

# RTI: Selecting and Implementing Evidence-Based Reading Interventions

Carolyn Denton, Ph.D.

Department of Pediatrics

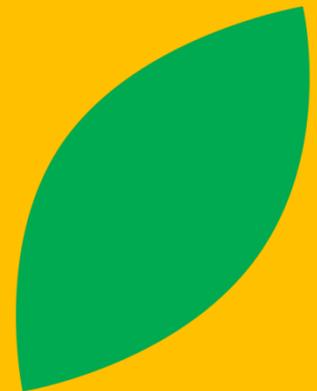
University of Texas Health Science

Center Houston



- Current Understanding of Reading Difficulties and Disabilities
- Core Principles of RTI
- Evidence-Based Instruction and Intervention for Primary-Grade Readers
- The Implementation of Reading Interventions in RTI
- RTI in Reading in Middle School
- Schools that “Beat the Odds”

# Current Understanding of Reading Difficulties and Disabilities

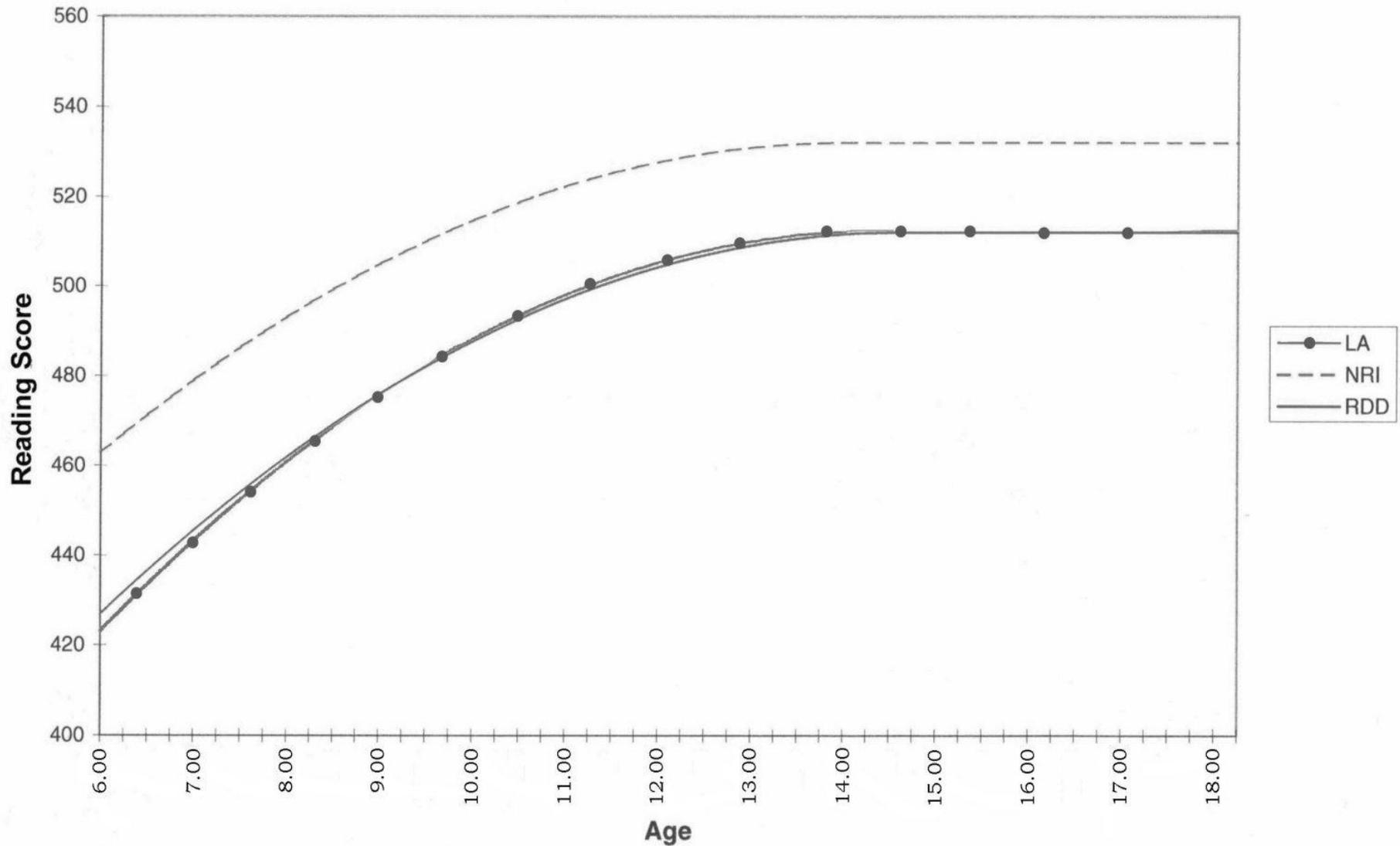


# ***Children Do NOT Outgrow Reading Difficulties***

A child who is a poor reader at the end of first grade has an almost 90% chance of remaining a poor reader at the end of Grade 4 (Juel, 1988) and at least a 75% chance of being a poor reader as long as they are in school (Francis et al., 1995)

....unless we provide quality intervention!

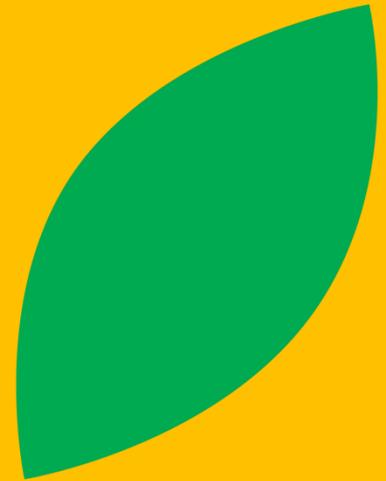
# Francis et al. (1996)



# Keep in Mind...

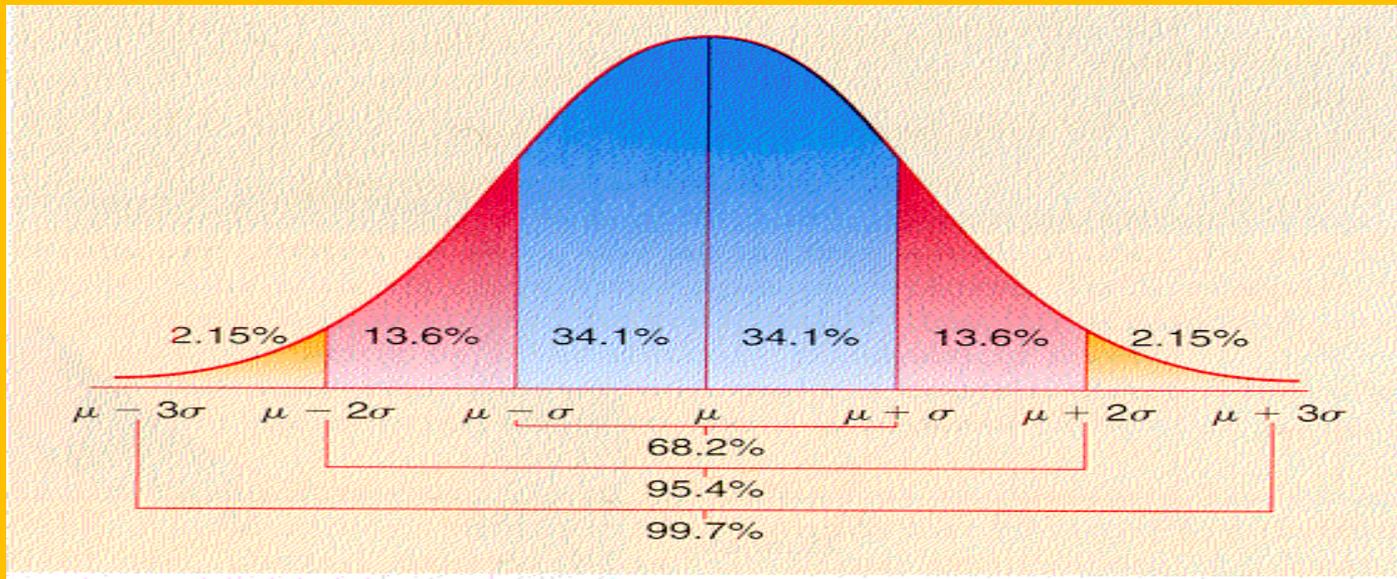
*Students who are performing below grade level will only close the gap with their classmates if they learn **FASTER** than other students.*

***More Instruction**  
**Efficient Instruction**  
**More Practice***



# Reading difficulty and disability

- *Is variation on normal development* (like high blood pressure or obesity, not the flu or cancer)
- Is caused and influenced by several different factors



← Ease of Learning to Read (*Talent*) →

**The typical school approach to students with reading difficulties assumes that the problem is “within the student” and that this is a finite condition.**

# Reading Disability

- By far the most common type is **dyslexia**
  - **Primary characteristic:** Poor ability to read words, especially when presented in lists
  - **Primary underlying cause:** Poor phonemic awareness (ability to hear and manipulate sounds in words), NOT “seeing backwards”
- Less common are disabilities in comprehension and speed of processing text (fluency)

# Comprehension Difficulties

- Many students with comprehension problems also have word reading problems—even in middle and high school.
- Students with adequate word reading but poor reading comprehension also have problems with comprehending oral language

# Causes of Reading Difficulties and Disabilities

- **Genetic:** A Genetic *Predisposition* (about 60% heritable)
- **Environmental:** Economic disadvantage (health care, preschool education opportunities, etc.); print exposure, parental literacy, oral language usage in the home and community, time spent reading to the child; ***not receiving appropriate instruction***
- **Neurological:** Affected by both genetic and environmental influences

Reading failure is caused by the *interaction* between features of instruction, the materials used, and student characteristics.

# Reading Difficulties and the Brain

The way the brain functions when doing reading tasks is different in people with serious reading difficulties (and in children at-risk for serious RD) and normally functioning readers.

But can this be changed?

# Neural Response to Intervention

**Does the pattern of brain activation change in response to intervention?**

- 8 students with severe dyslexia
- 8 week intense phonologically- based intervention (2 hours a day= up to 80 hours of instruction)
- 1:1 in a reading clinic (during the summer)
- 2 hours a day = up to 80 hours of instruction

Simos et al., *Neurology*, 2002

# Demographic Information and Reading Scores

Child	Gender	Age (years/mo)	WJ-III pre (%)	WJ-III post (%)	IQ	Medication
1	M	15	13	55	103	Adderal
2	M	10	2	59	95	Ritalin
3	M	10	2	38	110	Ritalin
4	F	8	3	55	105	Ritalin
5	F	7	2	50	110	Ritalin
6	M	7	18	60	101	—
7	M	11	1	38	98	Ritalin
8	M	17	1	45	102	—

# The Power of ***INSTRUCTION***

- Poverty
- IQ
- Family status
- Language levels
- Genetic predisposition
- Neurological processing patterns

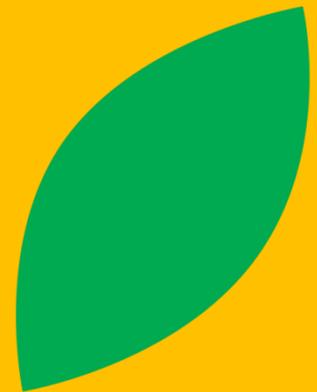


***INSTRUCTION*** MAKES THE ***DIFFERENCE!***

# One-Sentence Reaction

How might our current understanding of reading difficulties and disabilities affect practices in your school or classroom?

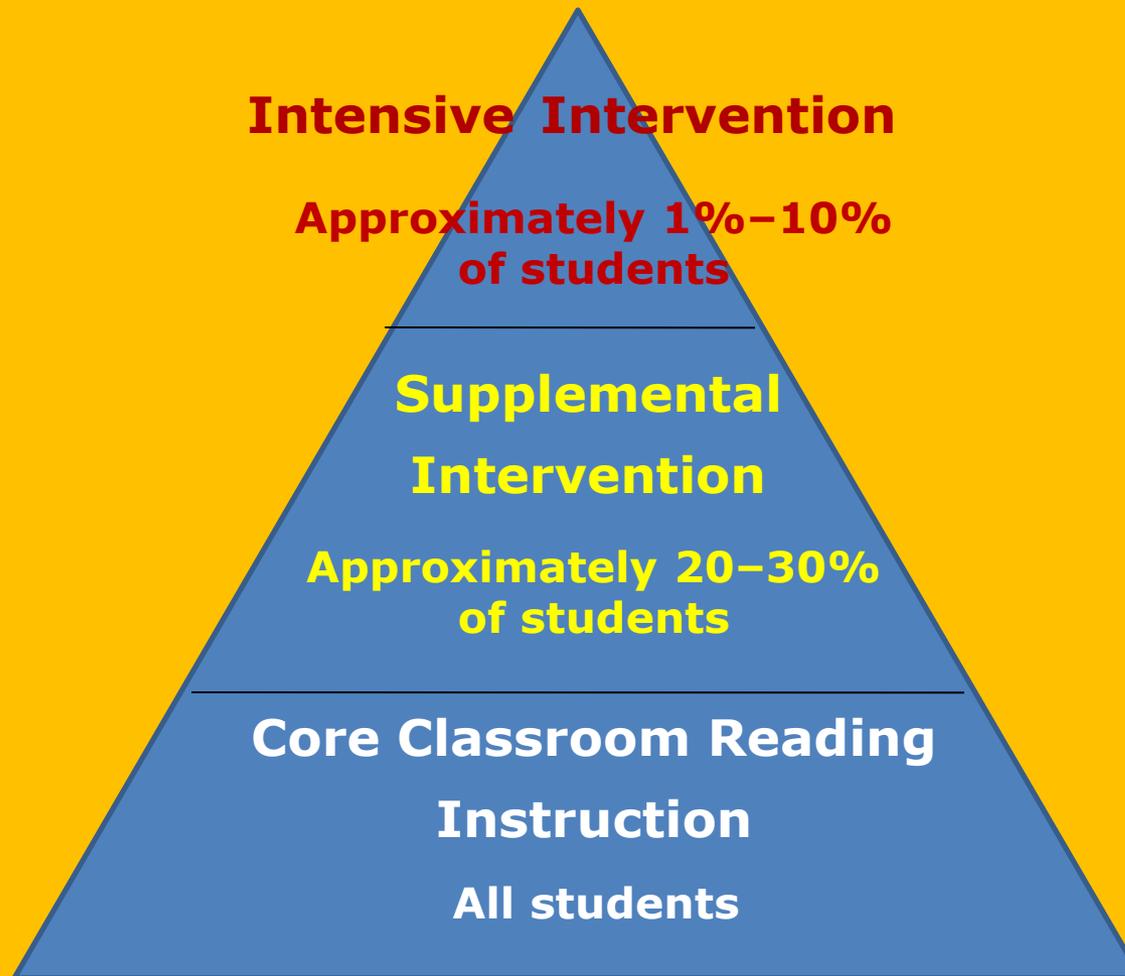
# Core Principles of Response to Intervention (RTI)



“Response to Intervention (RTI) is a comprehensive early detection and prevention strategy that identifies struggling students and assists them before they fall behind. RTI systems combine universal screening and high quality instruction for all students with interventions targeted at struggling students.”

Gersten et al., 2008  
What Works Clearinghouse  
Institute of Education Sciences  
US Department of Education

# A 3-Tier Intervention Model



# Identification of Specific Learning Disabilities

Data documenting how a student responds to evidence-based, quality reading intervention may be used **as a component of the process** of identification of a reading disability.

“It is **critical** that educators view RTI as a school-wide, multi-tiered prevention/intervention approach that is **aimed at meeting the learning needs of ALL students**, not just as part of the identification process for students with learning disabilities as referenced in IDEA 2004.”

Colorado Dept. of Education Exceptional Student Services  
Unit, 2006

# Core RTI Principles

- We can effectively teach all students.
- Intervene as early as possible.
- Use a multi-tier model of service delivery.
- Screen all students to locate those in need of intervention.
- Monitor student progress to inform instruction.
- Use data to make decisions. Data-based decision-making is **central** to RTI practices.
- When possible, use programs **validated by scientific research**. When research-validated programs are not available, use **evidence-based interventions and instruction**.

What are research-validated programs?



What Is evidence-based instruction?

“Teachers, want, above all, to provide instruction that makes a genuine difference in the lives of their children.”

Lyon, 2000

# Two Acceptable Standards

## Research-Validated Programs

- The programs or teaching approaches themselves were **directly studied**
- Research was of **high quality**
- Program demonstrated **significantly better outcomes than a comparison condition**
- **More than one study** found similar results

## Evidence-Based Programs and Practices

- Programs and teaching approaches **have characteristics that are known to be effective for struggling learners.**
- These characteristics are **derived from converging evidence** from multiple scientific studies.

# Evidence-Based Instruction

- According to the publishers, *everything* is “research-based” or “evidence-based”
- How can we really know what will work best for our students?

***High-  
Quality  
Reading  
Research  
Student  
Data***



***Intuition  
Testimonials  
Poor-Quality  
or Biased  
Studies***

# Evidence-Based Instruction

High-quality scientific research controls for competing explanations for the findings so that you can trust the conclusions

- Random assignment

and/or

- Matched groups with assessments before and after the intervention to “equate the groups”

# Evidence-Based Instruction

- Quality scientific research can indicate that a program is likely to be successful if it is **implemented as it was in the study** (with high fidelity)
- Research will *not* tell you what will work with every single child
- It can tell you what is *more likely* to work for most children

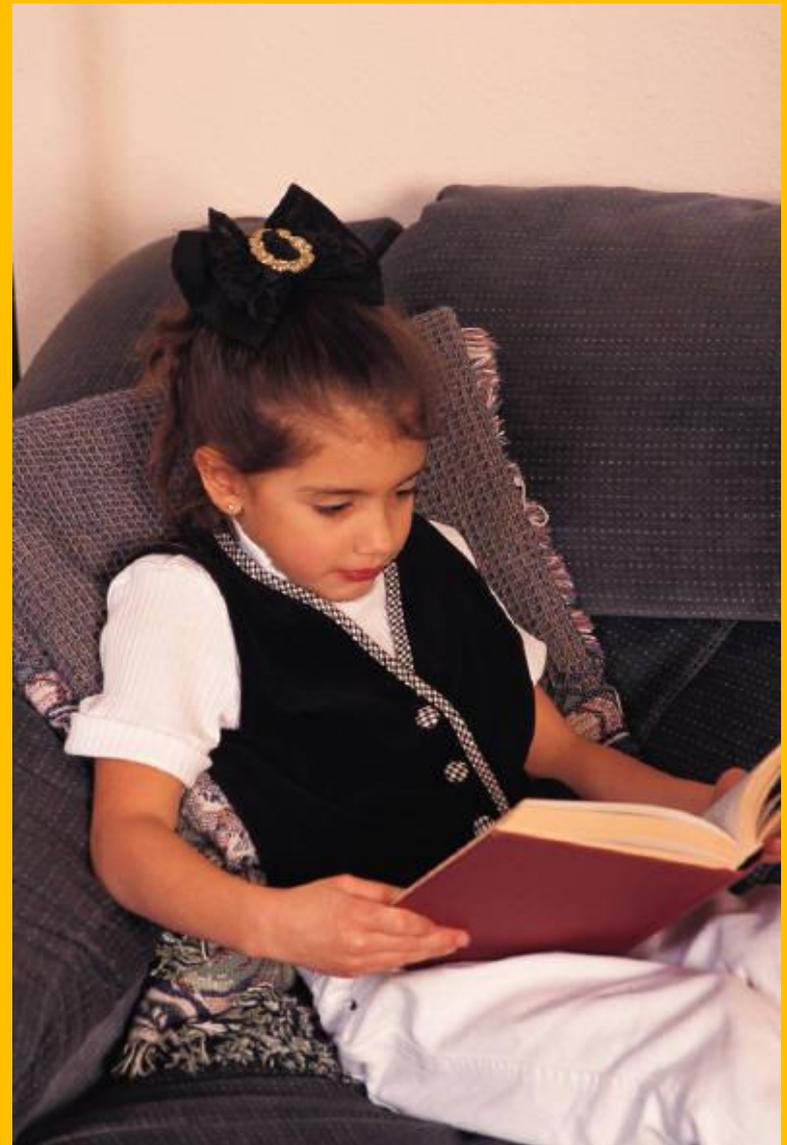
# Evidence-Based Instruction

The use of teaching approaches that are not grounded in quality research and that result in a high percentage of students failing to learn to read **“is analogous to a surgeon choosing to perform a procedure that has a 19% mortality rate over one that has a 10% rate because (1) it is easier to do, (2) the surgeon is trained in it, and (3) the surgeon simply likes it better.”**

Walker, Ramsey, & Gresham, 2004

**The more well-conducted research converges on the same findings, the more we can rely on the findings.**

**Research in early reading conducted over the past 25 years has converged on a set of findings that should inform our selection and implementation of reading programs.**



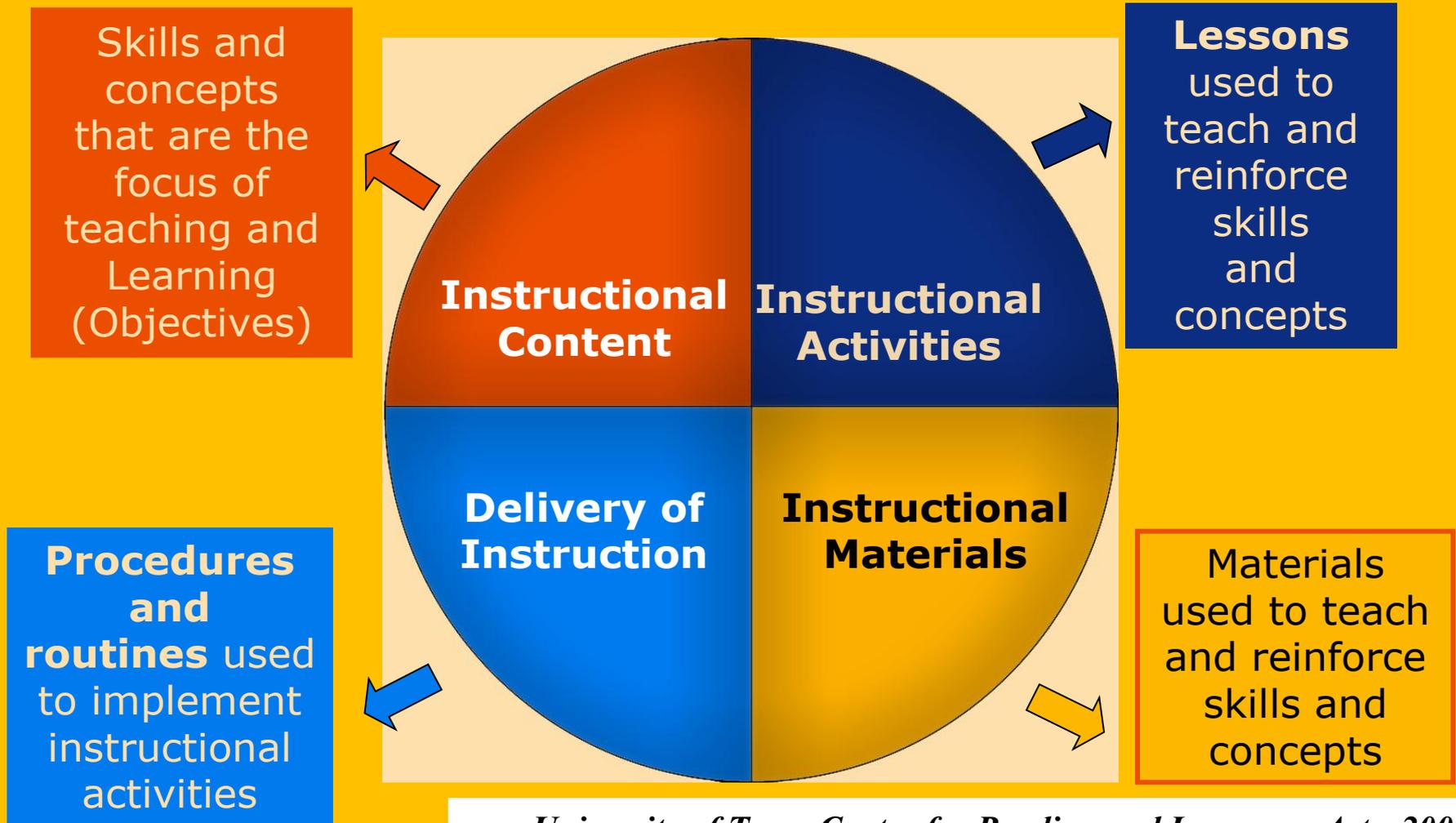
# Evidence-Based Instruction and Intervention for Primary-Grade Readers



# Tier 1 Classroom Reading Instruction

- Adoption of an **evidence-based core program** makes quality instruction more likely
- **Differentiated Instruction**
  - What are the other students doing?
  - Purposeful activities, provide independent practice on objectives that have already been taught
  - Students understand what to do and are successful
- **Adaptation** of Instruction When Needed

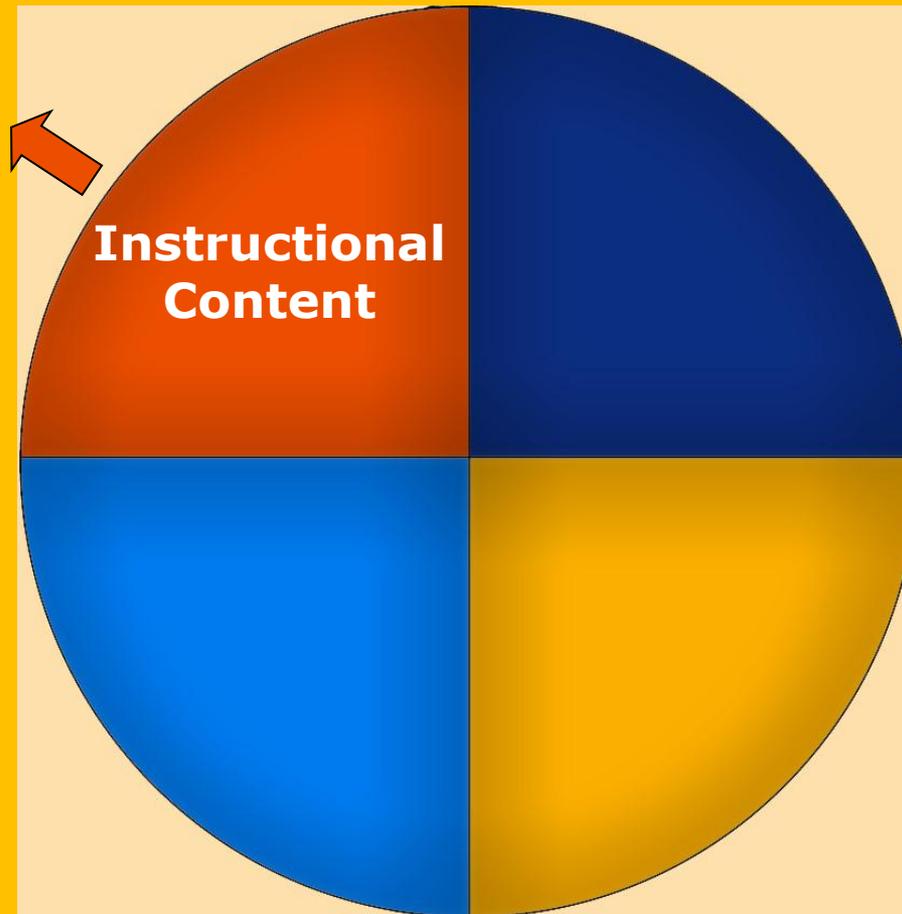
# Adaptation Framework



*University of Texas Center for Reading and Language Arts, 2003  
From Bryant & Bryant, 2003; Bryant, Smith, & Bryant, 2008*

# Adaptation Framework

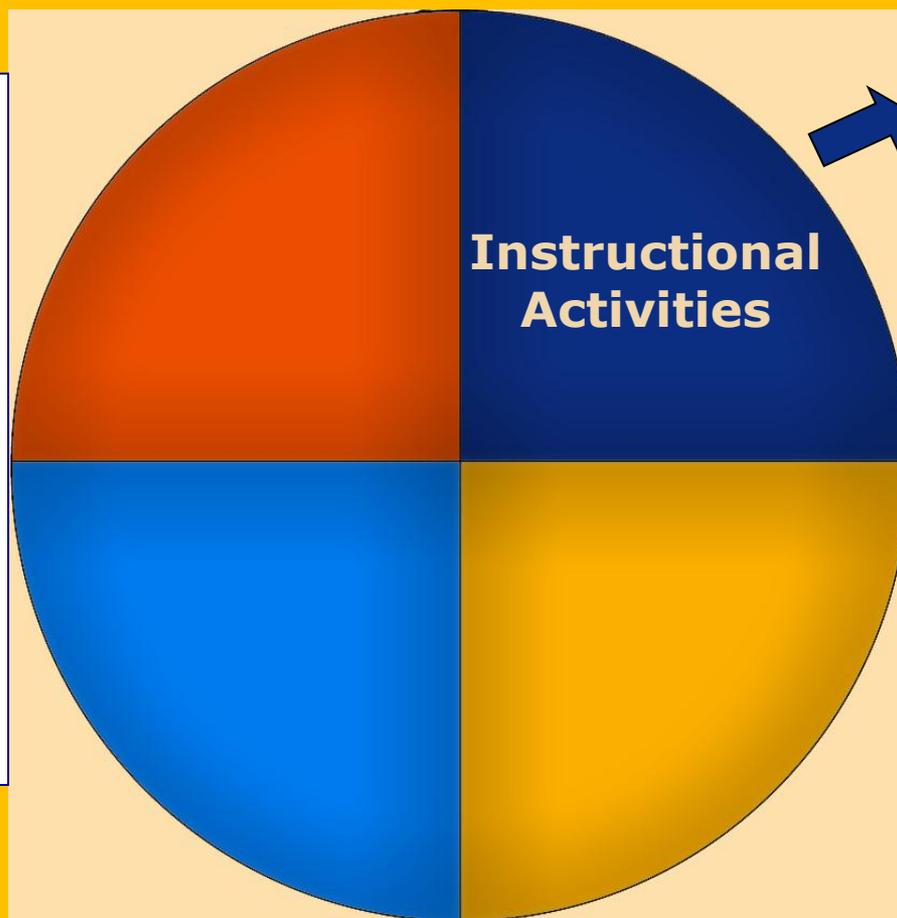
**Skills and concepts that are the focus of teaching and Learning (Objectives)**



- Segment and blend CCVC Words
- Sound out words with r-control vowels
- Read grade-level text at 45 wcpm
- Locate the most important idea in a paragraph

# Adaptation Framework

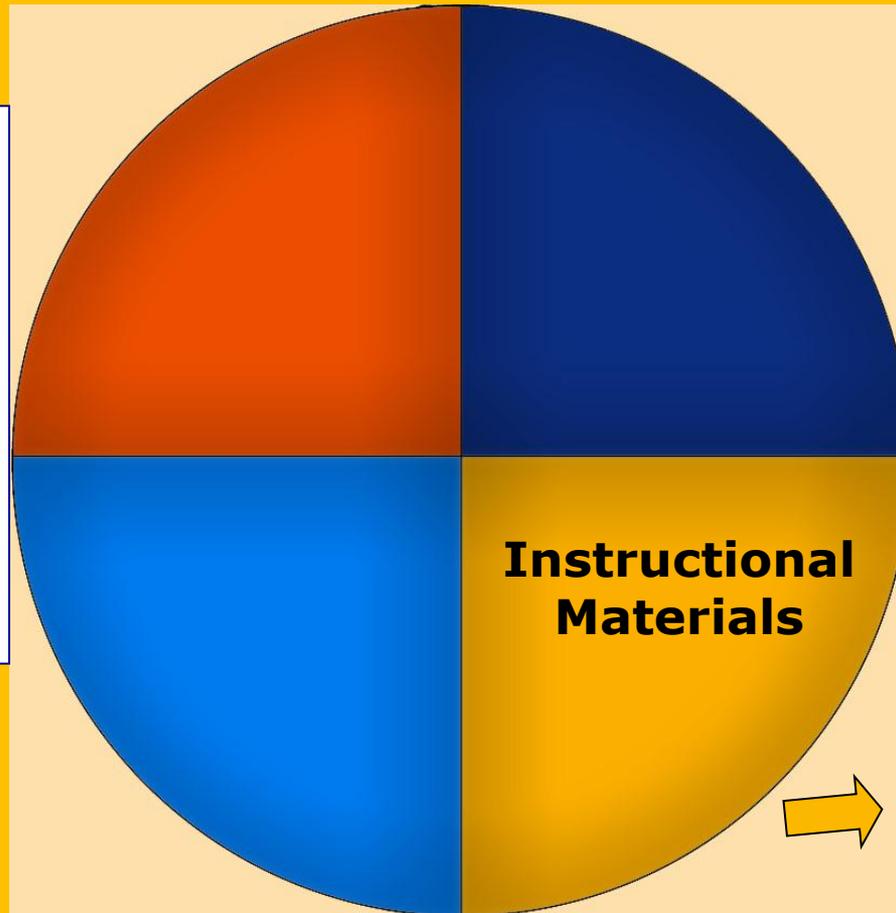
- Introduce the new letter sound
- Provide guided practice
- Provide independent practice



**Lessons  
used to  
teach and  
reinforce  
skills  
and  
concepts**

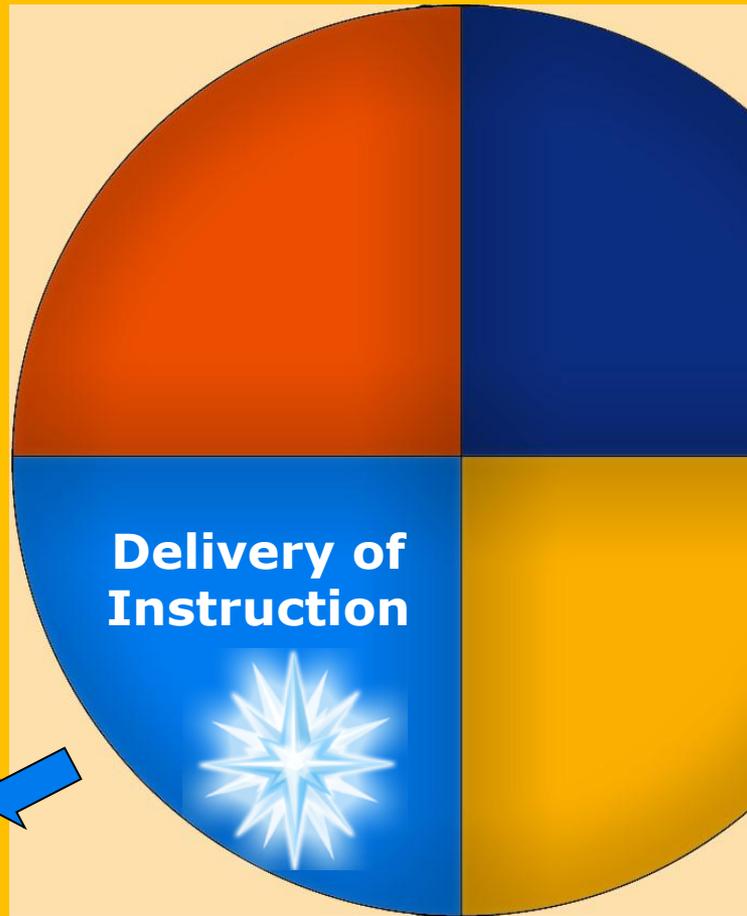
# Adaptation Framework

- Instructional-level text
- Decodable text
- Magnetic letters or letter tiles



**Materials  
used to  
teach  
and  
reinforce  
skills and  
concepts**

# Adaptation Framework



**Procedures  
and  
routines  
used  
to  
implement  
instructional  
activities**

- Decrease group size
- Make instruction visible and explicit
- Provide additional practice
- Adjust pacing
- Divide tasks into smaller steps

# Tier 2 Interventions



# Study of First Grade Reading Intervention

(Mathes, Denton, and others, 2005)

- At-risk first graders randomized within schools to Intervention 1, Intervention 2, or Typical School Practice
- Daily 40 min. lessons, Groups of 3-4, about 30 weeks
  - Provided in addition to quality classroom instruction in a “pull-out” format
  - Taught by certified teachers



Research supported by Grant # NSF 9979968;  
Interagency Educational Research Initiative.

# Proactive Intervention\*

- Explicit instruction in synthetic phonics, with emphasis on fluency
- Carefully constructed scope and sequence designed to prevent possible confusions
- Scripted program with time dedicated to practice in phonics skills outside of text reading
- Skills applied in fully decodable text
- Mastery tests



*\*Now SRA Early Interventions in Reading,  
Mathes & Torgesen, 2005*

# Responsive Reading Instruction

- Explicit instruction in synthetic & analogy phonics
- Less time spent practicing letters and words in isolation
- Students apply decoding, fluency, & comprehension skills while reading and writing
- Not scripted; teachers plan lessons based on continuous diagnostic assessment
- Leveled text; not decodable
- Differs from guided reading in that “sounding out” is the primary strategy for identifying unknown words



*Denton & Hocker, 2005*

# Results

- Students in both Proactive and Responsive groups performed significantly better than at-risk students in the same schools who did not receive the researcher-provided interventions in phonological awareness, word reading (timed and untimed), spelling, and oral reading fluency
- Two interventions had very similar results; Proactive did better in non-word reading (phonemic decoding)

# Growth in Word Reading by Intervention Group



# What percentage of children did **not** respond adequately to intervention?

(Woodcock Basic Reading Cluster < 30<sup>th</sup> percentile)

## Tier 1 Only:

16% (about 3% of school 1<sup>st</sup> grade population)

## Tiers 1 and 2:

- **Proactive:**  $1/80 = < 1\%$  (about .2% of school population)
- **Responsive:**  $6/83 = 7\%$  (about 1.5% of school population)

Mathes, Denton, Fletcher, Anthony, Francis, &  
Schatschneider (2005)

# Implications

- There is **not one** “magic program” to teach students with reading difficulties
- Various reading programs have produced good results
- They put different demands on teacher time and expertise (e.g., scripted, unscripted).
- They have some **common characteristics**

# Essential Characteristics

## Common to Successful Interventions

- *Integrated* instruction in key areas of reading, targeting students' needs: phonemic awareness, phonics, fluency, vocabulary, comprehension
- Explicit instruction
- Systematic instruction
- Small-group instruction with active engagement and little “down time”
- Extended opportunities to practice with feedback
- Opportunities to apply skills and strategies while reading connected text with teacher feedback
- Use of data to provide targeted instruction

# Explicit Instruction

- Clearly explain or show students what you want them to learn
- Students do not have to infer what they should learn
- *Students who are easily confused are more likely to be successful.*

# Explicit Instruction

- Purposeful planning with a clear objective
- Model and teach clearly
- Guided practice with clear feedback, specific praise, and scaffolding
- Independent practice
- Cumulative practice
- Continuous assessment
- Reteach as necessary

# Basic Instructional Format

- ✓ **Model and teach (“I do”)**  
Show students the correct way.
- ✓ **Guided practice (“We do”)**  
Students do it with teacher support.
- ✓ **Independent practice (“You do”)**  
Students practice alone.
- ✓ **Cumulative practice**  
Students practice new items along with items already learned.



# Systematic Instruction

- Based on a scope and sequence
- Thoughtful *plan* and *purpose* for instruction
- Sequence of instruction ensures key skills are mastered
- Easy to hard
- Separate possible confusions
- Frequent reviews

# Active Student Involvement

- Little “Teacher Talk”
- Quick pacing
- Little “down time”
- May include manipulatives
- Daily reading practice scaffolded by the teacher



# The Importance of Practice

- Provide many opportunities for **monitored practice.**
- Students need extended practice **over time.**
- What is practiced ***becomes a habit.***
- ***Caution: Don't let students practice their mistakes!***



# Feedback

- Students need to know when they've made mistakes.
- Don't let students practice their mistakes.
- Errors are opportunities for teaching.
- Provide feedback in a **neutral** tone
- Do not underestimate the power of **specific, honest** positive feedback

# Meaningful Reading and Writing Practice (Guided Application)

- Students apply skills and strategies in reading and writing.
- Teacher (or trained tutor) provides scaffolding, prompting and both corrective and positive feedback.
- At-risk students do not “automatically” apply the skills they have learned



See Handout 1

# Popular Strategies of Struggling Readers When they Encounter Difficult Words

- Guessing words
- Looking at pictures instead of print
- Skipping words
- Waiting to be told words
- Mumbling

# A Strategy for Reading Unknown Words

## Three-Step Strategy



Look for parts you know.



Sound it out.



Check it.

Denton & Hocker, 2006

# Scaffolds

## Look for parts you know.

- Do you see any letters you know?
- What sound does this letter make?
- Do you see any parts you know?

## Sound it out.

- Say it slowly.
- Can you sound out this part?
- What's the first sound? Now sound out the next part...

## Check it.

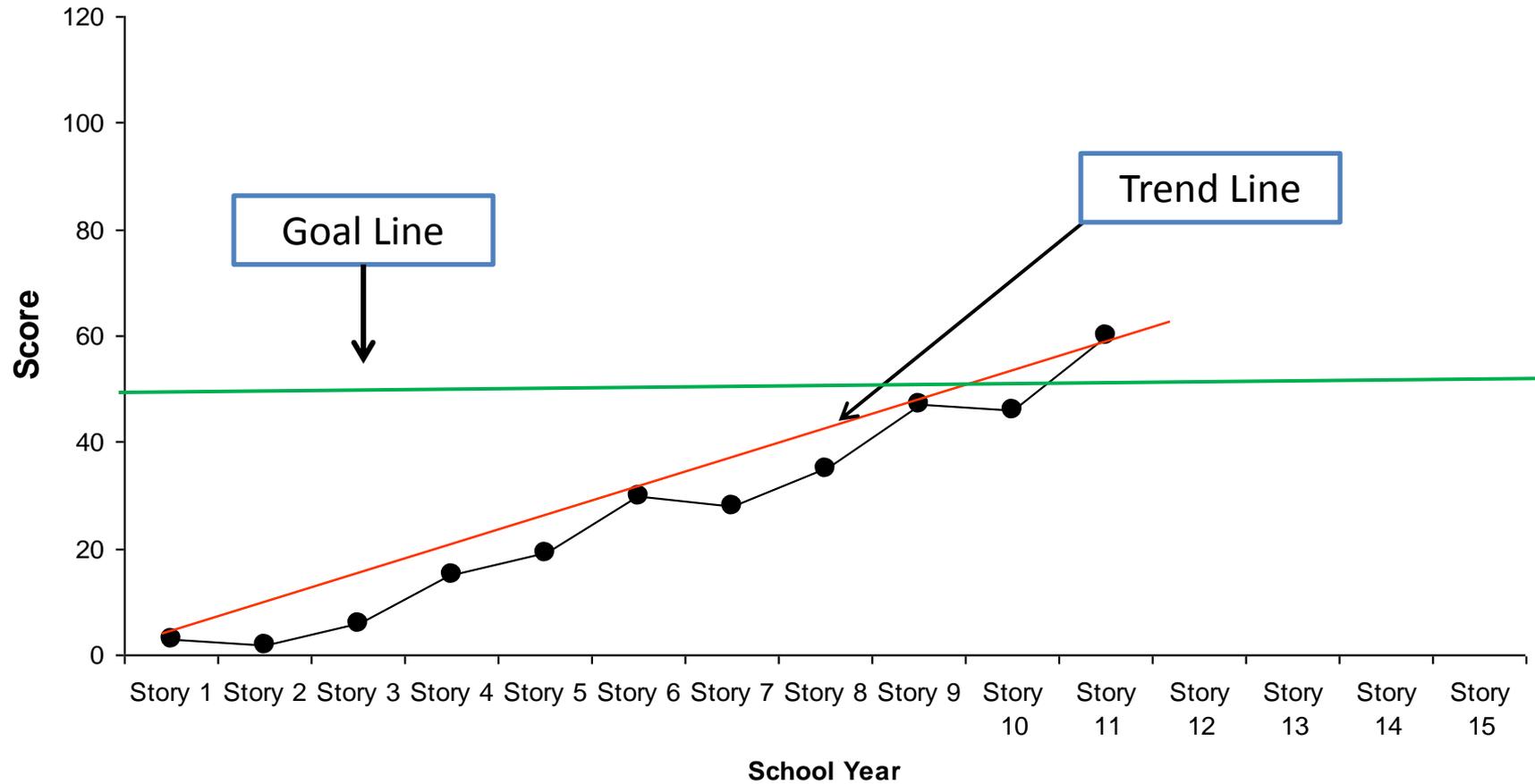
- Did that make sense?
- Did that sound right?

# Data-Based Targeted Instruction

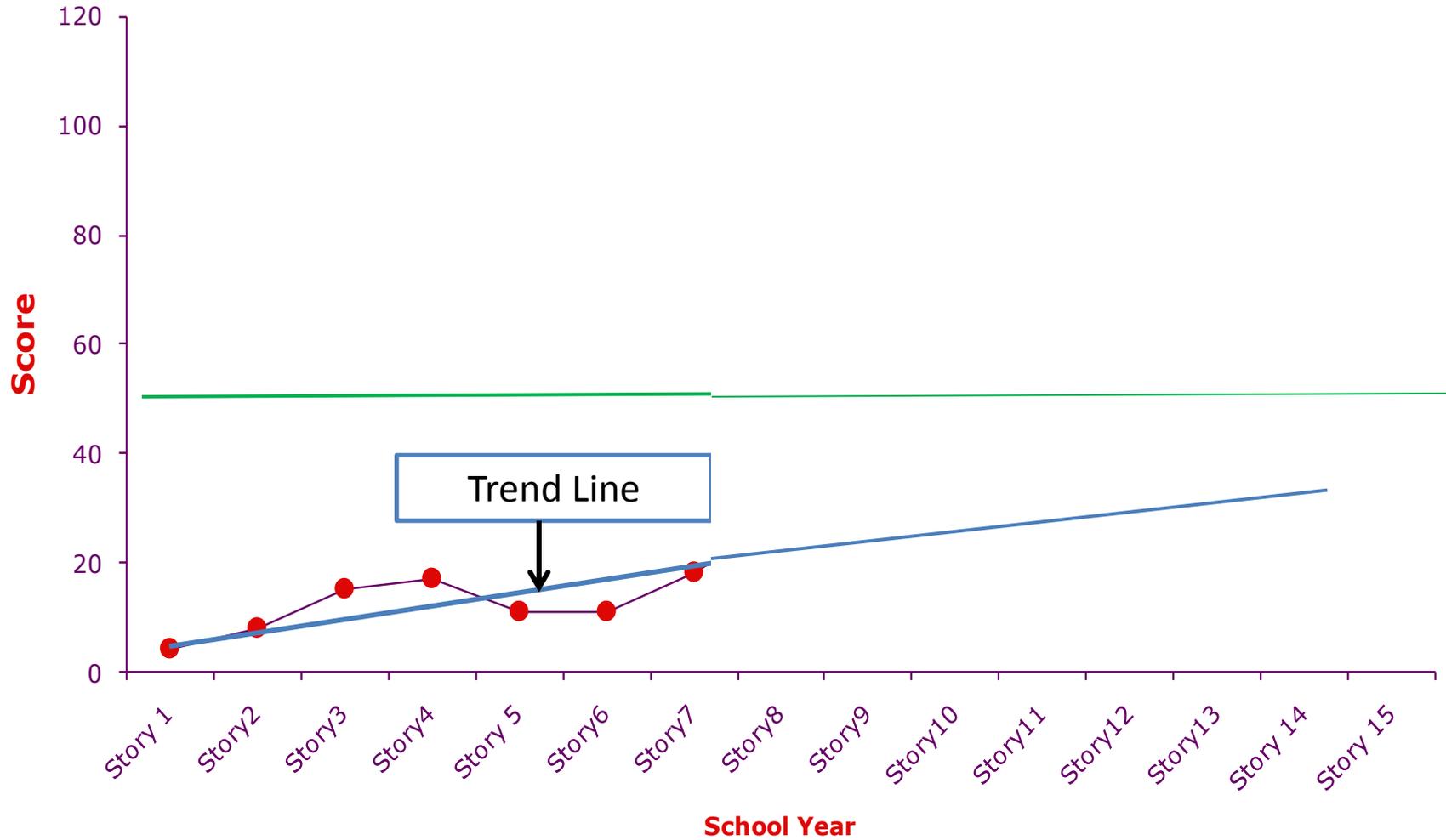
- Meet students where they are; go from the *known* to the unknown.
- Use **progress monitoring** data to inform instruction.
- Plan lessons based on **diagnostic assessments**.
- When instruction is not appropriate for the student, behavior problems are common



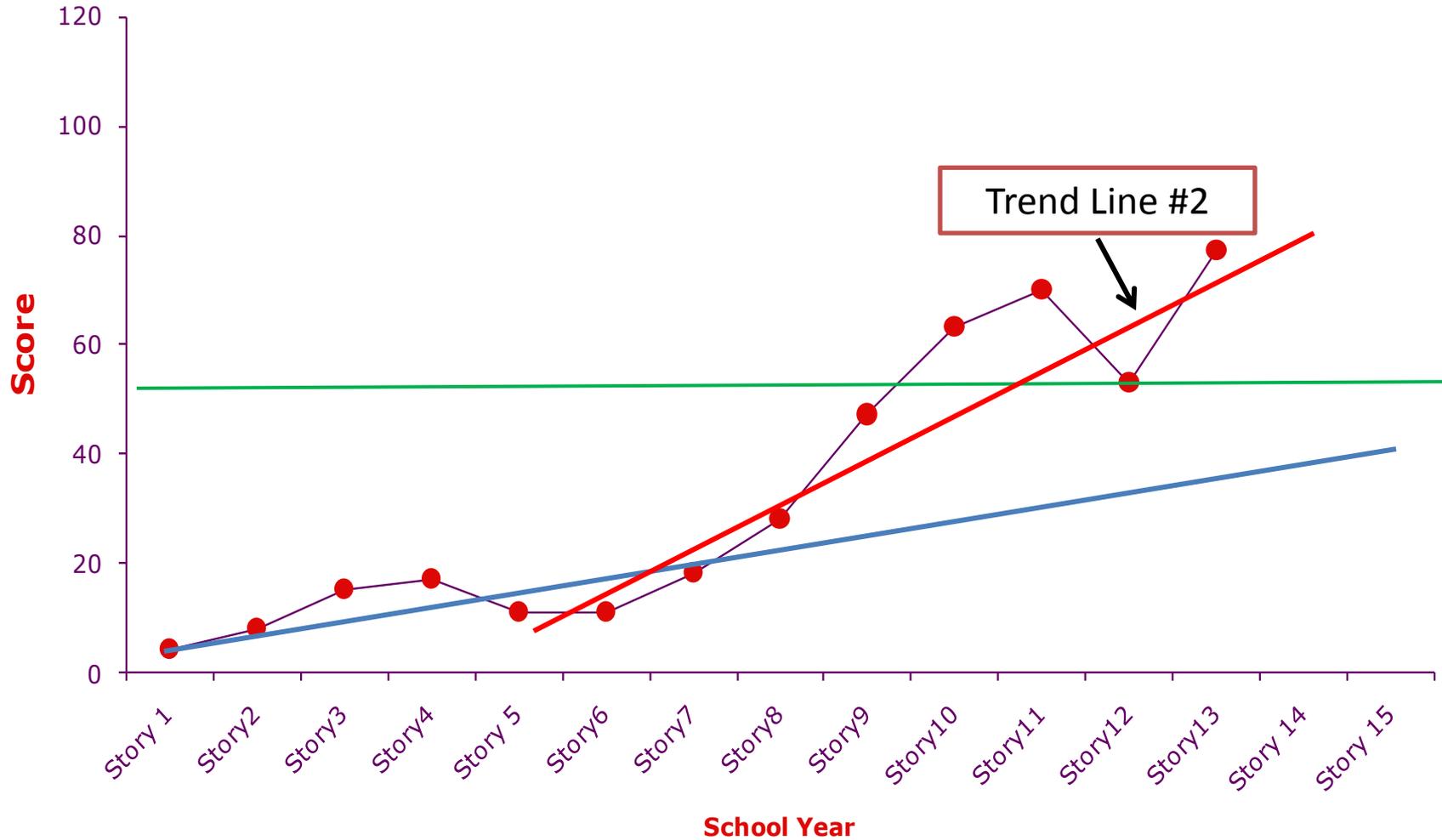
# Growth in Oral Reading Fluency for Imari



# Growth in Oral Reading Fluency for James



# Growth in Oral Reading Fluency for James



# Selecting Tier 2 Programs



**Select a “Research-Validated” program**

*or*

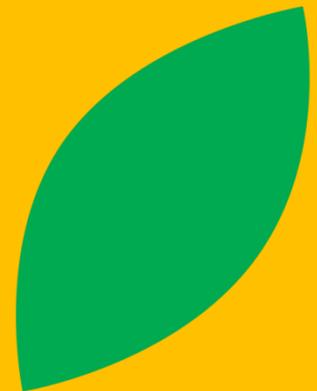
**Select a program with these key evidence-based characteristics**

See Handout 2

# Adapting Instruction Using Evidence-Based Practices

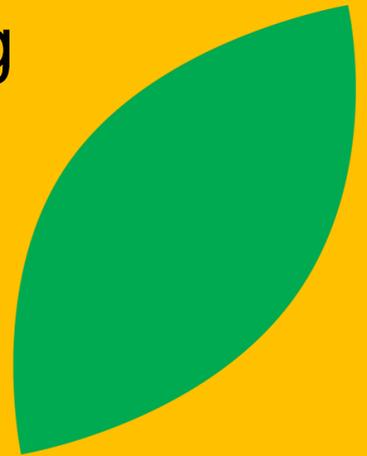
- Imagine that a first grade teacher has taught a lesson on sounding out silent e words
- One group of students impulsively guesses words rather than using sounding-out strategies
- How might the teacher adapt instruction for this group in a small group lesson?
- Think about all 4 types of adaptations.

# Tier 3: Intensive Intervention



# Characteristics of Many Students in Tier 3

- Difficulties **reading single words**
- **Oral language difficulties** (vocabulary, word retrieval)
- Poorly-developed **background knowledge**
- Difficulties with **verbal working memory**
- Impaired **executive functions** (attention, purposeful use and regulation of reading strategies; identifying what is important; self-monitoring)
- Low **self-esteem**
- Low **motivation to read**
- **Social and behavioral difficulties**



# A Complex Picture

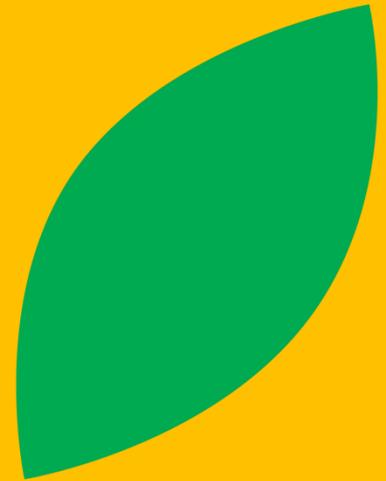
- **Many students with RD also have other conditions that affect learning**
- Anxiety, behavior disorders, etc.
- **Attention problems**
  - About 25% of children with ADHD also have RD, and about 25% of children with RD also have ADHD
  - It is *Inattention*, not hyperactivity, that is related to RD
  - Children with both disorders are more severely impaired and resistant to remediation
  - A study in progress is evaluating treatments for children with both disorders: I-CARD (Interventions for Children with Attention and Reading Disorders)

What kind of intervention is effective for students who don't respond adequately to effective, relatively intensive Tier 1 and 2?



# What Does Intensive Reading Intervention Mean? Think about “Intensive Care”

- **Very small groups**
- **Increased dosage**
- **Appropriate curriculum**
- **Powerful instruction**
- **Constant monitoring**
- **A sense of urgency**
- **Collaboration among teachers**



# Three Tiers of Instruction in the Primary Grades: One Example with Less Intensive Tier 2 Intervention

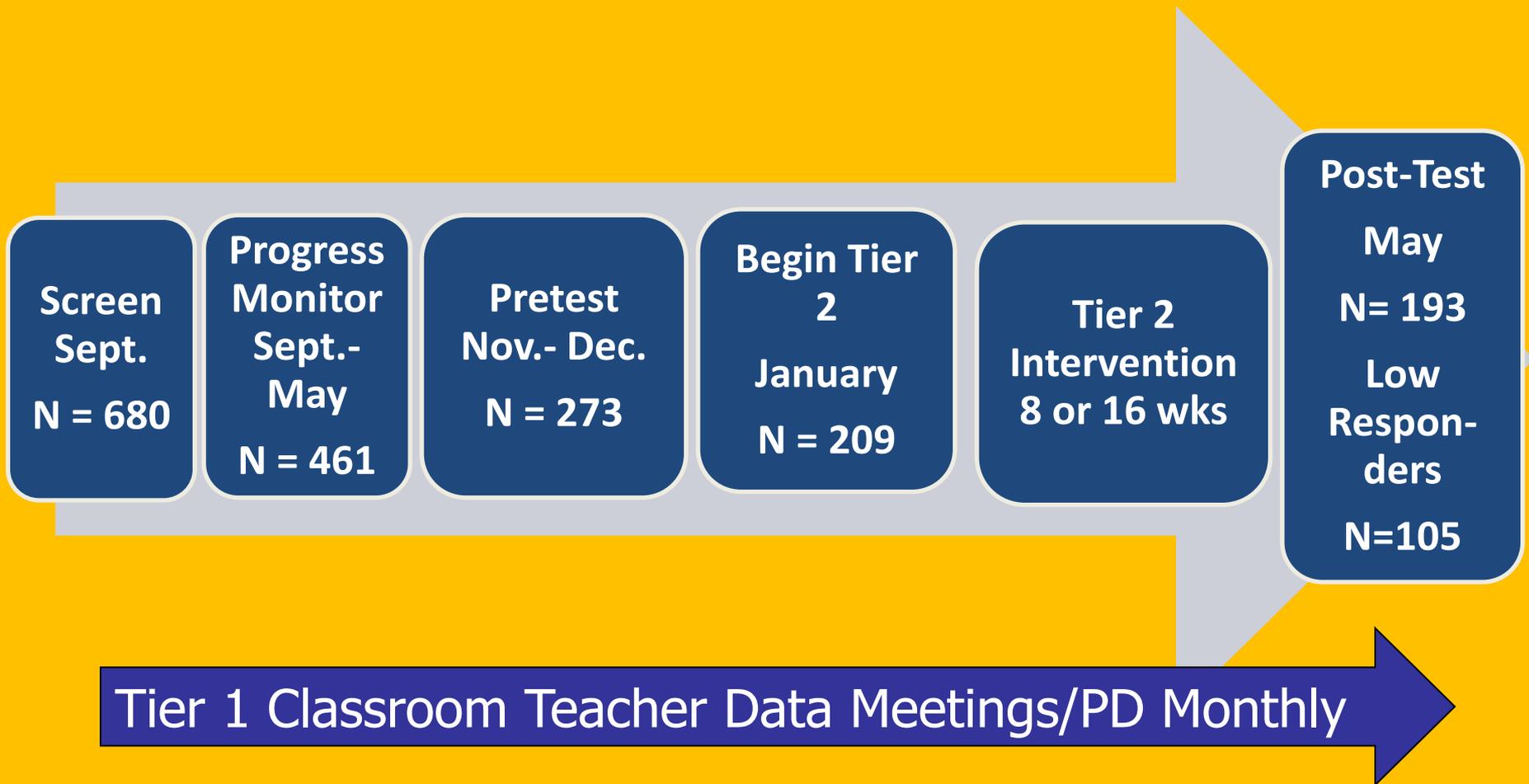
Denton, Cirino, Barth, Romain, Vaughn, Wexler, Francis,  
& Fletcher (2011)

Denton, et al., manuscript under review

# First Grade Study

- Compared outcomes for Tier 1 intervention Plus Tier 2 intervention provided for 1 semester on 3 schedules
- 9 schools in 2 school districts
- Identified instructional characteristics that impacted student outcomes

# Timeline: First Grade Year



# Supporting Tier 1

- Provided **graphs of progress monitoring data**
- Regular **data meetings** with classroom teachers: examined progress monitoring data for their 3 lowest students (Tier 3 or Typical Practice)
- Provided Brief PD on **adapting instruction in Tier 1** to increase use of evidence-based practices
- In-class **coaching** on request

# Tier 2 Intervention

- First Grade Tier 2: Screened students in the Fall and monitored progress for 8 weeks, then selected Tier 2 students
- Provided Tier 2 “pull-out” intervention beginning in January on three schedules for 8-16 weeks (30 min. lessons)
- Highly Standardized (scripted) intervention provided by paraprofessionals
- **Results were not as strong as in previous studies with more intensive Tier 2 intervention**

# Tier 3 Timeline

Randomized to Tier 3  
Intervention or Typical  
School Practice

**N = 103**

Two Schools  
Dropped Out,  
Students Moved,  
etc.

**N = 72**

Tier 3 Intervention  
Oct.-April

**N = 47**

Typical Practice

**N = 25**

# Study of Individualized Tier 3 Intervention

- Identified those with inadequate response to Tiers 1 + 2 in word reading and fluency
- Randomly assigned low responders to the research intervention or typical school practice
- Provided “pull-out” intervention to treatment group in groups of 2-4, 45 min., 4 days per week; tutors were hired and supervised by the researchers

Denton, et al., manuscript under review

# Study of Individualized Tier 3 Intervention

- Groups of 2-3 with certified teachers or experienced reading clinicians, hired, supervised, and coached by the researchers
- 45 min. lessons 4 days/week, about 26 weeks
- **Individualized within a framework**
  - Planning based on **frequent diagnostic assessment**
  - Each lesson included word study, fluency, text reading with integrated comprehension instruction, and writing in response to text (amounts of time for each varied)
  - **Teachers determined instructional objectives and selected activities from a “menu”** (Responsive Reading Instruction + more advanced activities)

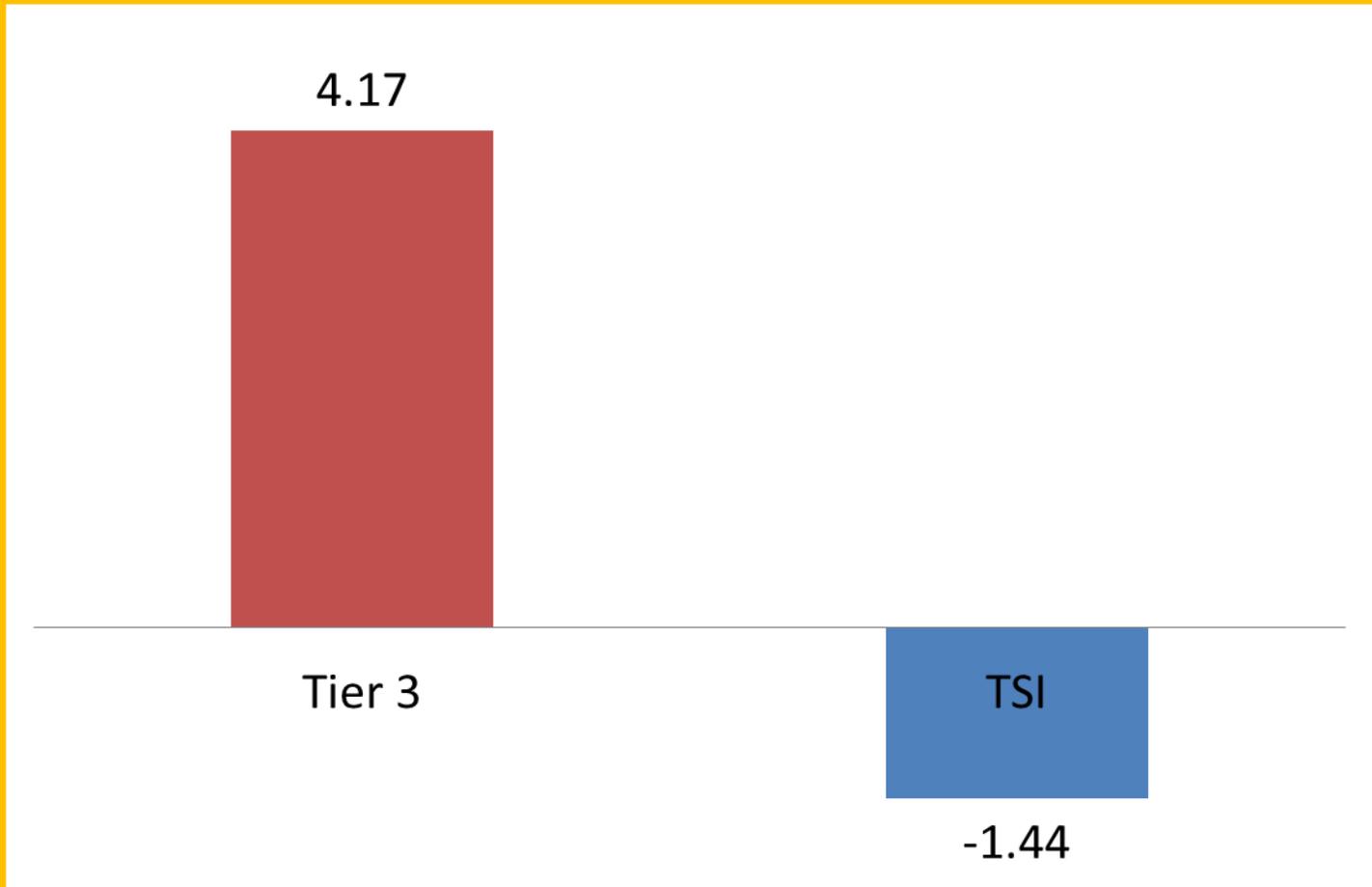
## MENU OF ACTIVITIES FOR INDIVIDUALIZED TIER 3 INTERVENTION

<b>Word Work</b>	<p><b>Phonological Awareness</b></p> <ul style="list-style-type: none"> <li>• Stretching Words (phoneme segmentation)</li> <li>• Mystery Word Game (phoneme blending)</li> <li>• Elkonin Sound Boxes/no print</li> </ul> <p><b>Letter-Sounds and Letter Combinations</b></p> <ul style="list-style-type: none"> <li>• Teaching Letter-Sounds</li> <li>• Teaching Letter Combinations</li> <li>• Pick-Up-the-Letter Game</li> <li>• Vowel Sound Game (medial vowel sound identification)</li> <li>• Teaching Letter Formation</li> </ul> <p><b>Sounding Out and Spelling Words</b></p> <ul style="list-style-type: none"> <li>• Teaching Sounding Out</li> <li>• Elkonin Sound Boxes with Print</li> <li>• Point Game (sounding out practice)</li> <li>• Silly Word Game (nonword reading)</li> </ul>	<ul style="list-style-type: none"> <li>• Teaching the Silent e Rule</li> <li>• Listen and Spell (mapping sound to print)</li> <li>• Word Linking</li> <li>• Word Pattern Charts (poster with a list of words with a sound-spelling pattern; e.g., oa, ay, ow)</li> <li>• Word Sorts</li> <li>• Sound Box Spelling</li> <li>• Reading Word Lists</li> </ul> <p><b>High-Frequency Words</b></p> <ul style="list-style-type: none"> <li>• Teaching High-Frequency Words</li> <li>• Beat the Teacher Game (timed flash card game to promote automaticity)</li> <li>• Writing High-Frequency Words</li> </ul> <p><b>Multisyllabic Words</b></p> <ul style="list-style-type: none"> <li>• Reading Multisyllabic Words</li> <li>• Writing Multisyllabic Words</li> <li>• Reading Closed Syllables</li> <li>• Teaching the Schwa Sound</li> <li>• Flexing Words</li> <li>• Reading Open Syllables</li> </ul>
<b>Fluency</b>	<ul style="list-style-type: none"> <li>• Repeated Reading with a Model</li> <li>• Partner Reading</li> <li>• Reading Phrases</li> <li>• Oral Reading with Word Instruction</li> </ul>	<ul style="list-style-type: none"> <li>• Beat the Clock (timed practice)</li> <li>• Whisper Reading (independent)</li> <li>• Read Naturally Procedure</li> </ul>
<b>Assessment</b>	<ul style="list-style-type: none"> <li>• Anecdotal Records</li> <li>• Assessment of Reading Accuracy</li> <li>• Benchmark Assessment (DRA)</li> <li>• Letter-Sound Assessment</li> <li>• High-Frequency Words</li> <li>• Oral Reading Fluency (RRI text)</li> </ul>	<ul style="list-style-type: none"> <li>• Oral Reading Fluency (DIBELS)</li> <li>• Word List Assessment</li> <li>• Quick Phonics Screener</li> <li>• Read Naturally Placement Test</li> <li>• Primary Spelling Inventory</li> </ul>

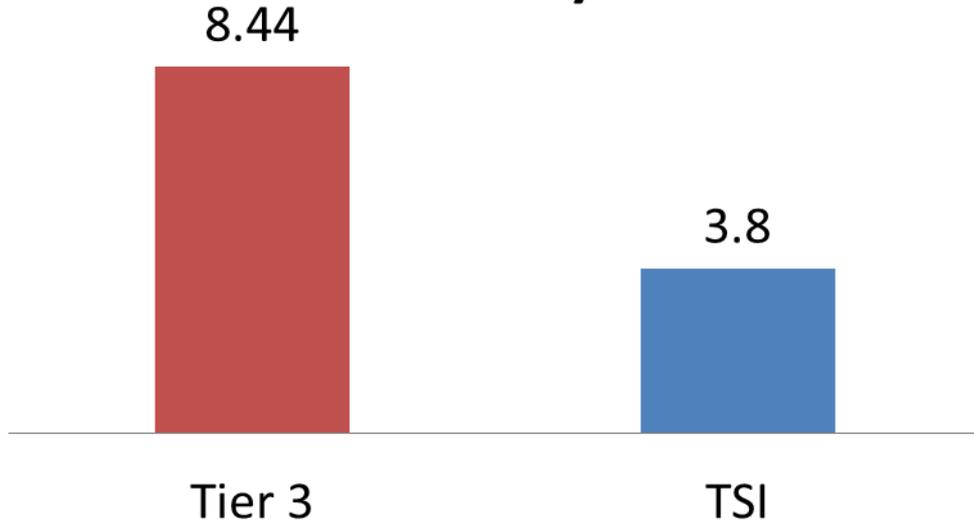
# Results

- Tier 3 Intervention group had better gains than Typical Practice group on all measures
- Statistically Significant in Word Reading and Phonemic Decoding, Word Reading Fluency, one measure of reading comprehension
- “Practically important” effects in Decoding Fluency, Reading Comprehension in extended text
- No meaningful differences in oral reading fluency

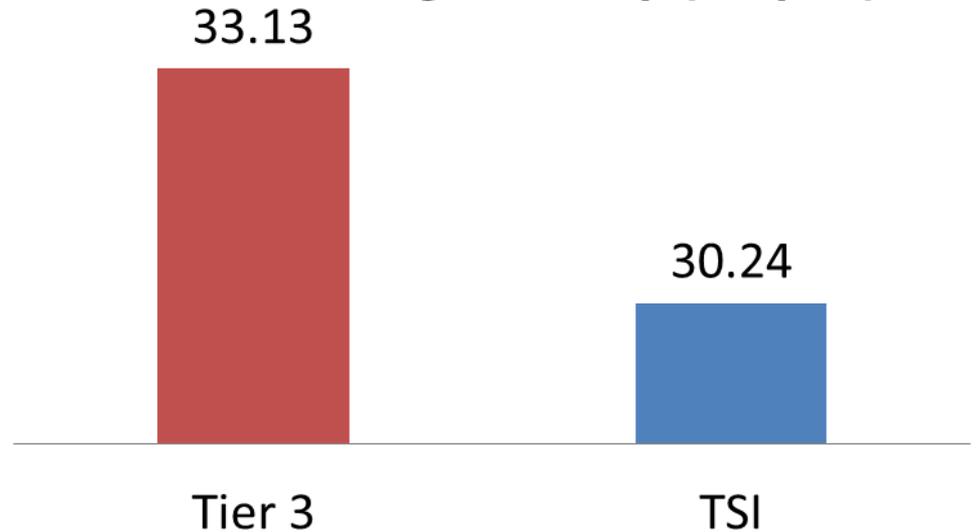
# Word Reading and Decoding Standard Score Change



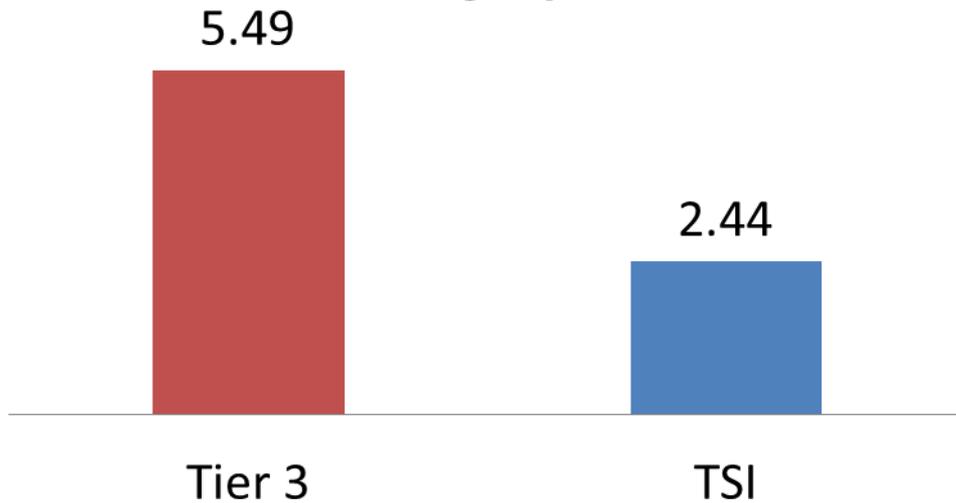
## Word Reading and Decoding Fluency



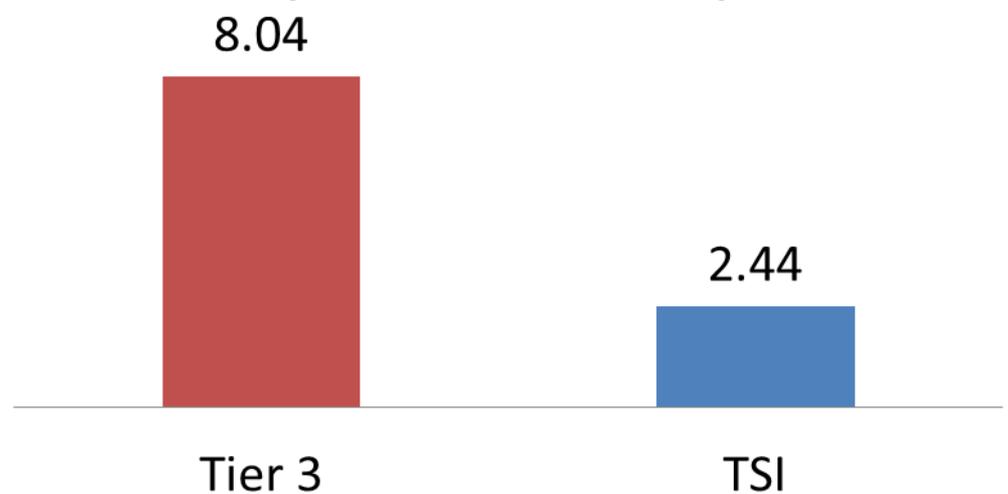
## Oral Reading Fluency (wcpm)



## Comprehension of Paragraphs



## Comprehension of Extended Text (Percentiles Gained)



# But...

- No meaningful differences in oral reading fluency
- Most students remained impaired in fluency and comprehension
- Students with low RTI in Tier 3 are severely impaired in language domains
- They will probably need an **extended period of practice with feedback** as well as **effective vocabulary instruction and activities designed to build background knowledge**

# Implications

- Less intensive Tier 2 intervention was not as effective as more intensive interventions
- Tier 3 intervention that was individualized within a framework was significantly more effective than typical school practice on multiple measures
- Oral reading fluency is consistently more difficult to impact; provide extended reading practice with feedback
- Comprehension strategy instruction is probably not enough for very impaired readers: Build vocabulary and background knowledge

# How might this research inform your implementation of RTI?

Identify one idea to take back to your colleagues related to:

- Tier 1
- Tier 2
- Tier 3