Teach.
Learn.
Grow.
the education blog

Everything you need to know about the science of reading

nwea

Table of contents

4
The science of reading explained

7
What the science of reading tells us about how to teach decoding—including phonics

12
How the science of reading can help you teach language comprehension skills

18
Supporting fluency and comprehension using practices grounded in the science of reading

23
Decisions, data, and *doing* the science of reading

The science of reading is the converging evidence of what matters and what works in literacy instruction, organized around models that describe how and why. It's been accumulating for a long time, providing solid guidance on how we can better help kids learn to read with understanding. It's here to help us better reach kids who are learning to read.

If you're an elementary educator and have been wondering how the science of reading can inform your practice, this *Best of* *Teach. Learn. Grow*. eBook is for you. Learn about how it ties into decoding, phonics, language comprehension, and fluency, plus how assessment data can guide your efforts.

The science of reading explained

For years now, the early literacy education community has been talking about the need to reform our practice to align to the science of reading. But what is the science of reading? And how can it improve our practice so kids become better readers?

What is the science of reading?

The science of reading is the converging evidence of what matters and what works in literacy instruction, organized around models that describe how and why.

One research study does not make a science. In early literacy alone, tens of thousands of studies have been published, and some even show results that are at odds with one another. For educators to be able to consume research meaningfully, we need to look for a convergence of evidence. When many well-designed studies point to a similar result, we should pay attention.

How does it help us make sense of reading?

An important model in early reading research is the **simple view of reading**. It says that reading comprehension (RC) is the product of decoding (D) and language comprehension (LC), or RC = D x LC.

RC = D x LC

Learning to read for understanding requires sounding out and recognizing words—decoding—but it also requires making meaning of the words and sentences we hear—language comprehension. While taking a microscope to any one aspect of reading reveals more complexity, the **simple view continues to be supported** as a strong core model in reading development, as it has been for decades.

What guidance does the science of reading offer?

Research is clear about what matters to teach in early literacy instruction: phonological awareness, phonics and word recognition, fluency, vocabulary and oral language comprehension, and text comprehension. For each of these, a convergence of evidence tells us what works, in practice.

- **Phonological awareness:** Teach students to recognize and manipulate the sounds within words. Move from syllables to the individual sounds, or phonemes. Explicitly connect phonemes to letters to more effectively support word decoding.

- **Phonics and word recognition:** Teach letter sounds and sound-spelling patterns explicitly and systematically. Practices that include both reading and writing of words in isolation and in text are most supportive of taught phonics.
- **Fluency:** Include frequent chances for students to read and re-read orally from connected text—sentences, paragraphs, and passages. Focus on the development of both automatic word recognition and fluent expression, keeping understanding of the text as the central goal.
- **Vocabulary and oral language comprehension:** Include high-quality, language-rich interactions in instruction. With read-aloud texts, unpack academic and inferential language. Explicitly build students' recognition of shared morphemes (e.g., root words, affixes) across words, both in oral and written language.
- **Text comprehension:** Even before young students can read on their own, teach from rich texts via read-alouds and scaffolded reading. Teach students to use metacognitive strategies like setting a purpose, monitoring for meaning, and building inferences while reading. Discuss texts, including focusing on their organizational structures.

What could a science-of-reading classroom be like?

To align more closely to what the science tells us, we should start seeing and hearing some change. We should stop seeing only *incidental* teaching of sound-spelling patterns. Instead of just happening to notice a silent E on the page we have open—Aha! Teachable moment!—we should teach decoding skills *systematically*.

We should see a dedicated portion of the literacy block where phonics is taught clearly and sequentially from an identifiable curriculum. When kids learn from our planned sequence how that silent E works, we should see engaging practice—word work, often masquerading as play—followed by both reading and writing practice that applies those silent E skills purposefully.

"The science of reading is the converging evidence of what matters and what works in literacy instruction."

We should also **stop seeing comprehension taught via leveled reading groups**, where each group visits the teacher for round-robin reading through a new text "at the right level." Instead, we should see use of a rich, complex text for all the students in a class. We should hear multiple reads of the same text, beginning with teacher modeling and moving to student practice. We should see partnering for repeated readings to develop fluency. We should hear the voices of students and the teacher in high-quality conversations about the text that focus on language, structure, and deepened understanding.

Where can we learn more?

Lots of good materials have been produced to get this research into practice, much of it paid for by our tax dollars.

- The renowned **Florida Center for Reading Research** has printable research-to-practice **student center activities** for pre-kindergarten to fifth grade. Many could be used at home, too.
- The **Institute of Education Sciences** has developed a website for families called **Supporting Your Child's Reading at Home**. It is packed with information, activities, and video examples for supporting children in kindergarten through third grade. Their **What Works Clearinghouse** has two teacher guides for early literacy: one focuses on **foundational skills** and the other on **reading comprehension**.

These excellent research-to-practice materials can only help if we actually use them. Commit to building a learning community around one or more of these materials, beginning by downloading and reading as a group. Then discuss, try things with students, reflect, and repeat. This is how the science of reading matters, and how it works: by helping all our kids to become empowered and thoughtful readers.

For more on the science of reading, see "**The science of reading and balanced literacy: What you need to know.**"

What the science of reading tells us about how to teach decoding—including phonics

Yeah, yeah, we hear you, **science of reading** fans. You want to talk about phonics!

First off, let's be clear that the science of reading is bigger than phonics. The science of reading is the converging evidence of what matters and what works in literacy instruction, organized around models that describe the how and why. Phonics is smaller in scope. It refers to how letter patterns represent sounds—and how we teach those patterns. Phonics is for supporting word decoding.

Phonics grabs a huge share of conversations about elementary literacy for good reason: critical to understanding the science of reading is understanding how good instruction in word decoding supports good reading outcomes in English.

What's a "good reading outcome"? Ultimately, our goal is kids showing strong comprehension of challenging texts. Research addresses both what kinds of skills matter for that outcome and what kinds of teaching works well for getting there. We're not talking about one study, here; we're talking about decades of accumulated and evolving insight from well-designed research.

A lot goes into teaching kids to read with comprehension. In this section, I'll focus on one piece: word decoding (and, yes, that means we get to talk about phonics).

Decoding matters. Big time.

When researchers investigate what matters in literacy instruction, they look at how a component skill affects growth in the bigger domain of reading with comprehension. **Particularly for elementary readers**, improving word decoding gives kids a big boost in comprehension, in both the near and long term. That makes sense: if a student can't read the words at all, then they sure can't read them with understanding.

> **"Kids need to navigate a language where 'dot,' 'taut,' and 'thought' all rhyme."**

Great word decoding is necessary for reading with understanding, but it is not sufficient. Remember the **Simple View of Reading**? Once a student has strong word decoding skills, growth in reading comprehension becomes more dependent on language, including vocabulary and knowledge.

Early identification and intervention are critical

Because decoding matters big time, it is imperative that we support decoding for those who struggle through **targeted early intervention**. Intervention really works best if it is, well, targeted and early. That means we want to find the *right* kids, the ones likeliest to really need the intervention, and we want to do it before they are actually falling behind in reading.

Here's where the science of reading gets almost magical (except that **it's real**). Research tells us that by assessing particular early skills—**even before kids can read words**—we can zero in on those students likely to struggle with decoding if we don't intervene. **Screening for signs of dyslexia** and other decoding difficulties homes in on those early, pre-reading skills that matter.

With this kind of screening, the two biggies are phonemic awareness and alphabet knowledge. Phonemic awareness is about noticing sounds within words; alphabet knowledge includes knowing what sounds letters stand for. These two foundational components come together as kids sound out words.

What works to launch decoding?

The science of reading clearly points to how teachers can best support the earliest stages of decoding. First, we know it works to systematically and explicitly teach kids to hear and work with the phonemes, or individual sounds, within words. We want them to hear the first phoneme in a short word like "dog." Then we need to systematically move focus toward those final and middle sounds, too. Finally, we move on to working with words that have more sounds, like "blast."

While many think of this instruction as being focused only on sound, **research tells us** that pairing sounds with visual letters in instruction is more effective. It helps kids to hear three phonemes in "cat" when they can connect those phonemes to letters. That's phonics supporting phonemic awareness. Conversely, it helps kids understand how decoding works when we connect word families—"cat," "bat," "hat"—to the substituting of one first phoneme for another, orally. That's phonemic awareness supporting phonics. Phonemic awareness and letter-sound understanding share the best kind of friendship, where just by being together they help each other grow.

"[T]he science of reading is bigger than phonics. [It] is the converging evidence of what matters and what works in literacy instruction, organized around models that describe the how and why."

Teaching of both phonemic awareness and phonics should be explicit: clearly demonstrate, then provide student practice and feedback, and then gradually support more independence in your students. Practice that looks like play keeps engagement high, which is critical to successful learning.

Sample exercises: Pair sounds to letters

How might a few minutes in a primary-grade classroom following the science of reading in decoding look? Here are a few examples:

- Two students can work together at a small whiteboard, with a bag of pictures or figures they can name using easy words: "cat," "man," "dog." After one pulls out a picture or figure, they segment the sounds in the word aloud and draw a line for each phoneme. Next, they represent the spelling of each sound on each line, using either a set of magnetic alphabet tiles or a marker.
- In large groups, you can pull one common picture for all pairs to work on. This allows for formative assessment on the fly by letting you ask pairs to hold up their work before moving on to the next word.
- To extend the large-group activity, you can ask students to choose one letter in the word to replace with another. Kids then sound out their new "word." Is it a real word, or just silly nonsense? Giggles are encouraged.

What works to further develop decoding?

After you've launched decoding and kids know and can use letter-sound correspondences in simple words, it's time to really engage with the reality of English: a lot of our words are not that simple. Kids need to navigate a language where "dot," "taut," and "thought" all rhyme. This is where more advanced phonics and word study clearly support the improvement of students' word reading. With practices like word study, phonics instruction goes well beyond the primary grades, moving to patterns and strategies for multisyllable word decoding.

Advanced phonics

Research has been clear since the National Reading Panel's report two decades ago: teaching phonics systematically works for improving reading comprehension long term.

> **"[C]ritical to understanding the science of reading is understanding how good instruction in word decoding supports good reading outcomes in English."**

"Systematic" means use of a planful sequence across and within skills. Yep, you need a phonics curriculum, because your phonics instruction should not be just incidental or willy-nilly. When we teach systematically, we introduce the middle sound in "taut" after students know the /o/ sound in "dot." While working on that AU spelling, we should provide practice reading and building AU words, practice with text reading that includes AU words, and practice in writing AU words.

Teaching whole-word memorization is not as effective. Instead, students should be shown how the sounds within words map back to the letters that make those sounds, and vice versa. When it is well developed, this ability to map back and forth between sounds and letters (aka orthographic mapping) turns out to be important for moving words into long-term memory.

While we ultimately aim for students to recognize words instantly, we can do more than just provide repeated exposure to those words. An instructional focus on the sounds and the spelling patterns within words is the fertilizer that helps a word grow automatic.

Word study

Words get harder as kids read richer text. Luckily, the science of reading continues to offer insight on what works as we support decoding multisyllable words.

Broadly, word study approaches are effective in improving decoding as readers move beyond simple words like "hat" to the more impenetrable, like "impenetrable." This means teaching kids to examine new words through a syllable lens or a morpheme lens, or through a combination of both.

Syllable analysis involves identifying and dividing syllables within a word, using the understanding that each syllable has one vowel sound. Morpheme analysis involves finding prefixes, suffixes, root words, and inflectional endings; these are a word's morphemes, or meaningful units.

Sample exercise: Word study with multisyllable words

How can the science of reading on decoding help an intermediate-grade classroom?

- Review several previously taught common prefixes (like dis-, in-, pre-, re-) and suffixes (like -ment, -tion, -ness, -able).
- To warm up, provide pairs of students with a list of multisyllable words in which to hunt for these prefixes and suffixes, word-search style, within a word list or passage.
- After students mark each prefix and suffix, have them practice reading the words aloud.
- Distribute some base words to each pair, asking students to create their own "big words" by adding a prefix and a suffix to each word. Share out and evaluate the results, considering the meaning of those morphemes. Have they constructed a real word or mumbo jumbo? Creativity and chuckles are both encouraged.
- To extend, include both morpheme and syllable analysis. After peeling off the prefix and suffix in a word in challenging text, analyze the syllables in the remaining base word. How many vowel sounds are there and, therefore, how many syllables? How is each syllable pronounced?

What's next?

Coming up, I'll show you what the science of reading tells us about language comprehension. But in the meantime, you can dig in further on support for word decoding in a couple of ways.

I linked to several research articles foundational to this post in the text earlier, for you to pop open and consider.

If some of those are too theoretical, too statistical, or otherwise too snooze-inducing for you, focus on the highly useful foundational skills **research-to-practice guide** offered through **What Works Clearinghouse**. It connects strong research evidence to strong practices in phonemic awareness and a broad scope of phonics. This and other practice guides were produced through a longstanding effort by the U.S. Department of Education to support—you guessed it—the science of reading.

Whatever further reading you decide to do, why not use what you learn to build your own local Team Science of Reading? (Did I mention that science is cool?) Together with colleagues, discuss what you read, try ideas out, and then come back together to share and reflect.

How the science of reading can help you teach language comprehension skills

Last year, I read a parent's post in a social media discussion about reading. They were seeking information on which schools in my town are teaching phonics only. This parent wanted nothing to do with all that "other stuff," just phonics. Why? "Because that's what the science of reading says works," they argued.

That's a problem. I'm all for the science of reading, but I'm not for the version that neglects some parts of it.

We can't pick and choose and expect great reading results

Improving **phonics and decoding instruction** is a hugely important effort. But decoding isn't the only thing that matters, and it isn't the only area where research evidence can inform what works. A critical second piece of the puzzle is the topic of language comprehension. Language comprehension is fundamental for literacy instruction, including for many emergent bilingual students.

Broadly, the science of reading is the converging evidence about what matters and what works in helping kids to read complex texts, including with good comprehension. One way to organize what matters for reading comprehension is through a model called the **Simple View of Reading**. It frames reading comprehension as the product of decoding and language comprehension: you can't get to reading comprehension without fully developing each.

"Even before kids can decode [...] we need to be building their language comprehension. This [...] is work that starts in infancy and keeps deepening throughout our lives."

Decoding means kids can convert printed squiggles into the words we use in speech. But language comprehension means that kids can understand the meaning that those words convey. A child can show language comprehension without decoding, like when you read a book aloud to them. Eventually, we want kids doing both at once, so they can engage with meaning while processing those symbols themselves.

Even before kids can decode, though, we need to be building their language comprehension. This isn't work that comes after decoding; it is work that starts in infancy and keeps deepening throughout our lives. Let's take a closer look at what the science tells us about what matters and what works in developing language comprehension.

What matters in language comprehension?

Several components working together within language comprehension matter when building strong readers, and I'll talk about three here: vocabulary, understanding of sentences and syntax, and knowledge.

A child's oral language vocabulary includes the words they can use and understand in speaking and listening. They may not be able to decode or recognize them in writing yet, but they have some understanding of their meaning. **Vocabulary knowledge** is proven to support reading comprehension. In fact, broad vocabularies even help with word decoding, by giving kids a way to confirm that what they sounded out is actually a word.

Knowing the meanings of words matters, but **words live in sentences**. That's where syntax comes in. **P. D. Q. Bach** gives us a great example in a satirical Christmas carol. What starts off as a patient request—**"Throw the yule log on, Uncle John"**—becomes an exasperated call to arms: "Throw the yule log on Uncle John!" Differences in meaning are not always about the words. Handling the subtleties and complexities of syntax is important for understanding, and this starts even before kids are reading sentences for themselves.

Note that for emergent bilinguals, both vocabulary and sentence-level comprehension are developing in more than one language at once. That leads to an incredible advantage, and it leads there in ways that can differ from what is typical of monolingual development. No "science of reading" that only focuses on monolingual English development is going to suffice.

There's one more piece that I mentioned mattering in language comprehension: knowledge. We gain knowledge from text, but we are also applying our own **funds of knowledge** to text. Knowledge helps us form an overall model of what a text is talking about, and it helps us to make inferences. This happens across sentences, not just within them.

"Several components working together within language comprehension matter [...]: vocabulary, understanding of sentences and syntax, and knowledge."

Words matter, sentences matter, and the interaction of paragraphs with what the reader brings matters in strong reading comprehension. This is why research—focusing on both monolinguals and emergent bilinguals, of course—has delved into what works in helping grow students' vocabularies, sentence-level understanding, and knowledge.

What works with our younger students?

Even before kids can read words, they are developing their future reading comprehension by developing their language comprehension. And this doesn't just have to be in English. For an emergent bilingual, this is happening across languages as the child builds their full linguistic repertoire. Development in both languages helps bilinguals' eventual reading comprehension, even when we zoom in on reading comprehension in English.

Let's be really clear about that one: **supporting development of a home language**, too—Spanish, Somali, or whichever language it is—helps kids with English reading comprehension later.

In class, we can help language comprehension development in two key ways: through oral language and through written language.

The science points to the importance of lots of **high-quality oral language interactions**, both between teachers and students and between students themselves. When teachers invite, extend, and scaffold kids' questions and their discussions, children's engagement with learning grows. When classrooms set expectations that kids will be quiet or answer only simple questions, language growth is dampened.

Peer-to-peer talk is important, too. **Thematic play centers**, like the veterinary clinic or the grocer, offer opportunities for kids to use new vocabulary words—"appointment," "surgery," "vegetables," "receipt"—and absorb new knowledge. (Some of your emergent bilingual kiddos will use a combination of languages, and even if you only know one, **that should be welcomed**.) Thematic units can also involve experiments, gardening, expert visitors, field trips, and—of course—books.

That brings us to a second key way that we can support language development: through sharing written language. Read-alouds from books that children can't read yet offer exposure to new words and more challenging language. Written language is more rich in vocabulary and syntax than what we tend to use in speaking, and it provides a way to stop and unpack words and pieces of knowledge that support inferencing. Even with second-graders who can read some books on their own, interactive read-alouds are important for offering language at levels beyond what they can decode or understand independently.

"In class, we can help language comprehension development in two key ways: through oral language and through written language."

Keep in mind that texts you use for growing literacy don't have to be different from texts you use to teach content. Use of content-rich literacy instruction is a promising literacy practice: use books and passages about the science or social studies kids are learning this month. Be clear in planning for two outcomes: improving content knowledge and improving language and vocabulary.

Try it out

We want kids talking and listening with one another and with you, their teacher. Here are two practices to check out, each with a clear and comprehensive guide from The Meadows Center for Preventing Educational Risk in Texas:

- **Turn and talk:** Try making regular use of the routine described in this guide when teaching new content, even outside of your literacy block. Think about different pairings. Try pairing a child with less developed language comprehension with a peer who is further along. Try encouraging students

with a shared home language to **translanguage**, so that some of the words in their exchanges are in a language you may not speak.

- **Read-aloud routine:** Follow this approach when you do your next read-aloud, to focus on building vocabulary and understanding from the text.

What works with our intermediate grade students?

When kids are a little older and have some decoding skills, developing language comprehension can include use of texts they read themselves. But that means it becomes important to account for students who have difficulty reading, too. More **intensive small-group intervention** is effective for these kids.

For many students who are struggling a bit, trouble involves an **overlap between decoding and language comprehension**. If a student struggles with language comprehension, decoding can be more difficult. Likewise, if a student struggles to decode, they read fewer words and, therefore, get less exposure to the vocabulary, syntax, and knowledge offered in written language. Interventions that are multifaceted and attuned to students' needs are most effective at supporting reading comprehension. For students with emerging English language proficiency, plenty of support for oral language comprehension should surround any work on decoding.

In whole-class instruction, should we focus on vocabulary instruction? It is difficult to improve comprehension outcomes just by teaching vocabulary; there are just so many words out there. Choosing words to teach should attend to two questions: 1) Is the word present in this text we are reading, in meaningful ways? 2) Is it an academic content word that students are likely to encounter repeatedly in other texts?

"Keep in mind that texts you use for growing literacy don't have to be different from texts you use to teach content."

Teaching key vocabulary words in a target text helps improve students' comprehension of that text, but staying at a definition level is not enough. More effective practice gets kids engaged with thinking about the word more deeply. Unpacking a word's uses, connecting it to other vocabulary, or using it in writing are examples of this more active processing. For emergent bilinguals, it can be helpful to draw attention to any cognates, that is, words with shared origin, such that spelling and meaning are close in the two languages. Stick with the words you teach for a few days, using different learning activities. Engage kids in talking to one another about the content you are teaching and listen for use of these new words.

Students may present as having a high level of proficiency in English, but there is always room for growth. Kids can be 100% proficient at navigating playground

language while still developing their skills at **more academic language**. This isn't just about vocabulary but syntax, too: when faced with the kind of complex sentence (ahem) that compounds, modifies, and then inserts a related thought, not all kids—monolingual or bilingual—are ready to fly on their own. What's the takeaway? It's important to offer scaffolding and support for vocabulary and sentence-level syntax in all whole-class instruction. Just make it regular practice. Provide the support so that *anyone who needs it* is given access to new content knowledge all the time.

Try it out

Here are a couple useful resources that can help you focus on building language comprehension with older students:

- **Teaching Academic Content and Literacy to English Learners in Elementary and Middle School:** You know what's great about practices that support emergent bilinguals? They help all kids, even those growing up learning only English. You know what else is great about this **What Works Clearinghouse** guide? It enlists all teachers, not just the reading ones. Plus, it comes with a **short video**!
- **Turn and talk:** This one (yep, same strategy as with little kids) is worth a second posting here. We have to stop letting instruction look like a teacher talking and students not talking. Instead, language development must be active, with voices and identities of students being invited and valued.

All that other stuff

Have we hit all the stuff in the science of reading? We know from the Simple View of Reading that both decoding and language comprehension matter in empowering kids to read with comprehension. Now that we've talked about both, are we done?

We are not. We haven't talked about the science of fluency yet, or how that enables kids' comprehension to show up even when they are doing the reading with challenging texts. And we haven't talked about how the scientist baton gets passed to each teacher, to check on actual effectiveness with your kiddos. That's coming up in this book, and this is what we call a teaser.

Before you get there, delve into the linked research, both in this article on language comprehension or in **my previous one on decoding**. Grab your study buddies and maybe a latte, discuss, and then start trying new ways to bring the science of reading to life.

Supporting fluency and comprehension using practices grounded in the science of reading

Who says the science of reading is only for reading teachers? Not me, that's for sure. When it comes to supporting reading fluency and comprehension, there's a lot that teachers of content like social studies and science can—and should—support as kids work with text. We're all on the hook.

In my earlier discussion of on the **science of reading**, I have recapped what converging evidence tells us about what matters and what works in particular areas of literacy instruction. How can we **support decoding, including via phonics**? How can we **support oral language comprehension**? These two big-bucket factors drive an important model: the **Simple View of Reading**. It says that reading comprehension can be understood, simply speaking, as the product of decoding and language comprehension skills.

But we have not yet focused in on a critical piece of how decoding and language comprehension join together in reading for meaning: the development of reading fluency. Now I'll dig in on fluency and how it supports reading comprehension.

What is reading fluency?

When a student shows strong fluency in a text, we hear smooth and accurate reading that has both a pace and a level of expression that sound a lot like natural speech. Fluency centers on two important factors—**automaticity and prosody**—and both matter for reading comprehension.

The first half of reading fluency: Automaticity

Many of us think of words correct per minute (WCPM) as a gauge of oral reading fluency. More precisely, that metric captures automaticity in word recognition.

When students read words automatically, that means they recognize the words both accurately and instantaneously. When some of the words are not yet automatic, those words need to be decoded effortfully. That slows kids down. A **host of research** shows that lower WCPM corresponds to weaker comprehension. That's because effortful word decoding pulls mental attention, making it hard to attend to meaning at the same time. Recognizing words automatically—reading with automaticity—**frees up brain space**.

The goal is not reading faster and faster; the goal is moving more words into the automatically recognized category, to enable a focus on comprehension.

How do we help? There are two main components to supporting word recognition. First, we need to help kids sound out unknown words with effective skills; that's phonics, the topic of a previous article. Next, we need to help them map those words that they have sounded out into memory, moving those words into the automatically recognized category. That process is called orthographic mapping.

"When it comes to supporting reading fluency and comprehension, there's a lot that teachers of content like social studies and science can—and should—support as kids work with text."

How can all teachers build students' automaticity?

Making words "decodable" means good phonics instruction. But next, we need to give kids a chance to move words from "decodable" into "automatically recognized."

Research evidence tells us that both reading a correct word aloud and accumulating multiple exposures to a word are likely to help move words into memory. As teachers, we can model the correct decoding of words that students struggle with, then ask them to read the word aloud for themselves. We can do this across whole sentences and whole paragraphs: I read, then you read. That's sometimes called guided repeated oral reading, or assisted reading. Then we can move into student-owned repeated readings, including partner reading and choral reading.

Taking time to read a challenging text several times is supportive of building automaticity with the words in that text. And—better yet—gains in **automaticity transfer** even beyond that particular text, to other texts. So reading one text over and over makes it easier for kids to read a new text for the very first time.

What about in older grades? Students often tackle difficult text while learning new content, including in social studies and science class. Teachers can introduce a challenging word, model it, and talk through its parts. "That word is *photosynthesis*. What other words do we know with *photo-* ?"

After taking time to model and unpack words, teachers can turn toward practice with reading the sentences that include them. Even in content area instruction, many secondary students who struggle with comprehension need support in their **understanding of and automaticity with hard words**.

The second half: Prosody

While automaticity is about recognizing each word, prosody is about interpretive reading of phrases and sentences and paragraphs. We can check automaticity using lists of words, but prosody can only be demonstrated with connected text that is supposed to mean something.

"[E]ffortful word decoding pulls mental attention, making it hard to attend to meaning at the same time."

Part of reading passages with fluency involves communicating that meaning, both to others and to ourselves. That has everything to do with our expression: think intonation, phrasing, and pacing. That's prosody. Once students can recognize the words in a text, they need to **support their comprehension** by using phrasing, emphasizing particular words, and pausing appropriately to convey meaning. While we can hear prosody when students read orally, it turns out that good prosody is at work supporting comprehension **in silent reading**, too.

How can we help? Happily, the same basic practices of assisted reading and repeated reading help students develop not just automaticity, but prosody. As the words become more automatic, students can shift focus to interpretive phrasing.

How can all teachers build students' prosody?

When students are tasked with conveying the meaning of a text to someone else, they have a reason to read with good phrasing and expression. Ask students to prepare a reading of a piece that lends itself to **performance**, like an important historical speech, a **poem**, or a play. These require that students get ready by doing multiple readings of the text. They invite students to infuse the reading with expression.

Second, we can teach students that, sometimes, good readers **slow down and lean more heavily on prosody** as a way to maximize comprehension. This works when you read a meaty sentence and notice at the end of it that you didn't understand what it said. Secondary teachers, I'm looking at you with your dense content-area texts. Show students how to tune their prosody high and their rate a bit lower when re-reading a sentence for understanding.

Reading comprehension: The point of it all

When students can read a text with good accuracy and rate and they can interpret phrasing in ways that support meaning, are they doing deep reading comprehension? Not necessarily. Fluent reading—automaticity and prosody—is supportive of engagement with meaning, but kids need instruction targeted toward maximizing text comprehension, too.

The **science of reading comprehension** offers several instructional approaches that converging evidence shows to be highly effective. Using the **What Works Clearinghouse Practice Guide** (and this **overview video**!), take on each of these two high-leverage topics with your science-of-reading learning buddies:

- **Teach text structures** so that students can organize relationships between ideas, including by using graphic organizers. Informational texts in science and social studies are especially supported by work with text structure.
- **Model and teach cognitive strategies** like self-monitoring for meaning. Can students learn to ask and answer a question for themselves about the text, after each paragraph or two? Check out the **older grades guidance** on this topic, too.

Use scaffolding to improve equity

As we talk about reading comprehension, it is critical that we understand something the science of reading does not support: dropping the difficulty of text down to students' "instructional" reading level for comprehension instruction. Equity in literacy instruction means that we **give access to rich, grade-level text to all**, including students who need more scaffolding and support to engage with that challenging text.

"[T]he same basic practices of assisted reading and repeated reading help students develop not just automaticity, but prosody."

What's a key approach to scaffolding that our converging research evidence shows to work? You probably saw this coming. It's **fluency work**, including repeated readings of that challenging text.

Good fluency practices build automaticity and prosody. But they also build access to the kind of rich, challenging text that all students need to engage with to grow their comprehension. I'm looking at you, too, middle and high school

social studies and science teachers. If we want all students to learn content, then we need to use evidence-based practices that give access to text.

Are we there yet?

In this eBook, we've toured through the lands of decoding, including phonics and phonemic awareness; through language comprehension, including vocabulary; and now through fluency and through reading comprehension itself. So is this road trip over? Not yet.

Turn the virtual page for one more topic, the one where each of us puts on a lab coat, stepping up to our own role as an active scientist who uses data to gain better understanding. See you there. I'll be the fashion-forward one sporting both safety goggles and driving gloves.

Decisions, data, and *doing* the science of reading

The **science of reading** is the converging evidence of what matters and what works in early literacy instruction. Earlier, I recapped what the evidence says about effectively supporting **phonics and decoding, language comprehension**, and **fluency** to help kids read increasingly complex text with understanding.

So if you've picked out your instructional and intervention approaches based on converging evidence in each of these areas, then you're doing the science of reading, right? Not necessarily.

Making those initial selections is a great start, but the science of reading involves more doing than done-ing. The science of reading is not a multivitamin—take this and you're good to grow! Instead, it involves active and iterative tending, observing, and adjusting. You need to continually *do* the science to ensure good growth.

Does "what works" always work the same? No.

If there's one thing the past couple of years have taught us, it is that life throws us curveballs. Granted, I don't know enough about baseball to be sure, but I think that means that sometimes when we swing the way the coach taught us to, the ball just doesn't go where we planned. Circumstances matter.

It can be hard to ensure when we teach that we are even doing just what the coach described. When researchers investigate the effects of an intervention, they gauge fidelity: was what got implemented a good match to what was planned? Teachers don't have that advantage. No one is there to check how well **the way schools implement something** matches what happened in studies.

"[W]hen we help more teachers to use evidence-based practices, we help more students read well."

And then there are all the ways that kids differ. Were the kids in the studies a different age or at a different stage in their literacy development than the ones in your classroom? Are your kids **emergent bilinguals** while the studies only focused on monolinguals? Were the kids in the study learning remotely, or struggling to relearn how to learn together in person? Any of these differences could make a practice that was effective in research pan out differently in your real-life classroom.

Should you still use evidence-based practices? Yes.

Just because circumstances matter does not mean we should throw out the science of reading with the bathwater. I'm on Team Science because the science of reading works. Take it from a couple of star players on this team, Kymyona Burk of ExcelinEd and Maria Murray of The Reading League: **"States that have adopted legislation around science-aligned approaches to reading instruction have seen significant improvements in reading achievement."**

Case in point: Mississippi. Remember when **Mississippi was notoriously the worst-achieving state in reading**? Now they have climbed out of the bottom altogether and are number one in growth on the National Assessment of Educational Progress (NAEP). How did they do it? One critical piece was comprehensive training of their K–3 teachers, both pre-service and in-service, in the science of reading.

"Science is the shift from "I offer good instruction" to "How well is this resulting in good growth, and for whom?"

It turns out that when we help more teachers to use evidence-based practices, we help more students read well.

You've got your evidence-based practices. Now what?

So maybe you've done your due diligence: you've chosen and learned to implement evidence-based practices in your literacy instruction. Welcome to the team! But remember: done-ing is not a thing. Here's where we move to the doing part of the science of reading. This is where you become the scientist by collecting data and responding to it with instructional adjustments.

Scientists are always using observations to address a good question. You do science when you shift from "I taught that" to "Who successfully learned that?" Science is the shift from "I offer good instruction" to "How well is this resulting in good growth, and for whom?" A teachers' science is an applied one—this is no cold, antiseptic lab and those are no mice—so you are constantly using these observations to tweak and adjust what you do, to maximize learning.

There are a few different ways people talk about use of observational data to inform instructional decisions. First, **formative assessment practice** calls for eliciting plenty of informal classroom learning data (anything from oral reading data to the kinds of questions students are asking), comparing that evidence to clear learning goals, and adapting and differentiating based on any needs that are revealed. If you can cultivate this kind of **responsive teaching and learning cycle**, that can **significantly improve growth** for students.

A second approach for using data to inform decisions is more tied to models like multi-tiered systems of support (MTSS) and response to intervention

(RTI). These focus more on data from screening and benchmark assessments, progress monitoring, and skills diagnostic assessments. Using them involves making changes to the focus or intensity of instruction, either for whole groups or for **individuals**, based on more objective data. Check out the **What Works Clearinghouse** practice guide on using **tiers of intervention** for a deeper dive.

We have evidence that **data-based decision making** can improve reading outcomes for struggling readers. But that doesn't always happen. Note that back in 2015, there was evidence that **many schools were not implementing schoolwide RTI models strongly**. We can do better. That sobering finding was a critical reminder that if you aren't using data to drive good instruction and targeted intervention, that data won't cause any change on its own. If getting on the bathroom scale were enough to lose weight, we'd all be done dieting.

What does it look like to use data in the science of reading?

"A great teacher is what matters and what works most of all."

Data is for informing decisions that help improve teaching and learning. If no one is going to use the data from an assessment to improve real decisions, then that assessment is a waste of instructional time.

Consider how well you are connecting each kind of data you collect to a decision you are improving. Making this habit central to your teaching means stepping up to *doing* the science of reading. Here are four things to try.

1. During a phonics lesson, ask all students to build a new word ("Change 'sack' to 'stack'!") on their own whiteboard. When you have everyone hold up their work, you will see at a glance if everyone's with you or if you need to circle back.

2. For students getting more intensive intervention targeting reading fluency, progress monitor on oral reading passages weekly. Plot your data against a goal line (or let **MAP® Reading Fluency™** do this for you) to see if growth is trending strong or weak. Then hold steady with the intervention or add some additional intensity, depending on what you see.

3. To gauge how well your new whole-class literacy instruction is working, look at aggregated data from fall to winter or winter to spring on growth assessments. With **MAP® Growth™**, you can compare student growth to norms so you have some context for how much growth to expect. If your kids aren't quite where they should be, it's time to find ways to improve. Are you incorporating reading fluency work in social studies learning yet? Can you point to your curriculum for systematic, explicit phonics

instruction? How well are you enlisting family support for language comprehension in each student's home language?

4. Check out the What Works Clearinghouse **guide "Using student achievement data to support instructional decision making"** for more ideas.

Science of reading, meet the art of teaching

I started this section with a reminder: the science of reading is the converging evidence of what matters and what works when teaching kids to read with comprehension. If you are adopting practices that our evidence says are effective *and* you are using data to watch for how these practices are effecting growth in your particular class, then you are doing the science of reading. You are a scientist.

But you should take off that lab coat before it gets dirty, because you are a special kind of scientist: a nurturing, garden-growing one, out there in the dirt with your tender little sprouts. You are caring and creative and responsive. You might, like Toad from **Frog and Toad Together**, occasionally sing to your plants, even if the evidence-based protocol doesn't call for that, because art and science together are what great teachers are made of.

And guess what the evidence says? **A great teacher is what matters and what works most of all.**

About the author

Cindy Jiban

Cindy Jiban has taught in elementary and middle schools, both as a classroom teacher and as a special educator. She earned her PhD in educational psychology from the University of Minnesota, focusing on intervention and assessment for students acquiring foundational academic skills. After contributions at the Research Institute on Progress Monitoring, National Center on Educational Outcomes, and Minnesota Center for Reading Research, Cindy joined NWEA in 2009. She is currently principal academic lead.

Read more at

nwea.org/blog

nwea

NWEA® is a not-for-profit organization that supports students and educators worldwide by providing assessment solutions, insightful reports, professional learning offerings, and research services. Visit NWEA.org to find out how NWEA can partner with you to help all kids learn.

JUN22 | KAP9248