Response to Intervention (RTI)

Preventing and Identifying LD

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Presentation Outline

1. Changes in Federal Law

2. Experimental Studies in Reading and Math
1. Changes in Federal Law
Across Methods: “Signature” Characteristic of LD

**Unexpected** and **Specific** Learning Failure

The child with *unexpected* learning failure (or underachievement) is perceived by parents and teachers as generally competent. The learning difficulty is surprising and puzzling.

**Specific** learning failure suggests neurological dysfunction and processing deficits, which are presumed to cause severe problems in reading, writing, or math.
IQ-Achievement Discrepancy

- In regulations accompanying Education of All Handicapped Children Act (1975), “underachievement” has been operationalized as IQ-achievement discrepancy.
Criticisms of IQ-Achievement Discrepancy

- IQ tests do not necessarily measure intelligence.
- IQ and academic achievement are not independent; so, difference scores are unreliable.
- In the case of word reading skill deficits, few meaningful differences between IQ-achievement discrepant poor readers and IQ-achievement consistent poor readers.
- Children must fail before they can be identified as LD.
Number of Students Served with Learning Disabilities Under IDEA by Age 1999-2000 School Year

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The Prominent Alternative: Defining LD in Terms of Severe Low Achievement

RTI

LD as nonresponders to validated instruction (unexpected underachievement).

Assumption: If a child does not respond to instruction that is effective for the vast majority of children, then there is something different about the child causing the nonresponse.

RTI eliminates poor instructional quality as a viable explanation for learning difficulty.
Two Purposes of RTI

• To reorient service delivery to provide early intervention
• To provide an alternative method of LD identification
Newest IDEA

Cites Two Methods for LD Identification

1. IQ-Achievement Discrepancy
2. RTI
Typical RTI Procedure

- **Tier 1** (Primary Prevention)
  - All children receive the universal, core instructional program.
  - All children are tested once in the fall.
  - At-risk students are identified for Tier 2 intervention on the basis of low performance.

- **Tier 2** (Secondary Prevention)
  - For at-risk students, a second tier of prevention is implemented using standard research-validated tutoring protocols.
  - Student progress is monitored throughout intervention, and students are re-tested following intervention.
  - Growth/performance is dichotomized as responsive or unresponsive.

- **Tier 3** (Tertiary Prevention)
  - Those who do not respond receive a multidisciplinary team evaluation and are identified for individualized programming in special education (LD, BD, MR).
Primary Prevention: Universal Core Program for All Students

Secondary Prevention: Standard, Research-Based Tutoring for At-Risk Students

Tertiary Prevention: Individualized Programs for Students who Do Not Respond to Standardized Intervention

CONTINUUM OF SCHOOL-WIDE SUPPORT

~80% of Students

~15%

~5%
Advantages of RTI Approach

- Provides assistance to needy children in timely fashion. It is NOT a wait-to-fail model.
- Helps ensure that the student’s poor academic performance is not due to poor instruction.
- Assessment data are collected to inform the teacher and improve instruction. Assessments and interventions are closely linked.
2. Experimental Studies in Reading and Math
National Research Center on Learning Disabilities (NRCLD)

Vanderbilt University and University of Kansas
OSEP Grant #H324U010004

Vanderbilt Experimental RTI Studies
Collaboration among
Doug Fuchs, Lynn Fuchs, and Don Compton
Experimental RTI Studies

- Preventing and Identifying Learning Disability
- Reading and Math Studies (initiated in subsequent years, so samples do not overlap)
- Across Reading and Math Studies
  - 3 Purposes
    1. Examine efficacy of 1st-grade preventative tutoring
    2. Assess LD prevalence and severity, with and without Tier 2 tutoring and as a function of identification method
    3. Explore pretreatment cognitive abilities associated with development
- Random assignment to 1st-grade study conditions
- Longitudinal follow up to assess development of long-term difficulty
In This Presentation . . . ,

Focus on Purpose #1

1. Examine efficacy of 1st-grade Tier 2 tutoring

(2. Assess LD prevalence and severity
   ~ with/without Tier 2 tutoring
   ~ as a function of identification method)

(3. Explore the pretreatment cognitive abilities associated with development)
Presentation Organization

- Math RTI Study
- Reading RTI Study
- Concluding Thoughts
The Prevention and Identification of Math Disability

Lynn Fuchs, Don Compton, Doug Fuchs, Kim Paulsen, Joan Bryant, and Carol Hamlett

Vanderbilt University
National Research Center on Learning Disabilities

OSEP Grant #H324U010004
RTI Research in Math

Compared to reading, much less is known about math, even at 1\textsuperscript{st} grade.

No validated tutoring protocols exist at 1\textsuperscript{st} grade.

The small body of work on math RTI (school psych literature) is limited to:

- Basic facts or simple computation
- Using brief, drill/practice intervention
- In few classrooms (unrepresentative of range of instructional quality)
Rationale

This study:

- Addressed other curricular components
- Incorporated sustained tutoring
- Used random assignment
- Included larger samples
- Focused on how to operationalize response and define MD
Sample

- 41 1st-grade teachers in 6 Title 1 and 4 non-Title 1 schools
- Using Week 4 CBM Computation, 139 lowest performing (21% of 667 consented students) identified as at risk (AR)
- 139 AR randomly assigned to control or tutoring
- Not at risk (NAR): 528 remaining students with consent
- Of 528 NAR:
  - All weekly CBM Computation
  - 180 sampled for individual and group pre/posttesting
  - Remaining 345 were only group pre/posttested
- With attrition, samples sizes at end of 1st grade:
  - 127 AR: 63 control + 64 tutored
  - 437 NAR: 145 individually/group tested + 292 group tested
Measures

- **Math (Pre/Post/FU)**
  - Group: Fact Fluency, CBM Computation, Gr 1 Concepts and Applications, Story Problems
  - Individual: WJ Applied Problems, WJ Calculation

- **Math CBM for Progress Monitoring** (Weekly)

- **Cognitive Abilities (Pre)**
  - Language (WASI Vocabulary, WASI Similarities, Woodcock Diagnostic Reading Battery Listening Comprehension)
  - Visuospatial (WASI Matrix Reasoning, WASI Block Design)
  - Phonological (CTOPP Rapid Digit Naming, CTOPP Sound Matching)
  - Processing Speed (WJ Psycho-Educational Battery-R Cross Out)
  - Induction (WJ III Concept Formation)
  - Working Memory (Working Memory Test Battery for Children – Listening Recall)
  - Attention (Social Skills Rating System 4 items)

(Test sessions were audiotaped and coded for accuracy.)
Pretest Performance

NAR > AR Tutored, AR Control

- WASI IQ
- WRMT WID and WA
- WJ Calculation and Applied Problems
- Fact Fluency
- Story Problems
- Grade 1 Concepts/Applications
- CBM Computation
Tutoring

- Small groups of 2-3 students
- 3 times per week outside classrooms
- Each session:
  - 30 min of teacher-led instruction
  - 10 min of student use of software, Math Flash, designed to improve automatic retrieval of math facts
Teacher-Led Instruction

- Concrete objects to promote conceptual learning
- 17 scripted topics (number sense, number concepts, numeration, place value, number combinations, story problems, 2-digit procedures without regrouping, missing addends)
- Computerized Practice on Number Combinations
- Each small group completed 48 sessions.
- All sessions audiotaped; tapes were sampled for coding; fidelity of implementation was strong.
Tutoring Efficacy

Improvement

*Weekly CBM Computation Slope*
- \( \text{AR tutored} = \text{NAR} > \text{AR control} \)

*WJ III Calculation*
- \( \text{AR tutored} > \text{NAR and AR} \)

*Grade 1 Concepts/Applications*
- \( \text{AR tutored} > \text{NAR and AR control} \)

*Story Problems*
- \( \text{NAR} > \text{AR tutored} > \text{AR control} \)

- First-grade tutoring enhances outcomes.
Tutoring Efficacy

Did tutoring decrease MD prevalence at end of 1st grade?

Yes, across identification options,
tutoring substantially decreased prevalence.

Example

Final Low Achievement (<10th percentile)
on Gr 1 Concepts/Applications, prevalence went from 9.75% without tutoring
to 5.14% with tutoring.

- ~ 2.5 million fewer children identified MD

- At end of 2nd grade, MD prevalence was still twice as high in the untutored group.
In Sum, Results …

- Demonstrate efficacy of 1st-grade tutoring
- Indicate that RTI can reduce MD prevalence, at least through end of 2nd grade.
- Other finding illustrate how options for designating MD affect prevalence and severity.
The Prevention and Identification of Reading Disability

Doug Fuchs, Don Compton, Lynn Fuchs
Joan Bryant, Loulee Yen, Marie Smith

Vanderbilt University
National Research Center on Learning Disabilities

OSEP Grant #324U010004
Purposes

1. Examine the efficacy of 1st-grade preventative tutoring in reading

2. Assess RD prevalence and severity, with and without preventative tutoring and as a function of identification method

3. Explore pretreatment cognitive abilities associated with reading development

Again, In This Presentation, Focus on Purpose #1
Districts, Schools, and Teachers

- 2 school districts in Tennessee (urban Metro-Nashville and suburban Williamson County)
- 8 Title 1 and 8 non-Title 1 elementary schools
- 42 first-grade teachers assigned randomly within schools to PALS \((n = 21)\) and No-PALS \((n = 21)\); in this presentation, we collapse PALS and No-PALS classes into Tier 1 instruction
Identifying “At-Risk” Students

- In the 42 classes, all students screened on:
  - RLN (CTOPP)
  - CBM Word Identification Fluency
  - Teacher judgment

- The 6 lowest students per class on one or both measures, also judged as such by the teacher, were designated “low study entry.”
Study Conditions

- In each class, the 6 “low study entry” were rank ordered and split into top and bottom strata.

- Within each stratum, children were randomly assigned to:
  - *Fall Tutoring* ($n = 84$)
  - *Spring Tutoring* ($n = 84$) -- if unresponsive to general education
  - *Control* ($n = 84$).

- In this presentation, we focus on Spring Tutoring and Control conditions (not the Fall Tutoring condition).
We collected weekly WIF data: 9 waves in the fall and 9 waves in the spring.

We identified the subset of students who were unresponsive to Tier 1 general education, using “dual discrepancy” on fall WIF slope and level.

Tier 1-unresponsive students to fall general education instruction:
  _ Spring Tutoring: $n = 40$
  _ Control: $n = 24$
Study Conditions (Cont’d)

- We administered a battery of standardized reading tests at fall, mid-year, end of grade 1, end of grade 2.

- Unresponsive students comparable by condition on:
  - IQ
  - Vocabulary
  - CTOPP Rapid Digit Naming, Elision, Memory for Digits
  - WRMT WID and WA
  - TOWRE Sight Word and Phonemic Decoding
  - Teacher Ratings of Effort and Distractibility

- They were:
  - $\sim 2/3 \ SD < \text{mean on WIF local norms}$
  - $\sim 2/3 \ SD < \text{national norms on IQ, Vocabulary, Phonological Processing}$
  - $1/3 \text{ to } 2/3 \ SD < \text{national norms on reading measures}$
  - Teachers’ mean effort rating $\sim 60\%$
  - Teachers’ mean distractibility rating between “sometimes” and “very often”
Tutoring

- Groups of 2-4 students
- Validated treatment protocol
  - Letter-sound correspondence, decoding words, sight word recognition, fluency-building, and partner reading, with point system for motivation
  - 9 wks, 4x per wk, 35-45 min per session
- Fidelity
  - All sessions audiotaped
  - Tapes of sessions #14 and #28 checked for all tutors against a 79-item checklist
  - Inter-rater agreement on coding of tapes was 96% across sessions and tutors
  - > 95% tutor fidelity across sessions and tutors
Measures

- **Screening**
  - CTOPP Rapid Letter Naming, CBM-WIF

- **Progress Monitoring**
  - Weekly CBM-WIF

- **Fall**
  - CTOPP (Elision, Memory for Digits); 4-subtest WASI; WRMT-R (WI, WA); Woodcock Diagnostic Reading Battery (Listening Comprehension); Cognitive battery also administered.

- **Mid-Year**
  - WRMT-R (WID, WA); TOWRE (Sight Word Reading, Phonemic Decoding)

- **End-Year and End Grade 2**
  - WJ (Passage Comprehension); WRMT-R (WID, WA), TOWRE (Sight Word Reading, Phonemic Decoding); Woodcock Diagnostic Reading Battery (Listening Comprehension); Social Skills Rating System (SSRS; short form); Teacher Rating of Reading Effort
Tutoring Efficacy
Progress Monitoring Data

- Spring Tutored and Control exhibited similar growth from fall to mid-year, prior to tutoring (slope 1).

- Spring Tutored group showed greater growth than control from mid-year to end-year, during tutoring (slope 2).
Tutoring Efficacy: Standardized Reading Measures

- For 3 or 4 measures (all but Sight Word Efficiency): interaction between condition and time, whereby
  - Contrast from pretest to mid-year was comparable for Spring Tutored and Control
  - Contrast from mid-year to posttest was significant, with Spring Tutored outperforming Control.

- Effects maintained at end of grade 2.
Word ID

![Graph showing Raw Score vs. Time for Tutor and Control groups. The x-axis represents Entrance, Pre-Intervention, Post-Intervention, and Follow-up. The y-axis represents Raw Score. Two lines represent Tutor and Control groups, with Tutor showing a higher trend change than Control.]
Sight Word Efficiency

- Entrance
- Pre-Intervention
- Post-Intervention
- Follow-up

- Raw Score

- Tutor
- Control
Decoding Efficiency

Raw Score

Entrance Pre-Intervention Post-Intervention Follow-up

Tutor Control
Tutoring Efficacy

*Did tutoring decrease RD prevalence at end of 1st grade?*

Defining RD = 1st-grade WID slope < .75 SD below normative mean slope

Yes: RD rates significantly lower in Spring Tutored (43.5%) than Control (81.8%)
In Sum, Results …

- Demonstrate efficacy of 1st-grade tutoring in the spring semester for students unresponsive to Tier 1 general education.
- Indicate that RTI can reduce RD prevalence, at least at end of 1st grade.
- Other findings illustrate how options for designating RD affect prevalence and severity.
Concluding Thoughts
Across Math and Reading

- RTI is a promising practice for preventing LD.
- Less is known about RTI for identification.
  - Across math and reading, findings indicate that prevalence and severity of LD changes depending on how “response” is operationalized.
  - This could lead to varying identification rates across states and districts, creating heterogeneity of category similar to traditional definitions.
  - So, guidance on how to “standardize” response is needed.
- In addition, guidance is needed about what constitutes “intervention” within RTI and how to measure quality of that intervention is required.
Other NRCLD Activities: Collaboration between VU and KU

- Survey research on state practices (VU)
- Technical assistance on RTI (KU)
- Identification and description of RTI model sites (KU)
For Additional Information

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