Can a Curriculum Support the Science of Reading and Science of Learning?

Categories: Expert Voices, Science of Reading, Reading

Linda Diamond has dedicated her career to teaching children to read, particularly those with word reading difficulties like dyslexia.

A long-time partner of Collaborative Classroom, Linda co-founded the Consortium on Reaching Excellence in Education (CORE) alongside former California Superintendent of Public Instruction Bill Honig, and served as CORE's president for 26 years.

Linda has also worked as a public school teacher, principal, Director of Curriculum and Instruction for a K–12 school district, and Senior Policy Analyst. She is the co-author of the nationally recognized textbooks Teaching Reading Sourcebook and Assessing Reading: Multiple Measures and Vocabulary Handbook.

We certainly know a great deal now about what is required for students to learn to read. The science of reading brings us over 50 years of accumulated and convergent research from multiple fields. The Simple View of Reading gives us a picture of what is needed in both decoding and language comprehension to lead to skillful reading (Gough & Tunmer, 1986).

Similarly, Dr. Hollis Scarborough created a theoretical framework that illustrates the foundational components of reading and their interrelationships in the strands of the Reading Rope (Scarborough, 2001). For an excellent explanation of the science of reading, refer to The Defining Guide.

However, despite the growing embrace of the science of reading, questions remain about how best to teach what we now understand. For the answer to this question, perhaps we can look to cognitive science about what is known about learning. Deans for Impact, a group of deans representing teacher preparation programs, released two reports that provide guidance about instructional methods: “The Science of Learning” and “The Science of Early Learning” (Deans for Impact, 2015; 2019). Taken together, these two reports draw on the research conducted by cognitive science and can serve as guides for teacher instructional practices.

Indeed, these two reports are consistent with the science of reading. We can also look back at the work of Barak Rosenshine and his seminal article “Principles of Instruction” for instructional guidance that was confirmed by decades of research (Rosenshine, 2012). Finally, to answer the question in the title of this blog, yes—we do have a K–12 curriculum that supports both the science of reading and the science of learning: SIPPS (Systematic Instruction in Phonological Awareness, Phonics, and Sight Words).
What Do We Know About Learning as It Relates to Literacy?

To best illustrate how learning science meshes with practice, the following chart lays out the principles from cognitive science (Deans for Impact, 2019; 2015) alongside the foundational reading skills curriculum *SIPPS*. When Dr. John Shefelbine first developed *SIPPS*, he knew the principles of learning and he baked those principles into the curriculum.

<table>
<thead>
<tr>
<th>Principles from Early Learning Science</th>
<th><em>SIPPS</em> (Systematic Instruction in Phonological Awareness, Phonics, and Sight Words)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All writing systems use a visual code and children must crack that code.</td>
<td>Before starting <em>SIPPS</em>, children are expected to have learned at least 20 letters of the alphabet, and <em>SIPPS</em> now includes the enhancement “Learning Letter Names.”</td>
</tr>
<tr>
<td>The sound-symbol relationship needs to be taught explicitly, beginning with simple sound-symbols and moving to more complex patterns.</td>
<td>As a curriculum that employs a structured-literacy approach, <em>SIPPS</em> explicitly and systematically teaches the sound-symbol system and moves from simple to more complex graphemes.</td>
</tr>
<tr>
<td>Children must develop phonemic awareness along with understanding how the spoken sounds connect to letters, and systematic phonics has been shown to be the most effective way to teach the sound-spelling or sound-symbol relationship (Castles, Rastle &amp; Nation, 2018).</td>
<td><em>SIPPS</em> includes clear and explicit instruction that teaches phonemic awareness and the sounds that letters and combinations of letters represent, the relationships of the spelling patterns to their pronunciations, and how to “decode printed words to [arrive at their] oral ones” (Deans for Impact, 2019, p.8). <em>SIPPS</em> requires students to continually practice—at both the word and text level—what they learned and mastered, and gradually expands to add new graphemes and their sound-spelling correspondences.</td>
</tr>
<tr>
<td>During phonics instruction, teachers should have students read and write the spellings for the sounds and also write words using those sound-spellings.</td>
<td><em>SIPPS</em> includes both explicit instruction in blending (sounding out) and reading words and guided dictation to have children encode and write graphemes and words.</td>
</tr>
<tr>
<td>“Some words in English follow complex patterns, and the most common of these should be taught explicitly” (Deans for</td>
<td><em>SIPPS</em> includes direct and explicit instruction in the most common sound-spelling patterns and high-frequency sight words. Lesson</td>
</tr>
<tr>
<td>Impact, 2019, p. 8).</td>
<td>routines support mastery of the sound-spellings in both decoding and encoding and application to connected text.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Skilled readers begin to recognize words automatically and then rely less on decoding. They develop fluent word recognition. Since fluent reading supports comprehension by reducing the memory load and allowing a focus on meaning, lots of practice with varied texts is necessary (Stanovich &amp; West, 1989).</td>
<td><em>SIPPS</em> builds in fluency and automaticity both at the word level as well as in connected, decodable text and with the fluency readers. Group blending practice, partner practice, and whisper reading with connected texts all strengthen fluent word and passage reading. Indeed, <em>SIPPS</em> moves children from the more controlled texts to authentic children’s texts starting after Lesson 23 in Extension Level.</td>
</tr>
<tr>
<td>As children develop as readers, they develop morphological awareness and come to realize that parts of words carry meanings.</td>
<td><em>SIPPS</em> Challenge Level supports students in their decoding of polysyllabic words and begins their understanding of morphemic units and the relationship to decoding.</td>
</tr>
</tbody>
</table>

**Principles from General Learning Science**

**SIPPS (Systematic Instruction in Phonological Awareness, Phonics, and Sight Words)**

<table>
<thead>
<tr>
<th>To learn, students must transfer information from working memory to long-term memory for subsequent retrieval. Working memory is limited, so it is important not to overwhelm students with too much new information at once (Sweller, 1988).</th>
<th>To aid this transfer, <em>SIPPS</em> shows information in multiple ways, visually with the sound-spelling cards and the mnemonics, orally, and in writing. In addition, <em>SIPPS</em> uses “carefully paced explanation, modeling, and examples [that] can help ensure that students are not overwhelmed” (Deans for Impact, 2015, p. 3; Kirschner, Sweller, &amp; Clark, 2006).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Because cognitive development is not a fixed, linear sequence, content should not be thought of as developmentally appropriate or inappropriate; rather the right question is <em>Have students mastered the prerequisites?</em> (Willingham, 2008).</td>
<td><em>SIPPS</em> is accelerative and builds in program mastery measures to ensure that students have mastered prior concepts and teachers know if students need review or are ready to move on.</td>
</tr>
</tbody>
</table>
To ensure students remember newly taught or hard-to-remember information, “stories and mnemonics are particularly effective at helping students do this” (Deans for Impact, 2015, p. 4; Peters & Levin, 1986).

SIPPS makes strong use of mnemonics in the sound-spelling cards, which helps students remember the phoneme-grapheme links and in turn facilitates the decoding process.

“Practice is essential to learning new facts, but not all practice is equivalent” (Deans for Impact, 2015, p. 4; Ericsson, Krampe & Tesch-Römer, 1993).

SIPPS continually provides practice opportunities for students by interleaving prior learning with new learning. This is reflected in the word learning routines and the decodable texts that children use for practice. By spacing practice and bringing back prior sound-spellings, SIPPS is designed to help students remember over the long-term.

Effective feedback is often essential to acquiring new knowledge and skills (Ericsson, Krampe & Tesch-Römer, 1993).

The SIPPS correction procedures include feedback that is clear and specific and focused on the task and improvement. In fact, the correction procedures are one of the most important features of SIPPS.

These are just some of the salient principles from cognitive science that align so closely to the design of SIPPS, but we can also turn to the summary of research in effective instruction articulated by Rosenshine (2012) and which still hold true today. Anita Archer and Charles Hughes also explain these principles in their book, *Explicit Instruction: Effective and Efficient Teaching*.

Rosenshine (2012) looked at three bodies of research to build his list of principles of instruction: research in cognitive science; research in the classroom practices of master teachers; and research on cognitive supports to help students learn complex tasks. The principles derived from these studies are:

1. Begin a lesson with a short review of previous learning.
2. Present new material in small steps with practice after each step.
3. Ask a lot of questions and check student responses.
4. Provide models.
5. Guide student practice.
6. Check for student understanding.
7. Obtain a high success rate.
8. Provide scaffolds for difficult tasks.
9. Require and monitor independent practice.
10. Engage students in weekly and monthly review.
Teachers using SIPPS can look at their lessons to see how each of these principles are embedded in the program. One of the leaders of explicit instruction, Anita Archer, says: “Explicit instruction is systematic, direct, engaging, and success-oriented—and has been shown to promote achievement for all students” (Archer & Hughes, n.d.). Isn't that, in fact, exactly what SIPPS, when taught as designed, achieves?

“Explicit instruction is systematic, direct, engaging, and success-oriented—and has been shown to promote achievement for all students” (Archer & Hughes, n.d.)

At a time when educators are diligently seeking excellent instructional materials that align to the science of reading and are grounded in principles of effective instruction and learning, it is often difficult to determine if a curriculum really is up to the task. With SIPPS, however, we have a solid match to the research and proven results. For a case study in the effectiveness of the program, read the article, “Pajaro Valley Unified School District’s Multi-Year Early Literacy Initiative.”

On a cautionary note, a curriculum is only as good as the skilled teacher who is using it as intended. With SIPPS, we have the right tool, and with a strong system of support, knowledge, and coaching, teachers of SIPPS will ensure that all children become readers.

References


