Building the Beginning Reader’s Brain

Presented by: Stacey Leitzel

What happened to these children?

Future reading progress is set early on... and children who fall behind rarely “catch up” on their own.

“The Self-Perpetuating Cycle of Reading Difficulties

- Difficulty in decoding
- Lack of fluency
- Avoidance of reading
- Less reading practice
- Declining vocabulary growth
- Limited academic language and content knowledge
- Declining comprehension
- Lack of motivation

“About 10 million children will encounter reading problems in the crucial first three years of school.”
—National Reading Panel Progress Report, 2000
What % of children with reading comprehension difficulties in grades 1–3 also have problems in decoding and/or vocabulary?

1 = 30%
2 = 50%
3 = 99%

Spencer, Quinn, and Wagner, 2014

Compared to 2017, there was a two-point decrease at grade 4 and grade 8 in the 2019 percentage of students at or above proficient.

<table>
<thead>
<tr>
<th>Grade 4</th>
<th>Grade 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>37%</td>
<td>36%</td>
</tr>
<tr>
<td>35%</td>
<td>34%</td>
</tr>
</tbody>
</table>

Public and non-public schools reading, National Assessment of Educational Progress, 2019

Less than half of our nation’s high school students meet the benchmark level in Reading on the ACT.

ACT Profile Report, 2017

The effects of illiteracy and the cost of remediation programs cost our nation billions of dollars annually.

ACT Profile Report, 2017

How Successful Are Intervention Programs?

Although many remedial programs may show success at improving reading skill, many times these effects tend to dissipate over time.

—Quirk, M. & Schwanenflugel, P., 2004

After research-based instruction, the percentage of first graders below 30th percentile can be reduced to 4-6%.

Foorman, Breier, & Fletcher, 2003; Mathes, et al., 2005; Torgesen, 2004 & 2005
Building the Beginning Reader’s Brain

- Strong Neural Connections
- Systematic & Explicit Phonics Instruction
- Cumulatively Decodable Text

Preventing Reading Failure: What We Know

The brain is not “hard wired” for reading. The neural connection needed for reading must be built through successful instructional experiences.
—Hubby & Goswami, 2011

Brain Imaging Studies

1. fMRI measures blood supply to different parts of brain:
   - When neurons are firing, more oxygenated blood flows to that area.
   - Iron in blood produces stronger magnetic signal, which can be detected.

Within his brain, the child is literally building the neural circuitry that links the sounds of spoken words, the phonemes, to the print code, the letters that represent these sounds.”
—Shaywitz, 2003, p. 177.

Fluent Reader
Phonological Processor
Sound-Symbol Connection
Orthographic Processor

Pre-Reader

Brain Imaging Studies
Brain Imaging Studies

"Freading"

"Memorize the pattern."
"Look at the picture."
"Guess at the word."

These strategies build word forms in the right hemisphere...an area not well-suited for reading.

"Environmentally-influenced" Dyslexia

"These persistently poor readers have a rudimentary system in place, but it’s not connected well. They weren’t able to develop and connect it right because they haven’t had that early stimulation."
—Shaywitz, 2002

“Approximately two-thirds of poor readers seemed to have the neurological systems for reading intact; however those systems have not been properly activated.”
—Shaywitz, 2003

Building the Beginning Reader’s Brain

- Strong Neural Connections
- Systematic & Explicit Phonics Instruction
- Cumulatively Decodable Text

Why Is Phonics So Critical?

English is a phonetic language.

English has 26 letters, 44 phonemes, and 74 phonograms.

Despite the number of phonograms, if students understand the phonograms and the spelling rules that govern them, they can unlock the mystery of 98% of the words in the English language.

Eide, Uncovering the Logic of English, 2012
If a child memorizes ten words, the child can read ten words.

But if the child learns the sounds of ten letters, the child can read:

- 350 three-sound words
- 4,320 four-sound words
- 21,650 five-sound words

Dr. Martin Kozloff (2002)

What Do We Need to Know and Teach?

- All the phonemes of the English language
- Phoneme-grapheme representation
- Letter formation
- Morphology (meaningful units of the language; roots and affixes)
- Syllable patterns

Effective Phonics Instruction Includes Sufficient Practice in Decodable Texts

"As an instructional strategy, the teaching and the text cannot be separated."

(Mesmer, 2001, p. 136)

What type of instruction do beginning readers need?

- Decode = Link sounds to the printed letters, blending them together, and saying the whole word
- Encode = Translate speech sounds into the letters that represent those sounds
- Construct meaning

What Do Beginning Readers and Writers Need to Do?

Teaching Method Influences Brain Activity

“...using phonic-based methods is a better use of limited instructional time than using meaning-based methods, both for learning to read aloud and comprehend written words accurately.”


“The results were striking: people who had focused on the meanings of the new words were much less accurate in reading aloud and comprehension than those who had used phonics, and our MRI scans revealed that their brains had to work harder to decipher what they were reading.”


Too many students are not developing the automatic decoding skills needed for fluent reading.

“While a rate-based type of learning involving memorization of sight words can get the student to a certain point, eventually there is too much to memorize and the system fails.”

—Shaywitz et al., 2003
EXPLICIT & SYSTEMATIC Phonics Instruction is CRITICAL for Learning to Read

3 decades of research funded by National Institutes of Health
10 large scale longitudinal studies & 1,500+ smaller-scale studies
10,000,000+ children studied
2,500+ articles & 50+ books

Building the Beginning Reader's Brain

- Strong Neural Connections
- Systematic & Explicit Phonics Instruction
- Cumulatively Decodable Text

The Simple View of Reading

\[ D \times LC = RC \]

Decoding (word recognition) \[ \times \] Language comprehension = Reading comprehension

Working Memory

Less fluent reader

More fluent reader

Decoding (word recognition)

Language comprehension

The Many Strands That Are Woven into Skilled Reading

Language Comprehension

- Background Knowledge
- Vocabulary Knowledge
- Language Structures
- Verbal Reasoning
- Literacy Knowledge

Word Recognition

- Phonological Awareness
- Decoding and Spelling
- Sight Recognition

Skilled Reading: fluent reader uses interaction of word recognition and text comprehension

Reading comprehension

As referenced in TEA’s Reading Practices video

“"It is simply not true that there are hundreds of ways to learn to read... when it comes to reading, we all have roughly the same brain that imposes the same constraints and the same learning sequence.”

—Dehaene, 2009, p. 218
Predictable Progression of Skills

**Text Comprehension**
- Decoding (word recognition)
  - Phoneme awareness
  - Letter recognition, naming, formation
  - Letter-sound association (phonics)
  - Blending
  - Decoding (and encoding)
  - “Memory” words

**Language Comprehension**
- Oral language
- Vocabulary
- Listening comprehension

**Automatic Blending Ability**
- Single consonants + short vowels are usually silent (CVC and CVCC)
- Consonant digraphs: Long vowel sounds: L and W (OAW, OIA)
- r-controlled vowels: Open and closed (Ar, Ar, Ar, Ar, Ar, Ar, Ar, Ar)
- Contractions: Soft c and y silent letters

**Fluent and Accurate Decoding Depends on...**

**Thorough Letter Knowledge**
- **Hear It**: Students identify the target phoneme in spoken language.
- **See It**: Students identify the uppercase and lowercase form of the letter.
- **Say It**: Students produce the letter sound in speech.
- **Write It**: Students form the letter on ice cream lines.

**Automatic Blending Ability**
- **sat**

**Application of Common Phonic Generalizations**
- **Reading Rules**
  - **CVC** (go): When a word has only one vowel and ends in one or more consonants, the vowel is usually short.
  - **CVCe** (ate): When a word ends in e and has only one other vowel, the e is silent and the other vowel is usually long.
  - **CV** (go): When a word has only one vowel and it is at the end, the vowel is usually long.
  - **CVCC** (rain): When a word has two vowels together, the first vowel is usually long and the second is silent.
  - **y/ī** (by): When a word ends in y and it’s the only vowel, the y stands for the long i sound.
  - **y/ē** (happy): When a word ends in y and has another vowel that is not next to it, the y stands for the long e sound.

**Daily, Repeated Practice With Words**
- **Isolation**
  - *Flashcards*:
    - Plant
    - Plan
    - Plan
    - Plan
  - *Word Practice*:
    - *Plan*
    - *Plant*
    - *Plant*
    - *Plant*

**Context**
Decodability is a critical characteristic of early reading text... it increases the likelihood that students will use a decoding strategy and results in immediate benefits particularly with regard to accuracy.”

—Cheatham & Allor, 2012

Practice materials should include stories that contain words using the specific letter-sound correspondences the children are learning.”

—Sousa, 2014

What kinds of texts do beginning readers need?

What makes decodable text decodable?

* High proportion of words with phonetically regular relationships between letters and sounds
* Close match between the letter-sound relationships represent in text and those that the reader has been taught

The lesson-to-text match is pivotal to the successful use of decodable text.”

—Mesmer, 2001, p. 136

“Cumulatively Decodable” Text

The words children read must contain letter-sound information they have been taught.
Reading cumulatively decodable text...

- Gives children practice applying the letter associations they are learning.
- Helps children learn to depend on decoding as their primary reading strategy.
- Helps children develop the automaticity needed for fluent reading.

What would children in early kindergarten need to know in order to decode these words?

I like to find things.
I like to find beetles.

What do I do with this word?

Teaching children to guess at words that they do not recognize immediately is never acceptable. —Sweet, 2013

Guessing is not a reliable, sustainable decoding strategy!

"As an instructional strategy, the teaching and the text cannot be separated." —Meehan, 2001

Building the Beginning Reader’s Brain

- Strong Neural Connections
- Systematic & Explicit Phonics Instruction
- Cumulatively Decodable Text

Routinely applying ineffective reading strategies may build neural pathways, but in areas of the brain less suited for reading (Hempenstall, 2006).
Why Instruction Counts

In a class of 24 kindergarten students,

- Some may come to school already reading
- Some will likely learn to read regardless of the instructional approach that is used
- Some will require systematic, explicit core instruction
- Some will likely require systematic, explicit core instruction and additional intensive instruction
- Some may have a reading disability and require special education services

Building the Beginning Reader’s Brain

- Strong Neural Connections
- Systematic & Explicit Phonics Instruction
- Cumulatively Decodable Text