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Building the Reading Brain

PreK-3



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Building the Reading Brain, PreK-3.

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A CHILD'S BRAIN AND READING: A DOZEN KEY LEARNINGS

1. The brain is not innately wired for reading; there are no naturally designated neural mechanisms for reading. The brain must co-opt structures designed for other purposes.

Children are born with a brain that has a built-in pathway for oral language. If they are exposed to a language, barring any neurological disability or disorder, they will learn to speak that language with little difficulty. The same is *not* true of reading. In a sense, reading is an unnatural act for the brain. There is no built-in pathway for reading. While raising children in print-rich environments is important—especially in the early years—most children do not learn to read through exposure; they must be taught.

2. Neuroplasticity is a characteristic of the brain that allows it to be shaped by experience.

How can a brain not wired for reading eventually accomplish this extremely difficult task? The answer lies in a unique characteristic of the brain called *neuroplasticity*. The reason we can learn habits and skills that are not innate is that the brain is “plastic” throughout life. This means that it can adapt to new circumstances and requirements, literally changing the function of certain cells. This ability to adapt to its environment, to sculpt itself depending on the demands of the environment, is one of the most amazing characteristics of the brain.

3. Many factors have been shown to be strong predictors of eventual reading success.

Because language is a precursor to reading, the size of children’s vocabulary, their expressive language, recognition of the letters of the alphabet, the ability to name the letters rapidly, and their knowledge of the purposes of books are all key predictors of later reading success. Reading aloud to children with interactive dialogue is one means to help children develop these skills before they are able to read well on their own. Writing, reading’s reciprocal action, supports the development of skills that will be important in learning to read. Listening to and repeating songs, jingles, or rhymes are additional ways to develop children’s emerging literacy.

4. Priming skills for reading, which include paying attention, being able to focus and concentrate, putting order and organization to thinking, and holding information in working memory become critical attributes that need to be in place in the early school years.

Teachers find that when they identify children who struggle with these attributes, they can make relatively simple instructional adjustments to encourage and essentially force children to become better at listening and holding information in their conscious memory. Instructional adjustments for priming skills also affect students' motivation to learn and ultimately how well they store and retain information critical to successful reading.

5. Essential to learning to read is the understanding that the sounds (phonemes) of spoken language can be represented by print and that phonemes can be arranged to make many different words.

We call this concept *phonemic awareness*, and children can pick up this understanding on their own through a language-oriented preschool environment, or it can be taught explicitly. It appears to be essential to decoding print, to learning to read. In addition to phonemic awareness, children must be able to recognize and produce rhymes, break words into syllables, distinguish parts of syllables (onsets and rimes), and determine root words, prefixes, and suffixes of words. *Phonological awareness* is the umbrella term given to this broader array of skills, which usually includes phonemic awareness.

6. Some strategies commonly used to teach children to decode have proved to be less effective than others. Information on how the brain learns best can assist teachers in selecting the most brain-compatible strategies.

The content that children practice needs to make as much sense as possible since the brain seeks patterns to make sense of the task with which it is engaged. Many commonly used word walls, letter-to-sound approaches, and orthographic rules seemingly have no patterns or logical sequence. They are confusing to the young child's brain. Word walls need to be sound-to-letter(s) based. Orthographic rules with examples, discussion, and jingles or songs with meaningful practice are more likely to be stored in and retrieved from long-term memory.

7. Early assessment in kindergarten has proved to be effective to determine which children are ready to read and which ones will require early intervention.

The conventional wisdom has been that some children are ready to read in kindergarten while others won't be ready until later, indicating that we should wait until they are ready. We now understand that many factors determine whether or not children appear to be ready to read.

Children who have limited exposure to print, who have not been read to, learned nursery rhymes, or been exposed to a language rich environment may enter school without the emergent literacy skills necessary to learn to read. Neurological factors may also play a role. Early assessment to identify these environmental and biological factors is essential to select an appropriate reading intervention program from the many that are available.

8. Difficulty in learning to read (e.g., dyslexia) can be the result of several factors.

Some reading problems are the result of a neurological decoding “glitch” in the reading pathway of the brain. This problem either can be a genetically programmed error—generally an underactivation in the angular gyrus and Wernicke’s area—or may be more environmentally influenced, such as by a lack of early stimulation or intermittent schooling. Other problems seem to stem from physiological, socioeconomic, ethnic, and/or second-language factors. Regardless of the source of the reading problem, nearly all deficits can be overcome with a reading program that is matched with the child’s assessed reading deficit and based upon direct, explicit instruction.

9. Recognizing whole words (and eventually some phrases) automatically is essential for fluent reading and comprehension.

As children become more proficient in decoding print, they begin to see common groups of letters as words. How does this happen? When a certain configuration of letters is processed numerous times, the brain begins to store this configuration as a single bit of information, a word. This chunking process is how the brain overcomes its limited processing space, identified as working memory. Without this ability, there would be insufficient “space” in conscious memory for comprehension of what is being read.

10. Because we read for a purpose, comprehension can be considered an end product of reading.

As important as it is to develop the ability to decode print, it is not of much use if we do not comprehend what we read. In order to comprehend what is being read, children’s brains must be able to decode automatically and unconsciously so that the conscious processing functions of the brain are totally available for connecting the words being read to previously acquired information. As the brain instantaneously accesses associations in memory, the reader is able to understand the content of the print. However, this does

not mean that we should wait until all decoding is automatic before addressing comprehension.

11. The size of children's vocabulary and their comprehension of what they read are highly dependent on their school and personal experiences.

Recall that the brain sculpts itself based on the input it receives from the environment. Children who are actively engaged with learning by practicing, rehearsing, talking, experiencing, responding, creating, or making products are more likely to remember words and develop expansive vocabularies. Additionally, they are able to attach new learning to neural networks that were previously established. Teachers help children to organize their thinking by giving them activities that require the children to organize, sort, compare, list, find differences or similarities, mind map, or develop schemas. Through these activities, children's minds form a way to store information important enough to remember.

12. Attaining fluency and comprehension in reading by the end of the third grade is the ultimate goal of reading instruction.

When children can read with speed and accuracy, they are able to concentrate on the meaning of the text. However, if they must devote considerable energy to the mechanics of reading, their focus on the meaning is diminished. The ability to read fluently is dependent, therefore, on how automatic decoding is (using the decoding reading pathway), how familiar children are with the orthography of language (accessing the visual association areas of the brain), and how quickly neural activity happens among the structures of the brain that have been developed and reinforced for reading.

Finally, we repeat from the introduction to this book: Reading well is more than a legislated priority; it's an ethical and professional imperative. It is our hope that this book will provide an understanding of how neuroscience gives a broader understanding of the complex reading process. Furthermore, outcomes from studies that include neural imaging of both learning and reading tasks are supportive of and match with results-based research from education's behavioral science. May this book be a guide to both parents and teachers as we strive to give our children the reading legacy they deserve.