

## HIGH-QUALITY MATHEMATICS INSTRUCTION: WHAT TEACHERS SHOULD KNOW

### CHALLENGE

- **Media:** For the past five years, the staff at Lyle Elementary School has focused their attention and resources on improving reading instruction, and the students' reading scores have improved. Now they would also like to work on improving their students' mathematics instruction. (movie)

### INITIAL THOUGHTS

- What is high-quality mathematics instruction and why is it important?
- How can teachers determine whether they are using an effective mathematics curriculum?
- What evidence-based instructional strategies can mathematics teachers employ?
- How can teachers effectively provide high-quality mathematics instruction

### PERSPECTIVES AND RESOURCES

- Module Objectives (box)
  - After completing the entire Perspectives and Resources section and reviewing the accompanying activities, you should:
    - Identify the components of high-quality mathematics instruction
    - Understand how to assess whether mathematics curricular materials are standards based
    - Be familiar with evidence-based instructional strategies for teaching mathematics
    - Recognize effective classroom practices that promote and support the implementation of high-quality mathematics instruction

#### 🕒 Page 1: A Review of Mathematics Education

- Research Shows (box)
- Four nationally recognized advisory panels convened to study and report on the problem... (bulleted list)
- Possible explanations for the relatively poor mathematics performance of U.S. students (bulleted list)
  - *Link:* "curriculum" (definition)
- "A Look at Lyle" (box with bulleted list)
- **Activity:** Discover your own attitudes and beliefs about mathematics and to reflect on how they might influence your instruction (box with link)
  - *Link:* Perceptions and Beliefs Regarding Math

#### 🕒 Page 2: Components of High-Quality Instruction

- High-quality mathematics instruction involves the combined implementation of (bulleted list)
- FYI (box with bulleted list)

#### 🕒 Page 3: Requirements of a Standards-Based Mathematics Curriculum

- Many states have adopted the Common Core State Standards for Mathematics (CCSSM)
  - *Link:* Determine whether your state has adopted them
  - FYI (box)

- Mathematical Practices
  - *Link:* National Council of Teachers of Mathematics (NCTM)
  - *Link:* National Research Council (NRC)
  - CCSSM Mathematical Practices (box with bullets)
- Grade-Level Standards
  - Standards for kindergarten through grade eight (table)
  - Mathematical concepts (graphic)
  - *Link:* Learn more about the CCSSM

#### 🔍 Page 4: Assessment of Curricular Materials

- “Curricular materials” (definition)
- **Tip:** Consult the list of materials identified as exemplary standards-based mathematics programs by the U.S. Department of Education (link)
- Did You Know? (box)
- Once teachers have made sure that their curricular materials are standards-based... (bulleted list)
- FYI (box)
- Address the Needs of Diverse Learners
- “Evidence-Based Feature/ Presence of Feature in Materials” (table)
- Supplementing Curricular Materials
  - Resource supplements (bulleted list)
  - **Media:** Kim Paulsen talks about supplementing the curriculum (audio)
- “A Look at Lyle” (box with bulleted list)
- **Activity:** Assess a mathematics textbook used in a local school and answer some questions (box with numbered questions)

#### 🔍 Page 5: Effective Strategies for Teaching Mathematics

- Three research-supported practices for teaching mathematics are...
  - “Explicit instruction” (box)
  - “Peer tutoring” (box)
  - “Cooperative learning” (box)
- *Link:* Web-based resources for determining whether a strategy or practice is evidence-based
- FYI (box)
- “A Look at Lyle” (box with bulleted list)

#### 🔍 Page 6: Explicit Instruction

- *Link:* “scripted lessons” (definition)
- “Steps in a Explicit or Direct Instruction Lesson” (box with bulleted lists)

#### 🔍 Page 7: Peer Tutoring

- These strategies have several features in common... (bulleted list)
  - *Link:* One method of pairing students
- **Media:** Watch a pair of students engaged in peer tutoring (video)

#### 🔍 Page 8: Cooperative Learning

- Cooperative learning has been found to... (bulleted list)
- **Media:** Watch a class engaged in cooperative learning (video)

#### 🔍 Page 9: Effective Classroom Practices

- Classroom practices teachers can implement to increase the mathematical understanding of their

- students (bulleted list)
- **Tip:** Teachers need to establish a classroom environment where students feel safe to explore
- Encourage Student Discussion
  - o **Media:** Watch a teacher encouraging his class to describe how they solved a mathematics problem (video)
- Presenting and Comparing Multiple Solutions
  - o “Example: Comparing Multiple Solutions” (box)
  - o “Guidelines for Supporting Comparison” (box)
  - o *Link:* Learn how the teacher presents the multiple solutions in the box above and guides the students in making comparisons
- Using Manipulatives (bulleted list)
  - o **Media:** Kim Paulsen discusses the benefits of manipulatives (audio)
- Selecting Appropriate Instructional Tasks
  - o **Media:** Scott Eddins describes how one teacher uses technology to build conceptual knowledge (audio)
- Research Shows (box)
- Assessing Student Understanding
  - o *Link:* “formative assessment” (definition)
  - o *Link:* “error analysis” (definition)
  - o Formative assessment
  - o Error analysis
    - “Example: Error Analysis” (box with example)

## Page 10: References, Additional Resources and Information

- References
- Additional Resources and Information

## Page 11: Credits

- Content Experts
- Module Developers
- Module Production Team
- Module Production Support Team
- Media Production Team
- Media
- Expert Interviews

## ASSESSMENT

- “Please complete the items below” (numbered questions)
  - o **Media:** Identify the evidence-based teaching strategy being implemented and any effective classroom practices being used (movie)

## WRAP UP

- Teachers can employ a number of classroom practices—independently or in combination—to increase their students’ understanding of mathematical concepts (bulleted list)
- **Media:** Lois Coles discusses the positive effects of using a standards-based curriculum and effective practices (audio)
- “A Look at Lyle” (box with bulleted list)
- Think back to your initial responses to the following questions... (box with questions)