EFFECTIVE INTERVENTION FOR WORD-LEVEL READING DIFFICULTIES

Getting Started – The Webinar

- My goal is to motivate you to further pursue this topic. Free follow-up resources will be provided
- If you develop knowledge of this information and “own it,” your students will greatly benefit
  - I've seen it happen!
- Fast-paced presentation – a lot of ground covered in a short time (thus the follow-up materials)
- This webinar offers opportunities for questions
Getting Started – The Focus

- Defining “Word-Level Reading”
  - The terms “decoding” and “word identification” are too imprecise and used differently
- Students who can benefit from this material
  - All students with word-reading problems
  - SLD, SLI, ED, ID, & non-designated
    - Based upon how we read, not on IDEA category

Getting Started - Outline/Objectives

1) Understand typical & atypical reading development
   - You will learn how students turn unfamiliar words into instantly readable familiar words
     - This boosts fluency and for many students is the most direct route to better reading comprehension
     - Then you will learn why some students struggle
2) Understand the most effective way to prevent word-reading difficulties
3) Identify the most effective way to correct reading difficulties
   - Regardless of disability classification
Typical Word-Reading Development

... and why some students do not develop typically

Vocabulary Lesson/Review - 1

- Auditory vs. Phonological
  - All sounds vs. the sounds of language

- Phonological Awareness vs. Phonemic Awareness
  - All language sounds vs. the smallest sounds (phonemes)

- Phonological/Phonemic Awareness vs. Phonics
  - Oral language awareness vs. printed letters
Vocabulary Lesson/Review - 2

- Sight Word/Sight Word Vocabulary/Sight Word Pool
  - Instantly familiar words that are effortless to read
  - Includes phonically regular and irregular
    - “Sight word” is not being used here to mean “irregular word”
    - The issue is whether the word is read effortlessly
  - Sight word vocabulary = “orthographic lexicon”

Development of Word-Level Reading Skills - 1

- Nature of an alphabetic writing requires phonological skills

- The two components needed to efficiently read an alphabetic writing system:
  1) Letter-sound knowledge/proficiency
  2) Phonemic awareness/proficiency

- What skilled early readers can do
  - Example of letter-sound proficiency (from TOWRE-2)
  - Example of phonemic proficiency (from PAST)
### Three Phases of Word Reading Development and their Phonological Counterparts

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### Development of Word-Level Reading Skills - 2

- Every level of word-reading development is preceded with the phonological skills upon which it is based
- No aspect of word reading, even sight word reading, is unrelated to phonological/phonemic skills
- Visual memory is critical for LETTER learning, but plays virtually no role in WORD reading
  - This includes “orthographic skills,” which are based upon *orthographic memory*, not visual memory (more later)
Word-Level Reading Development – Phase 1a:
Letter-Name Knowledge

- Early Phonological Awareness
- Visual Discrimination/Visual Memory
- Visual-Phonological Paired-Associate Learning

Word-Level Reading Development – Phase 1b:
Letter-Sound Knowledge

- Early Phonological Awareness
- Visual-Phonological Paired-Associate Learning
- Letter Name Knowledge
Word-Level Reading Development – Phase 2:
Phonic Decoding Skills

Phonological Blending

Letter-Sound Skills

PHONIC DECODING

Vocabulary/Phonological LTM

Word-Level Reading Development – Phase 3:
Rapid Sight Vocabulary Building (Orthographic Mapping)

Vocabulary
Phonological LTM

Phoneme Awareness (Analysis)

Orthographic LTM

Letter-Sound Skills
Orthographic Mapping

- Visual memory plays a role in letter learning but not in printed word learning (contrary to our very strong intuitions!)
- Phoneme proficiency is needed to efficiently build the sight vocabulary
- How and why?
- But first, how we do NOT remember the words we read: visual memory

Sight Vocabulary is NOT Based on Visual Memory/Visual Skills - 1

- Our intuitions fail us here
- Input and storage are not the same thing
  - Input is visual but storage is orthographic, phonological, & semantic
- Cattell’s findings in 1886
- Findings from the 1970s
  - Correlation between word reading & visual memory: very weak
  - RD (only) kids have equivalent visual memory to non-RD
- 1960s to 1980s mixed case studies
  - Adams’ comment about debating with students
  - If a first grader learns “bear” he can instantly identify “BEAR”
    - Consider all the fonts and personal handwriting we read
  - Our “abstract representation” of every letter
    - The visual “look” of letters and words get stripped off and translated into our abstract representation of those letters within the first 1/10th to 1/5th of a second after seeing the word – then orthographic memory (memory for letter sequences) takes over
Sight Vocabulary is NOT Based on Visual Memory/Visual Skills - 2

- Word reading correlates strongly with phonological skills but not with visual skills
- If word reading was based upon visual skills, then individuals who are deaf would not have such a struggle learning to read
  - They have no efficient “visual” alternative way to read
- Neuroimaging studies since 2000 show that the areas of the brain involved in written word memory (orthographic memory) differs from object memory/visual memory (Cattell’s findings from 1886 thus make sense)

How We “Map” Words to Long-Term Memory

- There are two compatible but non-identical theories of word learning/word memory
  - Orthographic Mapping (Dr. Linnea Ehri)
  - Self Teaching Hypothesis (Dr. David Share)
- Both are supported by both direct and indirect experimental evidence
- These theories help make sense of a large amount of experimental findings
The Self-Teaching Hypothesis

- Our teachers and parents did not directly teach us the vast majority of the 30,000 to 90,000 words we can read instantly
- Most words are learned as a result of one or more successful encounters with that word, and phonic decoding drives that process

Orthographic Mapping - 1

- Words are already stored in our phonological long-term memory (PLTM) in the form of pronunciations (heard and spoken)
- If we can pull apart pronunciations into individual phonemes (phoneme awareness), we can establish the “phoneme sequence” within each pronunciation
- If we can establish the phoneme sequence within each stored pronunciation, we can use the phonemes in that phoneme sequence as the “anchoring points” in our memory for the orthographic sequence (the letter order) that is used to represent that pronunciation in writing
Orthographic Mapping - 2

• Just note I’m talking about a flow of information in the opposite direction of phonic decoding
  • Phonic decoding goes in one direction: from text to brain, that is, from letter order to pronunciation
  • Orthographic mapping goes from brain to text, that is, from pronunciation to letter order (yet it is also assisted by the text to brain information flow; see more below)
• Don’t confuse orthographic mapping with phonic decoding
  • Phonic decoding helps sound out unfamiliar words
  • Orthographic mapping makes words familiar by attaching stored pronunciations to their written counterparts via phonemic proficiency and letter–sound proficiency
• Don’t worry if you don’t grasp this now because there are follow up materials

Orthographic Mapping - 3

Implications for word–reading difficulties:
• If weak phonemic awareness prevents us from quickly and efficiently pulling apart phonemes in spoken pronunciations, we cannot not easily anchor the written letter sequences to their existing phonemic sequences in PLTM
• Poor word readers have limited sight vocabularies, and this is why
Given limited time, I’m going to seamlessly integrate orthographic mapping and the self-teaching hypothesis together in what follows.

“How We “Map” Words to Long-Term Memory

“Transparent” Words
(i.e. words with one-to-one correspondence)

PLTM

Phoneme Awareness/Analysis

<table>
<thead>
<tr>
<th>/red/</th>
<th>/haz/</th>
<th>/win/</th>
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Oral First: A mind prepared to store words
Print First: Mapping while reading

Phonological LTM Activation
Self-Teaching Hypothesis
Letter-Sound Knowledge
Phoneme Blending
Phoneme Awareness/Analysis
Orthographic Mapping
How We “Map” Words to Long-Term Memory

Words that are “Opaque”
(i.e. words without a one-to-one correspondence)

/m/ /ā/ /k/  /r//ē/ /d/  /c/ /ō/ /m/
make  read  comb

What About Irregular Words?

• Irregular words are a much bigger problem for phonic decoding than for orthographic mapping!
• Most irregular words are off by only one element
  • (said, put, comb, island; multiple violations are rare: one, iron)
• Many regular words are not transparent yet are mapped with little difficulty – a minor adjustment is needed
  • Silent e words (bike, make)
  • Words with vowel digraphs (seen, boat)
  • Words with consonant digraphs (that, she)
• Vowel sounds often change in multi-syllabic “regular” words in non-stressed syllables (“vowel reduction”)
  • about, holiday, market
The Source of Word-Level Reading Difficulties

- The “phonological–core deficit”
- Difficulty in one or more of the following:
  - Phonological Awareness (analysis and/or blending)
  - Rapid Automatized Naming
  - Phonological Working Memory
  - Nonsense Word Reading (i.e., phonic decoding skills)
- Recall that all levels of word reading require phonological skills
- Students with the phonological–core deficit do not naturally develop the phonological skills that are the foundation of the next level of reading development
- There is no statute of limitations on the impact poor phonemic skills have on word reading

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Conclusion

- Phonological skills are essential for all levels of word reading development
  - From letter–name knowledge in pre–K/K to quickly adding new words to the sight word vocabulary in proficient older readers
  - This is largely unknown outside the research community
- Assuming adequate effort & opportunity, the phonological–core deficit is the source of word–reading difficulties
  - Poor word readers may display different “symptoms” and severity levels based on where they fall along the continuum on each of the elements of the phonological–core deficit (i.e., PA, RAN, WM, phonic decoding)
- *Phonemic awareness skills are underrated!*
- **Note:** Our inadequate assessment of phonemic awareness
  - Segmentation vs. manipulation
  - Untimed vs. Timed
  - Follow up resources on this

Preventing Word-Reading Difficulties

Research suggests it’s easier than you think!
The Sad Story About RTI - 1

- RTI was prompted by some amazing results from the reading research
  - Research showed we could prevent 50% to 75% of reading problems by how we do general education reading instruction in K–1
    - These results were the impetus of Tier 1 of RTI
  - Research showed we could reduce reading difficulties in at-risk to a similar degree (i.e., 50% to 75%)
    - These results were the impetus of Tier 2 of RTI
  - Research showed the most severely reading disabled students could make very large gains, with a substantial minority developing “normalized” skills
    - These results were the impetus of Tier 3 of RTI

The Sad Story About RTI - 2

- RTI was a large-scale attempt to capture those amazing results
- Implementation of RTI focused on the framework and the process of this multi-tiered approach
- The original teaching approaches and intervention techniques that produced these amazing results were never adequately communicated!
- Yet, teachers were charged with using research-based approaches but never told what those were
- All programs on the market claim to be research based
  - No protection for the term “research-based”
The Sad Story About RTI - 3

- The most common reading remediation approaches for Tier 2 and Tier 3 have been shown to have limited ineffectiveness in study after study
  - Far below the results in studies that prompted RTI
- A federal report from November 2015 said Tier 2 of RTI is not working
- The rest of the presentation will describe the highly successful prevention and intervention approaches that prompted RTI but were not adequately communicated

Research on Prevention

- Numerous studies on K–1 instruction formed the basis of the National Reading Panel (NRP) report
  - Many other studies also supported those findings but did not “make the cut” for the NRPs review
- The NRPs findings from their review of research helped form the basis of Tier 1 of RTI
- A major study by Foorman et al., (1998) also helped inspire RTI Tier 1
Research on Prevention

- Providing explicit, systematic instruction in letter-sound skills **AND** explicit, systematic instruction in *phonological awareness* dramatically reduces word reading difficulties
- This is so well established that a top research journal will no longer accept studies on this! (because it is beating a dead horse)
- However, it seems folks heard the message about letter-sound instruction, but not about systematic phonological awareness instruction
- There is little evidence that systematic instruction in phonological awareness is common in schools

Notes on the Prevention Findings

- Phonological-core deficit students benefit from letter-sound and phonological awareness (PA) training more than typically developing readers
  - K–1 phonics and PA training provide measurable reading benefits to typically developing readers through late 2nd to 3rd grade
  - Such benefits typically wash out by 4th–5th grade
    - This is because students without the phonological-core issues develop letter-sound proficiency and phonemic proficiency even if never taught, simply by exposing them to literacy activities
    - So, even if never taught these skills, typical readers catch up with phonic-trained and PA-trained typical readers by 4th–5th grade
Notes on the Prevention Findings

• Teaching explicit letter-sound skills without explicit PA skills in K–1 only prevents reading difficulties among a small portion of phonological-core deficit students.

• Without the explicit PA training, the letter-sound training has limited benefit.
  • Remember the reading and PA developmental levels – PA is needed to efficiently advance to the next level of word-reading.
  • This is likely why we have not seen much change since the NRP released their report – we are only attending to half the solution.

Prevention Programs

Letter-Sound/Phonic Programs

• Should be *explicit* and *systematic*
  • Defining these terms

• Many good ones out there
  • No direct research evidence that one is superior to another (among the ones that are explicit and systematic)

• *Pick a letter-sound/phonic program and use it!*

• Pay attention to the nonsense word reading in your universal screening assessments
  • Don’t dismiss poor nonsense word reading if everything else looks good
Prevention Programs

Phonological Awareness Training Programs

- Programs reviewed by the NRP and shown effective
  - *Road to the Code* (Blachman et al.)
  - *Ladders to Literacy* (O’Connor et al.)
  - *Phonemic Awareness in Young Children* (Adams et al.)
    - Dutch version—this is an English translation/adaptation
- Examples of programs that directly implement approaches and techniques that research has shown to be effective yet have not themselves been studied as programs
  - *Phonological Awareness Skills Program* (Rosner)
  - *Florida Center for Reading Research* (online materials – can be printed by schools for free—you paid for it with your tax dollars!)
  - *Equipped for Reading Success* (Kilpatrick)
- There are others out there that vary in how well they implement research findings

Phonological Awareness Training NOTES

- Should be *explicit* and *systematic*
  - Simply doing some phonological awareness activities from time to time will not provide the same benefit
- Some programs designed for Tier 1 whole class, others Tier 1 small groups
- No research evidence to show that one program is more effective than another
- All of the the programs are very inexpensive
  - Purchase of one manual per classroom for $30 to $60 that can be used over and over for years!
  - Yet the result is a 50% to 75% reduction in reading difficulties!

Prevention Programs
Correcting Word-Reading Difficulties

Tier 2 and Tier 3

Research on Intervention

- Studies vary widely in terms of outcome
  - From 0 to 25 standard score point improvements in real word reading and nonsense word reading
- Multiple reviews and meta-analyses looked at the impact of various factors on outcomes
  - Socioeconomic status (SES)
  - Age of student
  - Severity of reading difficulty
  - Group size (i.e., small group vs. one-on-one)
  - Length of intervention
- Contrary to expectations, the impact of these factors were small
Research on Intervention

- A recent review from a different angle had much more encouraging findings (Kilpatrick, 2015)
- There are large differences in outcomes across studies not attributable to SES, age, length of intervention, severity, or group size
- The review focused on standard score gains from nationally normed tests
  - Standard score gains tell us how much students “closed the gap” with same-aged peers
  - Conventional “effect sizes” only tell you how students did compared to a particular control group, not peers in general
  - How effect sizes can be misleading:
    • Vaughn et al. 2012 vs. Torgesen et al. 2010

Research on Intervention

- The review found that based on standard score (SS) points in real/word reading, three groups emerged:
  - Minimal improvement group (0–5 SS point gains)
  - Moderate improvement group (6–9 SS point gains)
  - Highly successful group (12.5–25 SS gains)
- SES, age, length of intervention, severity, and group size were represented in all groups
- Why the difference?
  • They did different things . . .
Research on Intervention

- **Minimal Group (0–5 SS improvements)**
  - All studies provided reading practice
  - Some did explicit, systematic phonics and some did not
  - No intervention without phonics made it out of this 0–5 group
  - So phonics is a necessary but not sufficient
  - None of these studies explicitly or systematically trained phonological awareness

- **Moderate Group (6–9 SS improvements)**
  - All studies provided reading practice
  - All studies provided explicit, systematic phonics instruction
  - All studies provided training in BASIC phonemic awareness
    - Restricted to segmentation and/or blending training
    - Blending and segmentation skills are mastered by typically developing readers by the end of first grade

- **Highly Successful Group (12.5 to 25 SS improvements)**
  - These were the studies that prompted Tier 2 & 3 of RTI!
  - All studies provided reading practice
  - All studies provided explicit, systematic phonics instruction
  - All studies provided training in ADVANCED phonemic awareness
    - Trained the manipulation tasks of deleting and substituting phonemes from any/all places in the word (beginning, middle, end, splitting blends, etc.)
Research on Intervention

• Why advanced PA training is important
  • Recall the concept of phonemic proficiency
  • To instantly delete or substitute a phoneme in a word, segmentation has to be automatic
    • Assessment and training with segmentation tasks do not guarantee this level of automaticity
    • Proficiency in manipulation tasks cognitively mimics the orthographic mapping process
      • In both cases, access to phonemes is automatic and subconscious

Research on Intervention

• Thus, intervention research and word learning research align very nicely
  • Even though they are independent – different researchers and the intervention researchers do not cite the word learning researchers and vice versa
• We must train phonemic awareness to mastery
  • This is equivalent to a 3rd to 4th grade level of skill
  • Current assessment and training stop at an ending first grade level of PA skills (segmentation & blending)
• We haven’t done this because of our unawareness of the role PA plays in sight word learning
  • Most folks mistakenly assume PA is restricted to early phonic skills with no impact on reading beyond that
Now we know why Tier 2 has not been working

• We’ve been using approaches that fall into the minimal improvement group (0–5 SS gains; not the approaches that prompted RTI in the first place!)
  • Reading practice (necessary but not sufficient)
  • Explicit, systematic phonics instruction in the absence of explicit, systematic phonemic awareness training
    • These programs yield 0–5 SS points in real words but 15–25 SS points on tests of nonsense word reading
    • Phonological–core deficit students get stuck at the second level of reading development (phonic decoding)
    • They won’t develop the advanced PA skills needed for orthographic mapping unless directly taught
  • Other non–phonic approaches

Examples of programs that train phonemic manipulation with research support

• A few experimenter–designed programs not commercially available ©
  • Lindamood LiPS Program
  • PhonoGraphix

Examples of programs that train phonemic manipulation that have not been the subject of research study

• Rosner’s Program
• Discover Reading
• Equipped for Reading Success
Summary

- Based upon research we now have a good understanding of how word-level reading develops and why those with the phonological-core deficit struggle in word-level reading
- Letter-sound proficiency and phonemic proficiency are key at all levels of word-reading development
- Instructional approaches that are consistent with word-reading development prevent and correct reading difficulties
- Instructional approaches that are not consistent with our understanding of word-reading development have limited results

Summary

- Research indicates we can prevent most reading difficulties
- It also shows we can correct most reading difficulties
  - Some can be “normalized”
  - Others will not be normalized but will be reading better than we have previously experienced
- This is true regardless of disability category
  - SLD, SLI, ED, ID, OHI & non-labeled weak readers
THANK YOU

- David A. Kilpatrick, PhD
  kilpatrickd@cortland.edu