Responsiveness to Intervention (RTI): Reading and Math Standardized Tier 2 Research-Based Intervention

National Research Center on Learning Disabilities (NRCLD)
A collaboration of Vanderbilt University and the University of Kansas

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Overview

Presentation topics

- Multi-Tier RTI Model
- Tier 1 Level
- Tier 2 and Beyond Level
- Reading Intervention
- Math Intervention
- NRCLD
Multi-Tiered RTI Model Overview

- Tier 1: General education instruction
- Tier 2 and Beyond: Small-group intervention
- Tier 3 (or final): Individual intervention (special education)
A Multi-Tiered RTI Model: Tier 1

- Tier 1 consists of general education instruction with the following features:
  - Scientific, research-based curriculum
  - Consistent implementation
  - Proven successful for vast majority of students
  - Screen all students, with weekly monitoring of at-risk students who do not respond to general education instruction
A Multi-Tiered RTI Model: Tier 2 and Beyond

- Tier 2 and Beyond consists of general education instruction plus the following intervention:
  - Small-group instruction (2-4 students)
  - 3-4 intervention sessions per week (30-60 minutes per session)
  - Conducted by trained and supervised personnel (not the classroom teacher)
  - Conducted in and out of the general education classroom
  - 9-12 weeks in duration (repeated, as needed)
A Multi-Tiered RTI Model: Special Education

- The final tier consists of general education instruction plus an individualized intervention (special education instruction):
  - Individualized instruction (1-3 students)
  - 4-5 intervention sessions per week (60-90 minutes per session)
  - Conducted by trained special education personnel (not the classroom teacher)
  - Conducted in and out of the general education classroom
  - One school-year in duration
Tier 2 and Beyond Intervention Overview

Small Groups (1:3, 1:5, 1:10)

- 9-12 weeks, 3-4 times per week, 30-60 minutes per session
- Point system for motivation
- Immediate corrective feedback
- Mastery of content before moving on
- More time on difficult activities
- More opportunities to respond
- Fewer transitions
- Setting goals and self-monitoring
- Special relationship with instructor
Tier 2 and Beyond Intervention Training

- Demonstration of each activity
  - Practice with each other
- Demonstration of entire intervention session
  - Practice with each other
- Scheduled practice with other instructors, supervised by trainer
- Practice with ‘real’ students
- Practice with trainers (as students)
- Detailed feedback to instructor at each step to assure fidelity of implementation
- Weekly intervention meetings to update on next series of lessons and to problem solve
An Example: First-Grade Tier 2 and Beyond Intervention for Reading

Validated Intervention Protocol Using Randomized Controlled Field Study

~ Conducted in 42 First-Grade Classrooms in 10 Metro Schools in Tennessee ~
NRCLD Vanderbilt Reading Study Overview

- Identified at-risk children
- Assessed at-risk students on cognitive and academic measures and collected teacher ratings of attention/distractibility
- Randomly assigned at-risk students to intervention and control conditions; tutored/instructed children in small groups 4 times per week for 9 weeks
- Post-tested students (followed children from beginning of grade 2 to end of grade 4)
Tier 2 and Beyond Intervention for Reading

- Small groups (groups of 3-4 students)
- 4 times per week outside classrooms
- Each session:
  - 45 minutes of instructor-led intervention
    - 10 minutes of sight words practice
    - 5 minutes of letter sounds practice
    - 15 minutes of decoding practice
    - 15 minutes of reading fluency practice
- Lessons are scripted for instructor
  - Detailed wording of steps and prompts involved in each activity
Tier 2 and Beyond Intervention Reading Lesson

- Steps included in the sounds, sight words, and decodable words activities:
  1. Introducing new sound or word
  2. Choral practice
  3. Individual practice
    - 2 opportunities to produce correct sounds or words
Tier 2 and Beyond Intervention Reading
Lesson (continued)

Reading activities:

4. Choral reading of previous story
   • Echoing the instructor, one line at a time
   • Choral reading of story

5. Choral reading of new story
   • Echoing the instructor, one line at a time
   • Choral reading of story

6. Individual speed reading
   • Each student reads new story 3 times, for 30 seconds
   • Opportunity to earn incentives for increasing reading fluency
Number of Tier 2 and Beyond Intervention for Reading Sessions

- Research intervention groups completed 36 sessions
- 64 lessons created within lesson sequence
  - 16 weeks worth of lessons (4 times per week)
Topic Mastery and Review for Tier 2 and Beyond Intervention for Reading

- Mastery of the topic assessed each day
- If every student in group achieved mastery of sight words on the first day of that set, group moved to the next set on the following day
- Each student had two trials to master sight words during the session.
- Group progressed to next set regardless of mastery status after two sessions on same set
  - To ensure that group would be able to cover more words and sounds
Results: Tier 2 and Beyond Intervention for Reading

- The first-grade reading intervention program resulted in improved performance on:
  - Word identification
  - Reading fluency
  - Comprehension
- Reading disability prevalence was lower among instructed students
An Example: First-Grade Tier 2 and Beyond Intervention for Math

Validated Intervention Protocol Using Randomized Controlled Field Study

~ Conducted in 41 First-Grade Classrooms in 10 Metro Schools in Tennessee ~
NRCLD Vanderbilt *Math* Study Overview

- Identified at-risk children
- Assessed at-risk children and a sample of not at-risk peers on cognitive and academic measures and collected teacher ratings of attention/distractibility
- Randomly assigned at-risk students to intervention and control conditions; instructed children in small groups 3 times per week for 16 weeks
- Post-tested at-risk and not at-risk students on fact fluency, computation, concepts/applications, and arithmetic story problems (followed children from beginning of grade 2 to end of grade 3)
Tier 2 and Beyond Intervention for *Math*

- Small groups (11 groups of two students and 16 groups of three students)
- 3 times per week outside classrooms
- Each session:
  - 30 min of instructor-led intervention
  - 10 min of student use of software, MathFlash© (designed to improve automatic retrieval of math facts)
Tier 2 and Beyond Instructor-Led Math Intervention

- Concrete-representational-abstract model, which relies on concrete objects to promote conceptual understanding (e.g., base-10 blocks for place value instruction)

- 17 scripted topics addressing number concepts, numeration, computation, story problems (e.g., not geometry, measurement, charts/figures, money)
Tier 2 and Beyond Intervention for *Math: 17*

**Scripted Topics**

- Identifying and writing numbers to 99
- Identifying more, less, and equal with objects
- Sequencing numbers
- Using $<$, $>$, and $=$ symbols
- Skip counting by 10s, 5s, and 2s
- Understanding place value (introduction)
- Identifying operations
- Place value (0-50)
- Writing number sentences (story problems)
- Place value (0-99)
- Addition facts (sums to 18)
- Subtraction facts (minuends to 18)
- Review of addition and subtraction facts
- Place value review
- 2-digit addition (no regrouping)
- 2-digit subtraction (no regrouping)
- Missing addends
Tier 2 and Beyond Intervention for *Math*: 17

Scripted Topic Completion

- All groups completed topics through 2-digit subtraction (16 topics), but due to varying mastery rates, only 5 groups completed missing addends
- Each group completed 48 sessions
- Due to absences, the number of completed sessions for individual students ranged from 35 to 48 (mean = 43.8)
Tier 2 and Beyond Intervention for MathFlash©

- Math fact flashes on and disappears from computer screen
- Student types fact from short-term memory
- If correct, computer applauds, says the fact, and awards a point (5 points = a “trinket” for the toy box at the bottom of the screen)
- If incorrect, computer removes incorrect fact, replaces it with correct fact, and says the fact
- At end of each session, feedback is provided about number of correct and highest math fact mastered
Tier 2 and Beyond Intervention for Math

Topic Mastery and Review

- Mastery of the topic assessed each day
- If every student in group achieved mastery prior to the last day of the topic, group moved to the next topic (a few topics required completion of all 3 days)
- For mastery assessment, students completed work-sheets independently, with percentage of correct answers determining mastery (for most topics, 90% accuracy)
- After the last day on a topic, group progressed to the next topic regardless of mastery status
- On the first day of each topic, students completed a cumulative review worksheet covering previous topics
- Review of topics 1-4 was conducted after winter break
Results: Tier 2 and Beyond Intervention for Math

• The first-grade math intervention program resulted in improved performance on
  • Math calculations
  • Math concepts/applications
  • Math word problems
  • Woodcock-Johnson III Calculation subtest
• Math disability prevalence was lower among instructed students at the end of 1st grade and at end of 2nd grade
NRCLD SLD and RTI Resource Products

- Executive Summary of the NRCLD Symposium on Responsiveness to Intervention
- Responsiveness to Intervention in the SLD Determination Process
- RTI Implementation Tool for Reading
- Screening Tool for Well-Described Responsiveness to Intervention Models and Comparison Models
- Responsiveness to Intervention: An SLD Determination Resource

- SLD Identification Overview: General Information and Tools to Get Started
- Specific Learning Disabilities and Responsiveness to Intervention Resource List
- A Research-Based View of Specific Learning Disabilities: Implementing Change
- Responsiveness to Intervention in Conjunction with Learning Disability Determination
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Thank you!

Check our website: www.NRCLD.org