RTI in Math: Evidence-Based Interventions for Struggling Students

Dr. Linda Forbringer

lforbri@siue.edu

- **References:**
  - **Research Basis - What Works Clearinghouse Practice Guide**:
    Assisting Students Struggling with Mathematics: RTI for Elementary & Middle Schools
    http://ies.ed.gov/ncee/wwc/publications/practiceguides/

  - **Detailed descriptions of intervention strategies:**
    Forbringer, L., & Fuchs, W. (2014). *RtI in math: Evidence-based interventions for struggling students.* New York: Routledge.

- **WWC Recommendations**
  1. **Universal screening → Tiered, Targeted Interventions**

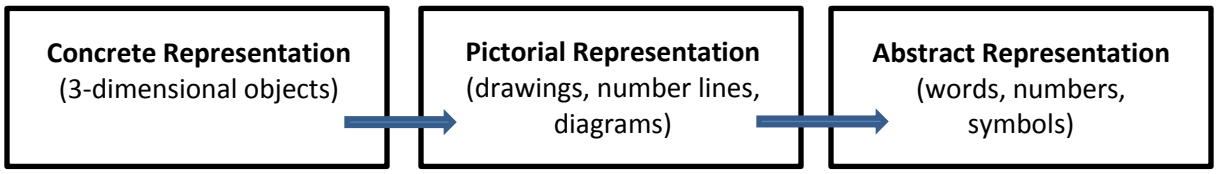
  2. **Monitor Progress and Adjust Interventions Accordingly**

  3. **Include Motivational Support**:
     Studies show that praise and rewards are more important than choice of textbooks or provision of computer assisted technology (Best Evidence Encyclopedia, Elementary Mathematics Review Summary, 2011).

  4. **Focus on Foundational Skills:**
     - Whole numbers in grades K-5
     - Rational numbers in grades 4-8

  5. **Develop Fluency with Basic Facts:**
     - Spend 10 minutes each session developing fluent retrieval of basic facts.
     - Focus on 2 new facts until mastered.
     - Select materials that allow you to choose the individual facts that students will practice.
     - Resources for Developing Fact Fluency:
       - Peer tutoring (e.g. Peer Assisted Learning Strategies; Classwide Peer Tutoring): www.promisingpractices.net/program.asp?programid=99
       - Forbringer, L., & Fahsl, A. (2009). Differentiating instruction to help students master basic facts. In *Mathematics for every student: Responding to diversity, grades pre-k – 5.* National Council of Teachers of Mathematics.

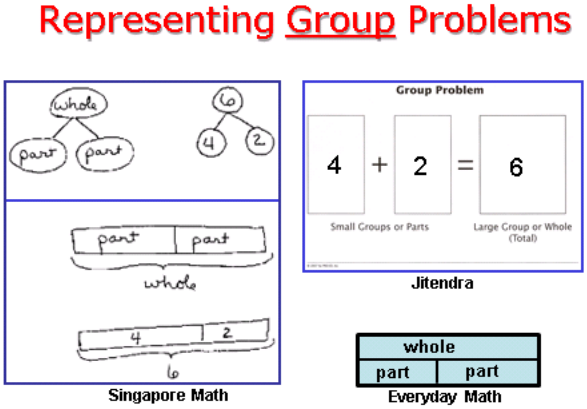
6. **Visual Representations:**
   - Follow the CRA continuum when introducing new material.



   - Explicitly link the concrete and pictorial representations with the symbolic representations used in mathematics. The representations should match the abstract process the students are using.
     - Examples: Ten Frames: Ten Frames: dot_card_and_ten_frame_package2005.pdf
     - Mathline: www.howbrite.com
     - DigiBlocks: www.digi-block.com

   - Research Findings:
     Students who struggle with mathematics need about 3 lessons at the concrete level before concrete support is faded, then 3 more lessons where visual representations are provided before they are ready to work solely with abstract words & symbols (Hudson & Miller, 2006).

7. **Problem Solving**
   - Teach common underlying structures.
   - Example – For addition, teach *group*, *change* & *compare*.



- Resources for Problem Solving:
    - Solving Math Word Problems: -Jitendra http://www.proedinc.com/customer/productView.aspx?ID=4145
    - Go Solve Computer Program: www.tomsnyder.com/products/product.asp?SKU=GOSGOS
    - Step-by-Step Model Drawing by Char Forsten (Singapore Math)
    - Thinking Blocks: http://www.mathplayground.com/wordproblems.html
    - Pirate Math (Fuchs) – www.kc.vanderbilt.edu/pals

8. **Explicit instruction:**
    - Students who require math interventions benefit from explicit instruction**.**
    - Steps in an explicit instruction lesson:
        - Introduction: Students actively review prerequisite skills & concepts
        - Model: The teacher models procedures and thought process
        - Guided practice: Student practice with the teacher; teacher gradually fades support
        - Independent practice: Students practice same material independently. Students should achieve 90-100% on independent work.

- **Resources for Evidence-Based Materials and Strategies:**
    - **Best Evidence Encyclopedia-** *Center for Data-Driven Reform in Education (Johns Hopkins University):* http://www.bestevidence.org/
    - **Center on Instruction** - *RMC Research Corporation:* http://www.centeroninstruction.org/
    - **Instruction Tools Chart** - *National Center on Response to Intervention:* http://www.rti4success.org/resources/tools-charts
    - **What Works Clearinghouse** - U.S. Department of Education Institute of Education Sciences: http://ies.ed.gov/ncee/wwc/