



Unpacking the Science of Reading Defining Guide

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“More than ever, educators are expected to make decisions that guarantee quality instruction. As knowledge emerges, so do philosophies, opinions, and rhetoric about definitions of instructional excellence. From policy makers to classroom teachers, educators need ways to separate misinformation from genuine knowledge and to distinguish scientific research from poorly supported claims.”



<https://www.adlit.org/topics/policy-legislation-initiatives/what-scientificallly-based-research-guide-teachers>

TEACHING DECISIONS

You have to make thousands of teaching decisions each day.

What guides you?

- Beliefs
- What worked in the past
- What you observe others doing
- What you are told to do; What someone you trust tells you to do
- What you like or prefer
- Research





The Science of Reading

A Defining Movement

SCIENCE OF READING DEFINING GUIDE

(The Reading League [TRL], 2022)

Preamble

Humankind's most precious treasure is our children, and our future depends on them. We recognize literacy as a fundamental human right that empowers individuals in a society. We also know that grim life outcomes are connected to illiteracy. We are resolved to prevent the collateral damage that is incurred by our students, especially the most vulnerable among them, when adults have limited access to the convergent scientific evidence.

Research has identified assessment and instructional practices with which every teacher and leader should be equipped. We believe that providing educators with this knowledge is a moral imperative. We are committed to evidence-aligned reading instruction being scaled with a sense of urgency in a comprehensive and systematic way by multiple stakeholders.



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The Definition

The science of reading is a vast, interdisciplinary body of *scientifically-based** research about reading and issues related to reading and writing.

This research has been conducted over the last five decades across the world, and it is derived from thousands of studies conducted in multiple languages. The science of reading has culminated in a preponderance of evidence to inform how proficient reading and writing develop; why some have difficulty; and how we can most effectively assess and teach and, therefore, improve student outcomes through prevention of and intervention for reading difficulties.

* See the chart on page 11 for a better understanding of what is meant by scientifically-based research

(TRL, 2022)

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What the Science of Reading is **NOT**

- ⊘ an ideology or philosophy
- ⊘ a fad, trend, new idea, or pendulum swing
- ⊘ a political agenda
- ⊘ a one-size-fits-all approach
- ⊘ a program of instruction
- ⊘ a single, specific component of instruction, such as phonics

(TRL, 2022)

Rationale for Promoting a Common Definition of the Science of Reading

Although the scientific evidence base for effective reading has existed for decades, the term “the science of reading” has gained traction in the last few years, potentially leading to misunderstandings. As a result, we believe that a common definition is useful for the field.

(TRL, 2022)

A Common Definition Will:

- ⊘ Support educators and parents as they discern what is and what is not in alignment with the science of reading.
- ⊘ Assist people in becoming informed and wiser consumers of instructional materials, professional development, and resources.
- ⊘ Impact publishers' and policy makers' decisions as they develop materials and policy guidelines.
- ⊘ Guide people in the true educational transformation needed for sustainable change to effective practice.
- ⊘ Unify the effort of all stakeholders on behalf of students to ensure the advancement of educational equity.



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* Scientifically-based research includes the components described in the table below.

REQUIRED COMPONENTS	DEFINITIONS	WHY IMPORTANT
Study design that is experimental or quasi-experimental. These designs specifically answer questions about why individuals have difficulty learning to read and write, as well as which practices are effective.	Experimental design features one or more experimental groups and at least one comparison group. Participants are randomly assigned to groups. Quasi-experimental design does not utilize random assignment. Participants are sometimes compared to groups with similar profiles.	Experimental and quasi-experimental designs allow researchers to determine if a particular variable being studied is the reason for improved outcomes. Random assignment, recognized as the gold standard, provides a clearer link between cause and effect because it helps control the effects of variables other than the experimental treatment. This allows for greater confidence that the treatment is what led to improved outcomes.
Detailed description of study methods and population for replication, generalizability, or refinement of findings.	To have confidence in findings, a convergence of evidence is needed. Detailed descriptions regarding design, participants, settings, instructional practices, measurements, and outcomes must be provided to replicate the study (i.e., conduct another study in a similar manner). Generalizability is the extent to which the findings of a study would be expected in real-world contexts.	It is important to show that scientific findings are unbiased and to determine for whom and under what conditions positive outcomes are produced. Replication is what leads to a large body of studies with similar results so that we can: a. Conclude findings are consistent (e.g., “on the right road”) b. Conclude findings are not consistent (e.g., more research needed) c. Discover new questions to be studied Clear descriptions of the context in which the study was conducted, the resources involved, and the participants allow readers to evaluate whether similar findings might be expected in their situations.
Publication in a peer-reviewed (refereed) journal.	Peer-reviewed journals provide a rigorous review by multiple independent scientists with relevant expertise.	Peer review is a “quality check” prior to publication to ensure the study and its outcomes were designed, executed, and described properly. It provides integrity to the body of studies that make up the science of reading.

(TRL, 2022)

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TYPES OF PUBLICATIONS

- Blog
- Opinion piece, descriptive summary
- Secondary literature
 - Books
 - Research review or literature review
 - Meta analysis
- Primary literature
 - Research article

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“The best solution to the problem of reading failure is to allocate resources for early intervention and prevention.” (Torgesen, 1998)

CATCH THEM BEFORE THEY FALL

Identification and Assessment to Prevent Reading Failure in Young Children

Torgesen, J. K. (1998). Catch them before they fall: Identification and assessment to prevent reading failure in young children. *American Educator*, 22(1&2) 32-39.

By James K. Torgesen
 One of the most important findings from the early 1990s was that the best way to prevent reading failure is to identify children at risk for reading failure as early as possible and provide them with intensive, explicit, and systematic instruction. This paper discusses the importance of identifying and assessing young children at risk for reading failure and provides recommendations for early intervention and prevention. The paper also discusses the importance of providing parents and teachers with information about reading failure and the best ways to prevent it.



Typically, instruction for children who are at risk of reading failure must be more explicit, more comprehensive, more supportive, and more intensive than reading instruction required by average readers (Foorman & Torgesen, 2001; Snow, Burns, & Griffin, 1998).

Foorman, B. R., & Torgesen, J. (2001). Critical elements of classroom and small-group instruction promote reading success in all children. *Learning Disabilities Research & Practice*, 16(4), 203-212.



Learning Disabilities Research & Practice, 22(2), 90-102
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A Root Awakening: Vocabulary Instruction for Older Students with Reading Difficulties

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There is reliable evidence that new vocabulary is primarily acquired through wide independent reading. However, struggling readers tend to avoid reading, resulting in limited word knowledge and inadequate vocabulary growth. This article offers new techniques for teaching new words from context. While there are no clear solutions to the problem of vocabulary expansion for older students with reading difficulties, there are important steps teachers can take to support vocabulary growth. These steps include: (1) creating a verbal learning environment that fosters word consciousness, (2) selecting and teaching specific words, and (3) teaching an independent word learning strategy through a combination of contextual and morphemic analysis. These instructional approaches are grounded in ongoing research recognized by researchers as being characteristic of effective instruction for students with reading difficulties, including explicit instruction, providing explicit and collaborative engagement, and providing many opportunities for practice, including distributed practice, with teacher feedback. Finally, we discuss the possibilities inherent in a student-centered, schoolwide approach to vocabulary instruction at the secondary level. We conclude with a call for additional research examining the effectiveness of instructional approaches to vocabulary development for secondary school students with reading difficulties, including a schoolwide collaborative model.

For many students in the upper grades, reading does not come easily. Upon reviewing the available research for disadvantaged learners, Beckler (1977) found insufficient vocabulary to be strongly associated with academic failure for students in grades 3 through 12. Three decades later, the English language, with its complex mix of Latin, Greek, French, and German, continues to confound diverse learners. According to Carver, Kame'enui, and Carter (2007), "The learning characteristics that have the strongest causal connection to academic failure are rooted in the area of language" (p. 18). While language includes many constructs, we will focus on vocabulary development for adolescents with reading difficulties.

In their review of research-supported vocabulary instruction for students with learning disabilities (L.D.), Hanzelt et al. (2005) have noted that "the development of proficient reading skills is documented as the most effective independent word learning strategy" (p. 29). In other words, teaching students to read at more proficient levels (i.e., to identify words, read fluently, and comprehend what they are reading) is an important way to support their vocabulary

development. There is reliable evidence that typically developing readers acquire vocabulary primarily through wide independent reading (Nagy & Anderson, 1984; Nagy, Hiebert, & Anderson, 1987). However, if generally skilled readers encounter with a new word to learn it (Nagy & Scott, 2000; Scott & Farrington, 1998), and adolescents with reading difficulties may need considerably more repetitions (McKinnon, Beck, Comstock, & Nye, 1995). Unfortunately, struggling readers tend to avoid reading, resulting in limited word recognition and inadequate vocabulary growth (Hanzelt, Simmons & Kame'enui, 1998; Stanovich, 1986). In addition, students with reading difficulties tend to discontinue their experience difficulty inferring the meanings of new words from context (Gooden, Bryant, & Higgins, 2001; Carver, 1994; McKinnon, 1985; Pany, Jenkins, & Schrock, 1982). This limitation results in what has been termed the "Matthew Effect" wherein the word-rich get richer, and the poor remain at a linguistic disadvantage (Stanovich, 1986). While this pernicious cycle is of great concern to parents, policy makers, educators, and researchers alike, a simple or realistic solution to the vocabulary gap has not yet been found. It is doubtful that one exists, rather, the best solution will likely require a consistent and persistent long-term investment in vocabulary development through a variety of approaches.



COMPONENTS OF A RESEARCH JOURNAL ARTICLE

- Abstract
 - Literature Review
 - Research Questions
 - Methods
 - Subjects
 - Setting
 - Procedures
 - Design
 - Results
 - Limitations
 - Discussion
- Journal with editorial board
 - Submission guidelines
 - Peer-review process



QUALITY INDICATORS

- Replicability – detailed description of procedures so someone else can reproduce the study and see if they get the same results
- Generalizability – students and setting in the study need to be enough like yours/most
- Treatment integrity – measurement of implementing the treatment
- Reliable and valid assessments and measurements
- Experimental and control groups
- Random assignment



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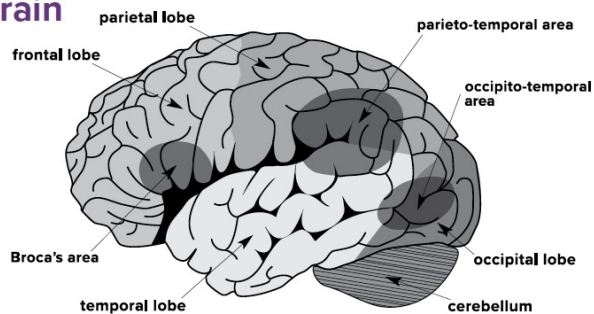
WHERE TO FIND RESEARCH

- Professional Journals
- Ask the first author to send you a PDF
- Books, IES Practice Guides, Reports from National Centers (Iowa, FCRR, REL)
- Online Resources
 - Podcasts – *Clean Research to Practice, Education Research Reading Room*
- International Dyslexia Association Membership
- University Databases
- Phone a Friend (SLP, School Psych, friendly neighborhood professor)



Reading Processes: What the Science of Reading Reveals About How Reading is Processed in the Brain

In recent years, our knowledge of how the brain acquires the skill of reading has evolved. We now have a deeper understanding of how the brain processes multiple sources of information while reading. Brain researchers have identified areas and networks of the brain involved in processing print, speech sounds, language, and meaning.



© CORE, Teaching Reading Sourcebook, 3rd Ed., 2018, Arena Press, page 4.

Since neural connections required for reading do not exist between these areas in the pre-literate brain, efficient pathways are built with explicit instruction and deliberate practice. This instruction has a significant

SIMPLE VIEW OF READING

The Simple View of Reading has been empirically validated by over 150 scientific studies. It shows us that reading comprehension is not the sum, but the product of two components - word recognition and language comprehension - such that if either one is weak, reading comprehension is diminished. No amount of skill in one component can compensate

for a lack of skill in the other. While it is a simple view of a developmental process, skilled reading development is NOT simplistic. For a more in-depth understanding of the subcomponents within word recognition (WR) and language comprehension (LC), we turn next to Scarborough's Reading Rope.



(TRL, 2022)

Instructional Practices Aligned With the Science of Reading: **Word Recognition**

The following is a *sampling* of instructional practices for word recognition. It is not an exhaustive list. See the Defining Guide eBook at thereadingleague.org/what-is-the-science-of-reading for more.

Examples of instructional practices aligned with findings from the scientific evidence base:

- Phonemic awareness and letter instruction: Instruction in the identification of phonemes in spoken words and how they link to letters.
- Explicit and systematic instruction in how to decode (read) and encode (spell) words, including word part analysis (e.g., syllables, morphemes).
- Connected text reading to build reading accuracy automaticity, fluency, and comprehension.

(TRL, 2022)

Examples of instructional practices **NOT** supported by scientific evidence:

- Emphasis on larger units of speech (syllables, rhyme, onset-rime) rather than individual phonemes.
- Implicit and incidental instruction in word reading, visual memorization of whole words, guessing from context, and picture cues.
- Emphasis on speed or words per minute over accuracy when reading texts (practiced with reading of patterned texts or sustained silent reading for all students).

Instructional Practices Aligned With the Science of Reading: **Language Comprehension**

The following is a *sampling* of instructional practices for language comprehension. It is not an exhaustive list. See the Defining Guide eBook at thereadingleague.org/what-is-the-science-of-reading for more.

Examples of instructional practices aligned with findings from the scientific evidence base:

- Read-alouds from a variety of complex texts to build knowledge and vocabulary.
- Robust conversations to develop students' academic language (e.g., narrative and inferential language).
- Explicit instruction in grammatical structures and academic vocabulary within the context of other reading activities.

(TRL, 2022)

Examples of instructional practices **NOT** supported by scientific evidence:

- Read-alouds from leveled texts that students will be reading so that text is not sufficiently complex.
- A lack of explicit instruction of morphology, memorization of isolated words and definitions out of context, and a lack of strategic and intentional instruction.
- Implicit instruction of grammatical structures.

The Science of Reading Includes Learners with Linguistic Differences

Educators supporting students with linguistic differences such as multilingual learners (MLLs), English learners (ELs), and speakers of English language variations can rely on the science of reading and the conceptual frameworks highlighted in this guide. These students benefit from the practices derived from the science of reading. All proficient readers must master the same concepts in order to learn to read. However, it is important to provide students with linguistic differences a focused attention on oral language development.

“Both English literacy and English oral language proficiency must be priorities if these students are to have adequate and equitable opportunities for success in school and beyond.”

(TRL, 2022) (Goldenberg, 2020: bit.ly/Goldenberg2020RdgWarsRdgScienceEngLearners)

“The linguistic differences that children bring with them to school should be viewed positively in classrooms and used as strengths to leverage performance in literacy.”

B Gattlin-Nash, L Johnson, R Lee-James. International Dyslexia Association: *Perspectives on Language and Literacy*, 28-35, 2020.

MTSS: A Framework to Improve Reading Outcomes Through Prevention and Intervention

Multi-Tiered Systems of Support (MTSS) is a school-wide framework for implementing effective instruction. MTSS involves efficiently targeting instruction to student needs based on universal screening and diagnostic assessments.

School and district teams use assessments in a data-based, decision-making process to build a system of increasingly intensive instructional supports that are customized to fit the needs of the students. Simultaneously, schools must also assess their human and instructional resources to ensure that those needs are met.

MTSS does not involve prescriptive practices to be rigidly implemented by tiers or levels of assignment. Nor is it adding to current, ineffective practices for the sake of innovation. It is a comprehensive system whereby ineffective practices are strategically abandoned and proven practices are prioritized.

(TRL, 2022)

- **Disagree respectfully.** Debate is a sign of a healthy scientific community. Science advances through questions and challenging previous conclusions. Acknowledge differences and discuss them with respect and decency.
- **Recognize the fallibility of anecdotes and personal experiences.** Our experiences were the product of the unique contexts in which they occurred. Personal experience and anecdotal observations should not outweigh findings of high-quality research.
- **Fairly evaluate all evidence.** Apply healthy critique to all studies, regardless of whether the conclusions are inconsistent with your beliefs.
- **Identify best practices from multiple studies.** Identifying “what works” comes from a body of high-quality studies.
- **Dig deeper and seek clarification.** Look closely at the sources that researchers, presenters, or program vendors cite as support. When needed, ask them for clarification.

(TRL, 2022)

- **Have courage to reconsider.** Be willing to change beliefs or practices in light of new evidence.
- **Self-critique.** Reflect on the ways you use and interpret evidence. Acknowledge when your understanding is incomplete, and invite feedback from others on your interpretation of research.
- **Examine and disclose conflicts of interest.** A researcher, presenter, or program developer should disclose when they profit from the use of a program or materials. A potential conflict of interest demands greater scrutiny of their claims.
- **Base decisions on quality of evidence, not popularity.** The popularity of an author or presenter should not be an indicator of the validity of their recommendations, nor should the popularity of a program be a reason to use it.

By Nathan Clemens (See Clemens, N.H., Powell, S.R., & Vaughn, S. (2021). A special educator’s guide to evidence.)

SUMMARY AND NEXT STEPS

- Commit to learning more about the science of reading
- Download the Defining Guide, read it, use it and share it
- Commit to an action this week
 1. Reflect on your instruction
 2. Evaluate your instructional materials
 3. Talk to your coworker
 4. Write to your college or university
 5. Call your elected official

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“Teachers can benefit by understanding two things about research and causal inferences. The first is the simple (but sometimes obscured) fact that statements about best instructional practices are statements that contain causal claims. These statements claim that one type of method or practice causes superior educational outcomes. Second, teachers must understand how the logic of the experimental method provides the critical support for making causal inferences.”

Stanovich, P. J. & Stanovich, K. E. (2003). *Using research and reason in education: How teachers can use scientifically based research to make curricular & instructional decisions.* National Institute of Child Health and Human Development; Department of Education; and Department of Health and Human Services.

(TRL, 2022)

In Conclusion: An Equity Statement

We believe that literacy success for all is the **defining human right** of the 21st century, regardless of zip code, ethnic origin, dialect, or language. We urge you to join us by insisting that all children are afforded instruction that prepares them to read and write at proficient and advanced levels. Children who are skilled readers and writers will be **empowered by their literacy** and will refuse to be defined by the low expectations of others.

We extend our deepest gratitude to the dedicated advocates of this Defining Movement. Together, we can elevate the stories of lives that have been dynamically altered through our **united commitment to improving literacy narratives using evidence-based practices**. Our children are worth the labor of pressing through the unknown, holding challenging conversations with high expectations, and even falling forward while building expertise.

(TRL, 2022)

RESOURCES

Science of Reading Defining Guide

<https://www.thereadingleague.org/what-is-the-science-of-reading/>

Tracy Wheedon Reading the Preamble to the Defining Guide

<https://www.youtube.com/watch?v=70sAypUFHGw>

How The Brain Learns to Read

<http://bit.ly/HowtheBrainLearnsToRead>

Stephanie Stollar Consulting Blog on Maintaining a Scientific Community

<https://www.readingscienceacademy.com/blog>



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