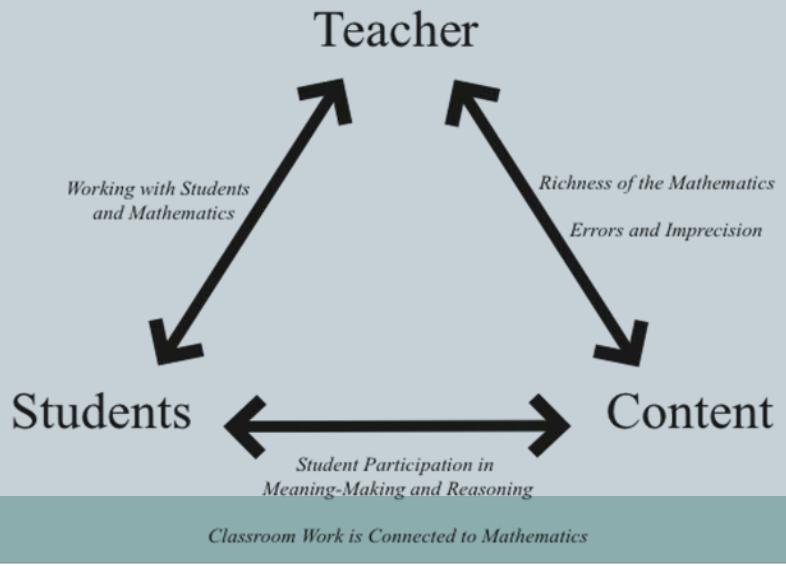
MATHEMATICAL QUALITY OF INSTRUCTION (MQI)

LEARNING MATHEMATICS FOR TEACHING/MATHEMATICS INSTRUMENT DEVELOPMENT GROUP

HARVARD GRADUATE SCHOOL OF EDUCATION

What is the MQI?

- **MQI** is the Mathematical Quality of Instruction instrument
- Allows observers to evaluate the quality of the *mathematics* in instruction
- Captures the nature and quality of the mathematical content available to students as expressed in teacher-student, teacher-content, and student-content interactions
- Provides separate teacher scores for different dimensions of the mathematical work teachers do



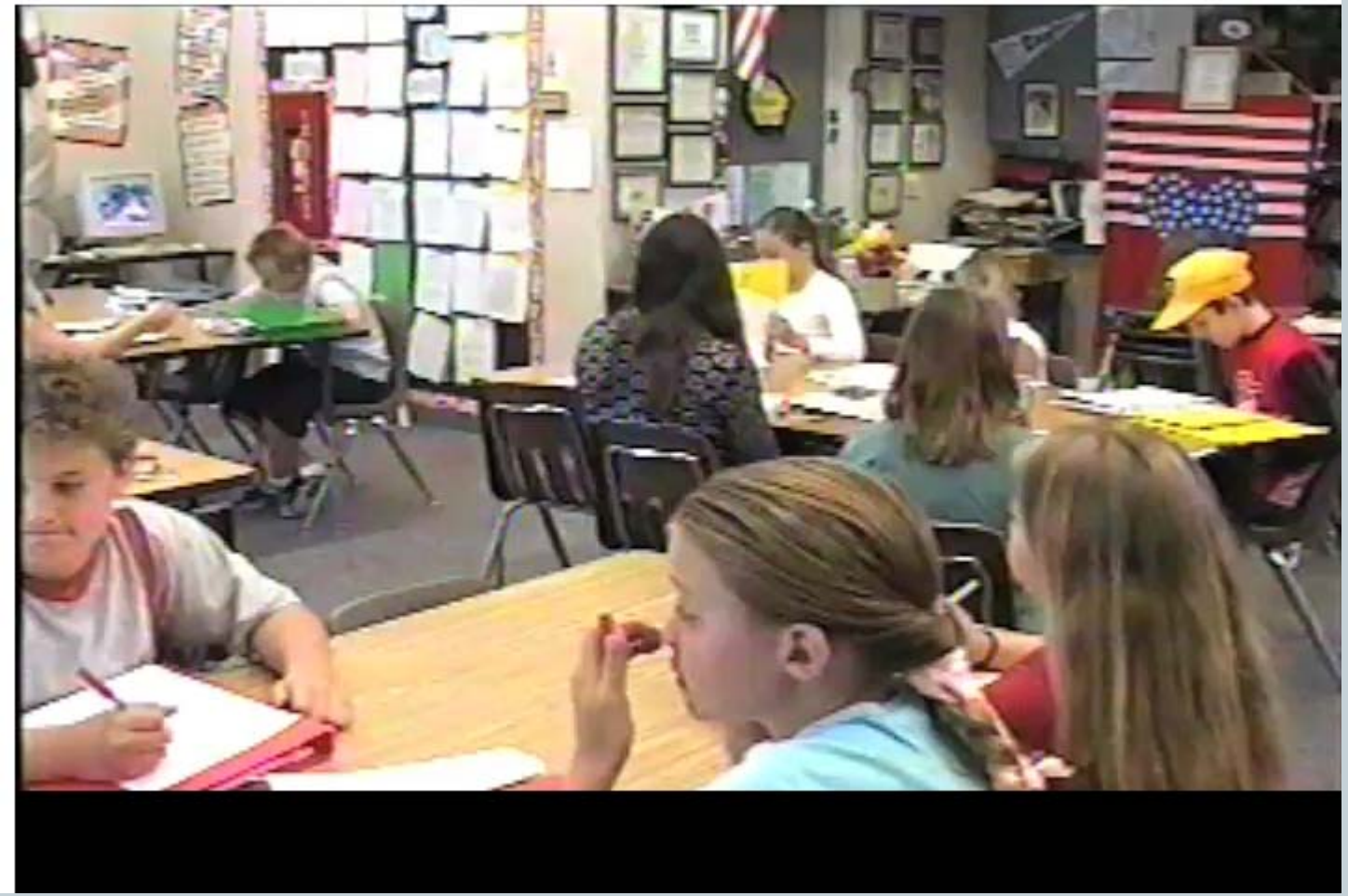
Example: Pies

- Typical example of upper-elementary / lower middle school instruction (5th grade)
- Class has been working on “warm-up” problems

$$-4\frac{2}{3}+1\frac{5}{6}$$

- Teacher notes student difficulty, calls class back together to solve

Example: Pies



Question

- What seems mathematically salient about this instruction?

Dimensions of the MQI

- **Errors and Imprecision** –capture teachers' errors in doing/talking about mathematics, which can occur when solving problems, defining terms, launching tasks, in the notation that is used, etc
  - Major Mathematical Errors or Serious Mathematical Oversights
  - Imprecision in Language or Notation
  - Lack of Clarity
  - Overall Errors and Imprecision

Dimensions of the MQI

- **Richness** - capture the depth of the mathematics offered to students

  Meaning of Facts/Procedures

  - Linking/Connections
  - Explanations

  Focus on Mathematical Practice

  - Multiple Procedures or solution methods
  - Developing Mathematical Generalizations
  - Mathematical Language

  - Overall Richness

Dimensions of the MQI

- **Student Participation in Meaning-Making and Reasoning** – captures the ways in which students engage with mathematical content
  - Students provide explanations
  - Student mathematical questioning and reasoning
  - Enacted task cognitive activation
  - Overall Student Participation in Meaning-Making and Reasoning

Dimensions of the MQI

- **Working with Students** – captures whether teachers can "hear" and understand what students are saying, mathematically, and respond appropriately
  - Responding to Student Mathematical Productions in Instruction
  - Remediation of Student Errors and Difficulties
  - Overall Working with Students

Dimensions of the MQI

- **Classroom work is connected to mathematics**
  - Intended to identify "bad reform" lessons
  - Excessive behavioral management
- **Explicitness and thoroughness (9th grade)**
  - Intended to measure clarity and crispness of procedural instruction
- **Overall MQI**
  - Excellent, fair, poor

What makes MQI unique

- Teachers receive separate scores for each dimension as well as an “overall” score
  - Some dimensions more critical than others for personnel and professional development decisions
    - Errors vs. working with students
- Can be tailored to be agnostic with regard to teaching style
  - Can use as-is, which is standards-aligned
  - Or can eliminate dimensions designed to captured standards-aligned behaviors (SPMMR)

MQI technical information

Teacher-level reliability, 3 lessons 2 raters

	Richness	Errors	Working with students	Student participation	Overall MQI
Long MQI	0.80	0.75	0.68	0.82	
MQI "Lite"*	0.85	0.77	0.69	0.76	0.77

* Likely based on past generalizability studies

MQI technical information

- Validity
  - MQI scores significantly related to teacher value-added scores
  - MQI scores significantly related to teacher mathematical knowledge for teaching (MKT)
  - Factor analyses suggest anticipated constructs do appear

MQI logistics

- MQI and MQI "Lite" both available for K-9 mathematics
- Uses recorded lessons
  - Greater accuracy when it comes to the mathematics
  - Provides evidence for challenge to scoring
  - thereNow, teachscape, lesson lab, even flip cameras
  - Comparing taped vs. live next year (?)
- Three lessons / teacher, two raters / lesson
  - Lessons must be spread out
- If it were our shop…$1600/teacher
  - Will drop as cost of video comes down further
- Not volunteering our shop
  - Volunteering ETS
  - Advantage: ETS knows what they are doing
  - Advantage: Objective view of teachers' practice

Possible Uses of the MQI

- As extra check on low-value-added teachers
- As screen prior to promoting teachers to coaching positions
- For pre-tenure decisions/Tier 2 certification (?!)
- For teacher professional development
  - Provides specific feedback about strengths and weaknesses
  - Building professional development materials “on top” of the MQI
  - Looking for pilot districts with which to work