



Where Learning Science Meets Learning to Read

CONTRIBUTOR:

The Applied Learning Sciences (ALS) team is dedicated to the application and translation of foundational and cutting-edge learning science research toward McGraw-Hill learning solutions.



Meet Jessie and Friends



Jessie and her friends are starting kindergarten, and along with it, their journey into the rich world of literacy. Research tells us that this journey will impact the rest of their years in school—and, indeed, the rest of their lives.

However, Jessie and her fellow kindergarteners must first master one of the most complex cognitive tasks known to humankind: learning to make meaning from meaningless marks on a page. This is a challenge for ALL students, some more than others.

Thanks to developments in neuroscience and technology, we now have a greater understanding of what happens in the brain as students learn to read. The more we understand, the better tools and strategies we can develop to ensure that every student is successful on his or her individual literacy path.

From Science to Instruction

Reading involves networking across several areas of the brain such as the visual system and language regions. Research has shown that the most efficient way to establish connections between these areas is through explicit, systematic instruction that teaches emerging readers the relationship between letters and sounds. This research, which continues to evolve, serves as the base for *Open Court Reading*.

R After adopting *Open Court Reading*, our kindergarteners were going up, I believe it was 11% proficient just within the first three months, our first graders had jumped 12%, and our 2nd grade had made a jump of 19%.

BUCK WATSON, PRINCIPAL, BRADLEY COUNTY, TN

Research shows that when students reach reading proficiency by the end of grade 3, they are far more likely to:

- Graduate from high school
- Access and finish post-secondary education
- Gain employment
 (and have greater earning potential)
- Gain access to quality healthcare
- Avoid incarceration as juveniles and adults
- Achieve higher quality social/emotional health

A Journey Toward Literacy

As you read these words, ask yourself: Am I aware of the mental processes involved in reading this sentence?

Chances are very good that you are not aware of these processes at all. For many (though not all) of us, reading feels as automatic and natural as breathing. We become such fluent readers, in fact, that we cannot help but read text, even when we have no intention of doing so.

However, humans are not born with brains hard-wired for reading—it is a skill unique to our species. It will take many years of practice and a good deal of exposure before important connections in the brain are developed and readers such as Jessie can become fully literate. Along the way, Jessie and her friends will need to learn and integrate six major reading-related processes, as identified by the <u>National Reading Panel</u>:



From Science to Instruction

As trained readers, adults often lose sight of how difficult reading really is. The brain does not go straight from images of words to their meaning. An entire series of mental cognitive processes must occur before a word can be decoded.

In *Open Court Reading*, phonological and phonemic awareness skills are key components in kindergarten and first grade, and include working with words, as well as oral blending and segmentation.

Sounds and spellings are introduced through systematic, explicit, and sequential instruction, enabling students to build both decoding (reading) and encoding (spelling skills).

Recognizing that it is through practice that skills become automatic, the program reviews and reinforces explicit phonics instruction in grades 2 and 3. Beyond phonics, there is word structure that takes students from sounds and spellings to morphemes. This helps students read longer words fluently and figure out the meaning of words.

By grades 4 and 5, word analysis emphasizes decoding longer, more complex words and breaking them into meaningful parts — base words, roots, and affixes. At the same time, students develop fluency and comprehension skills.

A Peek Inside the Reading Brain

When an athlete practices a skill over and over again, motor memory develops to the point that the skill can be performed without conscious effort. Through practice, new neural connections are made within the brain, automatically directing the muscles to perform a skill. Although the brain is not a muscle, the process of learning to read, including repeated practice, is remarkably similar.

Let's try a quick experiment to begin thinking about the neural processes involved in reading.



Did you see a meaningless arrangement of lines in Figure 1, and a letter in Figure 2? How does the brain take the same four lines, which have no meaning in Figure 1, and attach a sound (or more!) to them in Figure 2?

How do we then take these same four lines, in context with other arrangements of lines, and make a word that itself has meaning?



Brain imaging and cognitive studies have demonstrated that in fact, reading is a highly complex, networked, rapid set of processes that involve areas throughout the entire brain LEARN MORE

From Science to Instruction

The first step on a successful path to literacy is to make sure that all students are equally equipped to take words apart and recompose them. Effortless reading demonstrates that this ability has become entirely automatic. However, it must first be explicitly taught that each speech sound can be represented by different letters or groups of letters.

- Open Court Reading teaches the alphabetic principle and the relationships between sounds and letters in grades K and 1, with scaffolding throughout to reinforce learning.
- Once taught, phonemic awareness and phonic skills are reviewed and reinforced with components such as the Alphabet Book, Alphabet Sound Cards and, later, the Sound/Spelling Cards with visual cues for each letter and sound.
- PreDecodable and Decodable books provide practice in applying the letter-sound relationships students are learning and develop the mapping of letters to sound in the brain.

Open Court Reading Sound/Spelling Cards



Building the Reading Brain

Jessie and her friends, who are just beginning their literacy journey, have not yet established the complex neural networks involved in expert reading. What do they need in order to achieve this?



The development of reading skills, like any learning activity, is built upon a positive cycle. That is, the more we read, the more we become able to read. The more we become able to read, the more we *want* to read... which leads us to reading even more, continuing the cycle. All of this reading builds the neural circuitry and efficiencies found in proficient readers.

Building a reading brain requires extensive, explicit instruction in phonological awareness and phonics. Research studies have demonstrated that when developing readers focus on phonics, rather than whole-word instruction, they experience increased activation of the brain areas needed for expert reading. When students master each skill through routine practice, automaticity develops, freeing up cognitive capacity for new and higher-order reading processes.

This strong foundation in phonics can support Jessie as she advances in her reading. Even as she develops her phonics and decoding skills, Jessie must also engage in "reading to learn" — by connecting what she reads to her growing vocabulary, content knowledge, and comprehension skills. As her fluency increases, continuous and supported practice across all narrative and expository genres will be key.



From Science to Instruction

Each daily lesson in *Open Court Reading* follows a three-part lesson plan:

Foundational Skills focus on phonological and phonemic awareness, phonics, decoding, fluency, and word analysis.

Reading and Responding addresses comprehension, vocabulary, and inquiry through close reading of complex texts.

Language Arts provides instruction in the writing process; penmanship; grammar, usage, and mechanics; and spelling.

As decoding and word recognition improve, students are exposed to more complex texts, that are not phonetically controlled, allowing them to read effectively across all genres and subject areas with ease and confidence.

Plants and Animals

		DAY 1	DAY 2
	Foundational Skills Resources - Decodable Starler, Book 5, Stary WI - Routines 7, 8, 9, 10 - Sound/Spelling Card, W0	Phonács and Decoding + /05/ spelled og. pp. T212-T213	Phon/cs and Decoding - /06/ patiel or, p. 1726 Reading a Decodibe Story - Book 5, Story UL, p. 1726
	Reading and Responding Resources - Routines A. II. 13. and 14 - stradeer Anthonogy 2, pp. 82-99	Build Background, pp. 1214-1215 Preview the Selection, p. 1215 Read the Selection, p. 1216 Comprehension Strategies - Claritying, pp. 127, 128, 1200 - Sammartiang, pp. 128, 1210 Discuss the Selection, pp. 1221-1222 Develop Vocabulary, pp. 1222-1223 Powney, p. 1223	Close Rending, p. 1227 Access Complex Text - Closify and Categorite, pp. 1227, 1228, 1229 - Compare and Contrast, pp. 1227, 1229 Practice Vocabulary, p. 1230 Press, p. p. 1230 Ingelity, p. 1238
L	Language Arts Resources • Language Arts Handbook, pp. 34-35, 38-41, 260-261, 314	Writing • Writing to Enform, p. T224 Spetting • /86/ spetled og Preflues non- and re-, p. T225	Witting - Writing to Inform, p. 7232 Perunacadap - Capital Letters A, M, and N, p. 7233

Meet Tyler



Another student in Jessie's class, Tyler, is also beginning his journey toward literacy. Tyler's journey, however, will be different than Jessie's.



One in five students, or around 20% of the population, has a language-based learning disability.

Approximately 10% of the population has the specific disability known as dyslexia — one of the most common language-based disabilities.

10%

Though he doesn't know it yet, Tyler has dyslexia. Although he and Jessie will both reverse letters and numbers in kindergarten and grade 1, he will continue these reversals through the later grades. There will be other signs too: Tyler will struggle with rhyming, correctly pronouncing words, picking out the phonemes in words, understanding punctuation, and writing.

What causes language-based and reading disabilities?

Among people with dyslexia, <u>imaging studies</u> have provided evidence of differences in both the structures and activity in various areas of the brain.

For example, MRI studies of people with dyslexia have uncovered brain activity differences and decreased gray matter in various areas of the brain—making it physiologically more challenging to learn how to read.

LEARN MORE

Tyler Learns to Read

Just like Jessie, Tyler will also need to build a strong foundation in all six reading processes: phonemic awareness, phonics, vocabulary, fluency, guided oral reading, and comprehension.

Researchers have found that while disorders such as dyslexia can present some challenges when learning to read, these challenges are usually not insurmountable. The brain is remarkably flexible, forming and reforming new connections based on sensory input, processing, and practice.

With specific types of literacy supports, Tyler's brain will be able to form new neural networks for reading, though they may differ slightly from Jessie's.

Like all learners, Tyler will benefit from continuous assessment and observation so his individual needs can be identified and monitored. Extensive, direct, and systematic instruction in letters and their corresponding sounds will be especially effective. As Tyler builds these phonics skills, a structured progression through other decoding skills (e.g. breaking apart syllables, word attack strategies, grammatical structures) will help free his cognitive resources for higher-order reading processes such as comprehension.





Assessment/Observation

From Science to Instruction

Open Court Reading provides:

- The introduction of skills that follow a developmental progression and invests time into the mastery of discrete skills.
- Skills that can help students overcome reading challenges and encounter new words with confidence.
- Instructional routines to provide consistent patterns for learning and help build neural connections between key areas of the brain that work together during reading.
- Ongoing assessment that helps educators identify gaps in reading progress and identify reteaching and remediation to close them.
- Workshop Time to give teachers the opportunity to work with small groups for additional practice and skill review.
- Online learning tools to provide a visual and auditory platform for students who may need a different path to get to the same goal.

Jessie and Friends Sit Down to Write

Reading and writing are deeply interconnected, as Jessie and her friends will soon discover. Both reading and writing draw upon many of the same cognitive processes and shared areas of the brain. Research demonstrates that reading and writing are enhanced when taught simultaneously, in ways that support both processes. This relationship is often termed *reading/writing* reciprocity.

FOR EXAMPLE, WRITING CAN BE USED TO:

Reinforce phonics instruction (for example, practicing writing letter blends can also help students read these same blends) Search for graphophonic and syntactic meaning. Graphophonic cues being those that help readers sound out unknown words and syntactic being cues from sentence structure.

Engage in metacognition, such as self-correcting spelling and syntax

Comprehend various text structures, such as cause/ effect and sequencing



As many experts have noted, the act of writing is not only valuable for literacy learning, but is also motivating, especially when introduced alongside reading and other content areas. Research shows that the brain releases a neurotransmitter called *dopamine* when engaged in well-designed, creative learning activities such as writing. Just as in reading, extensive practice in writing leads to a positive, self-reinforcing cycle of growth, learning, and the desire to continue to write.

As Jessie and friends learn to write, they will each need individualized and flexible support. Both students will benefit from extensive writing practice and individualized feedback. In addition, the introduction of collaborative writing projects, as well as opportunities to exchange and evaluate each other's written work, will be powerful strategies for promoting their writing and reading skills.

From Science to Instruction

Open Court Reading teaches students the writing process, the traits or qualities of good writing, and the characteristics of different genres.

- Through early dictation, beginning in kindergarten, students transfer reading skills to writing.
- In three-phased writing instruction: the teacher models, the whole class collaborates, students write independently.
- Writing includes opinion pieces, informational text, narrative, and poetry.
- Students learn handwriting, as research shows that this frees the writer to focus on cognitive activities.



Elementary School, Middle School, and Beyond

As Jessie and her friends continue into upper elementary school, the strong literacy foundations they established in the earlier grades will become especially important. By about grades 3 or 4, Jessie and friends will be using more sophisticated literacy skills to tackle more complex texts.

By middle school, both students will depend on their more refined literacy practices to engage in academic tasks across all content areas. However, it is important that we do not assume that Jessie and her classmates have finished learning to read by the time they enter grade 6. In fact, even as they learn higher level skills, such as engaging in critical analyses of text, students must continue to build upon the fundamental literacy skills first introduced in the earlier grades, including: By the time students have completed grade 5 of *Open Court Reading* they are fully prepared to take on the challenges of reading more complex texts. Using the foundational skills they have achieved, students know how to approach every new word, and their word analysis skills enable them to figure out meaning through strategies such as identifying prefixes, suffixes, and root words; context clues; and more.



While *Open Court Reading* connects the science behind reading to practical instruction, it also makes the process fun. When students are enjoying reading in class, and teachers are having fun teaching, this dramatically increases the chances that students will read independently outside of class. Research suggests that just 20 extra minutes spent of daily reading outside of school can significantly increase reading proficiency.



Strategic reading

Vocabulary



Text structure analysis (e.g. cause/effect, description, compare/contrast)



Metacognitive processes (e.g. question generation during reading)

Comprehension

Summarization and paraphrasing

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