping key ideas from graphic organizers built during readings and discussions onto a linearly structured writing outline for planning compositions. This process facilitates students analyzing content and text structure, effectively reworking information and ideas so they can internally shape well-informed suppositions, making new knowledge their own and having the ability to convey it to others in a clear and logical order (Graham & Perin, 2007; Kornhaber, 2000). Story structure from which the reader learns to ask and answer who, what, where, when, and why questions about the plot and, in some cases, map out the timeline, characters, and events in stories

Writing connection: Direct instruction in story components has been found to enhance children's organization and quality of story writing (Fitzgerald & Teasley, 1986; Traga, Philippakos, Munsell, & Robinson, 2019). Since the Common Core Standards address the importance of writing narratives for expository or imagined experiences, the need to teach effective writing strategies to convey details, be descriptive, and sequence must be integrated into instruction. Narrative or story writing helps students understand not only their inner self but also today's and yesterday's history and scientific understandings (Hineline, 2018).

## 5-6

Both question answering, in which the reader answers questions posed by the teacher and is given feedback on the correctness, and question generation, in which the reader asks themself *what*, *when*, *where*, *why*, *what will happen*, *how*, and *who* questions

Writing connection: Writing to Read, a large-scale statistical review of research highlighting writing techniques that improve students' reading, identified the importance of answering questions about a text in writing; but it also pointed out the effect of student-generated questions and responses on writing quality (Graham & Hebert, 2010). Both responding to teacher questions and creating answers for self-produced questions helped students learn how to locate main ideas, evidence, and key details with improved comprehension for the text (Cohen, 1983; Peverly & Wood, 2001).

**On students acquiring knowledge:** "If students are to make knowledge their own, they must struggle with the details, wrestle with the facts, and rework raw information and dimly understood concepts into language they can communicate to someone else. In short, if students are to learn, they must write."

- The National Commission on Writing for America's Families, Schools, and Colleges

Summarization, in which the reader attempts to identify and write the main or most important ideas that integrate or unite the other ideas or meanings of the text into a coherent whole

Writing connection: When students analyzed and critically examined important ideas about texts and summarized them in writing, reading comprehension and information retention improved (Friend, 2000; Graham & Hebert, 2011).

Multiple-strategy teaching, in which the reader uses several of the procedures in interaction with the teacher over the text (Multiple-strategy teaching is effective when the procedures are used flexibly and appropriately by the reader or the teacher in naturalistic contexts.)

Writing connection: Students can be explicitly taught to carry out more complex composing processes through strategy instruction. The strategies can be initially taught and modeled by teachers in the form of collaborative think-alouds regarding exactly in what way and for what circumstance the best strategies can be used for the completion of specific writing tasks (Philippakos, 2021; Philippakos & Graham, 2022).



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# INTEGRATED APPROACHES TO READING DEVELOPMENT: IMPLICATIONS FOR EDUCATION

By Danielle Gomez (née Scorrano), EdD, Research and Outreach Director at The Windward Institute



Current advances in the understanding of the reading brain emphasize integrated approaches to how the brain evolves and the reading skills that consequently develop. Using integrated approaches enables researchers to understand the comprehensive factors that influence how children's brains develop for reading and the factors that facilitate or inhibit reading proficiency. It is well documented that evidence-based, explicit reading instruction causes brain pathways and regions to reorganize for word reading and that further language and cognitive processes facilitate additional mechanisms for proficient reading comprehension (Castles et al., 2018; Dehaene, 2009; Seidenberg, 2017). Further research examines the extent to which other environmental factors and internal psychological and neural processes contribute to the neuroplasticity of the brain for reading development. Studies in this area have been increasingly documented across numerous disciplines. This synthesis applies findings from ecological and risk and resilience frameworks, which are relevant for practitioners and families in developing an integrated understanding toward reading development and potential difficulties.

Risk and resilience frameworks as well as ecological models explore the influence of the environment on reading development. While ecological models (e.g., Bronfenbrenner, 1979) have long been applied across various disciplines, a recent push in reading research has sought to examine them for the extent to which environmental factors may impact reading. The insights gained from these expanded research directions point to the need to consider educational programs and interventions that answer this question: "What works for whom under what conditions?" (Petscher et al., 2020, p. 10). Application of these frameworks involves understanding societal and cultural factors in the classroom, community, and beyond that impact both reading and overall child development. The benefits of these models are outlined here.

Risk and resilience frameworks as well as ecological models explore the influence of the environment on reading development.

#### EXPANDING UNDERSTANDING OF THE COMPLEXITY OF READING AND LANGUAGE PROCESSES

Grounded in other theoretical frameworks across numerous disciplines, risk and resilience, or multifactorial, models approach reading development across a spectrum, examining overall potential and achievement against difficulty and failure as a probabilistic rather than deterministic fate. These frameworks ultimately explore the potential of factors to either pose a risk for reading failure or serve as protection that mitigates risk of later failure (Catts & Petscher, 2022). Bodies of research that have informed the science of reading show that reading development and comprehension are multifaceted and involve skills in word reading, language comprehension, cognition, and content (i.e., background and vocabulary) knowledge (Scarborough, 2001).

Risk and resilience frameworks support an explicit, structured, multicomponent approach to teaching reading, in line with existing research showing the effectiveness of these interventions addressing reading comprehension difficulties (Lovett et al., 2017; Pallante & Kim, 2013).

#### DEEPENING AWARENESS OF THE CONNECTION BETWEEN READING AND SOCIAL-EMOTIONAL DEVELOPMENT

The internal workings of the brain are complex, interwoven with a multitude of other biological processes—from our genes to the cognitive and emotional underpinnings of our neurobiological makeup. Gotlieb and colleagues (2022) explain, "In the brain, social,

See Alexis Pochna's article, "Investigating the Intricacies of Comprehension" on p. 51 to learn more about reading comprehension.

emotional, and cognitive processing are interdependent and engage overlapping neural systems and networks" (p. 3). Executive functioning (EF) has shown to indirectly support and interact with reading and language areas in the brain (Burgess & Cutting, 2023). Furthermore, strong EF networks have shown to be a mechanism for "cognitive resilience" for children who have reading disabilities (Haft et al., 2016). Other brain and behavioral studies have shown relationships between executive functioning, anxiety, and reading disorders. In fact, neuroscience research has documented the bilateral relationships between reading problems, executive functioning, and anxiety; that is, these problems not only co-occur but can bidirectionally influence each other (Margolis & Liu, 2022). Considering these developments, children with reading disabilities would benefit from educators and other caregivers comprehensively attending to the cognitive and social-emotional needs and challenges associated with their disabilities.

The internal workings of the brain are complex, interwoven with a multitude of other biological processes—from our genes to the cognitive and emotional underpinnings of our neurobiological makeup.

Risk and resilience frameworks explore the extent to which these interrelated, internal, social-emotional and environmental factors may be involved in—or ultimately impact—reading development. For example, they may apply research in the involvement of internal social-emotional factors like growth mindset, the role of trauma, the effects of stress, or, conversely, positive social relationships (al Otaiba et al., 2022; Catts & Petscher, 2022; Petscher et al., 2022).

#### UNDERSTANDING THE IMPACTS OF COMMUNITY, SOCIAL DISPARITIES, AND VULNERABILITY

Variations of ecological models (e.g., Spencer et al., 1997; García Coll et al., 1996) have examined how both direct and indirect factors in the environment influence disparities in access and equity in education for children in vulnerable populations, including factors based on race, culture, or socioeconomic status. In understanding the relationship between school, home, community, and child development, whole child approaches have outlined factors like climate, instruction, social-emotional development, and individual supports (Darling-Hammond & Cook Harvey, 2018).

Current research has also utilized these domains to investigate their role in reading success (Petscher, 2023). Other ecological models examine why and how vulnerability and disparities exist for certain populations of students as they interact with, and are impacted by, their direct environment and indirect contextual forces (e.g., more directly with home, school, community; indirectly by policies and societal infrastructure). Research framed in ecological models more directly explores and provides implications for the relationship between reading development and public health, community violence, access to books, and societal disparities, importantly addressing factors related to equity (Terry et al., 2022).

## LOOKING AHEAD: MORE COMPREHENSIVE APPROACHES TO SCREENING, INSTRUCTION, AND INTERVENTIONS

Integrated approaches to reading development encompass growing bodies of scientific studies. Continued studies will target and examine the extent to which certain factors may be causal and which factors could be either individualized across certain subsets or generalizable across populations (Petscher et al., 2020; Scorrano, 2023). Nevertheless, it is clear that integrated models are critical for educators and parents/caregivers to learn about as they build a more comprehensive awareness and understanding of risk and protective factors to support their children. Ultimately, such "comprehensive instruction is necessary to address inequities in general and special education, and to help children become fully literate—a designation that goes beyond simply decoding and comprehending text" (Gotlieb et al., 2022, p. 2). This current area of research exploration and application to reading helps us implement more targeted support for individual students and promote equity for all children.

## READ

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PSYCHOLOGICAL COMPONENTS OF READING DISABILITIES: Novel interventions to Address Anxiety and Executive Functioning Featured speaker Amy E. Margolis, PhD

2023 FALL COMMUNITY LECTURE



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Exploring Whole Child Approaches to the Identification and Support of Children with Dyslexia Hosted by Danielle Gomez Produced by The Windward Institute

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Jeanne Wanzek, Stephanie Al Otaiba, and Kristen L. McMaster

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Understanding the Persistent Problems of Policy and Practice

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# A HISTORY OF Literacy Education

Waves of Research and Practice



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