Using Practical Measures to Support Secondary Mathematics Instruction

Federal Way Public Schools
Metro Nashville Public Schools
University of California-Irvine
University of Washington
Vanderbilt University
Agenda

• Introduction to practical measures
  – Edsight: Data Visualization Tool

• How practical measures are being used in district-wide initiatives to improve mathematics instruction
  – Case 1: One-on-one coaching in Metro Nashville Public Schools
  – Case 2: Curriculum Guide Writing initiative in Federal Way Public Schools

• Closing comments and discussion
Background: What Does it Take to Improve the Quality of (Mathematics) Teaching on a Large Scale?

• Identifying potentially productive instructional improvement strategies
  – Theory of action for instructional improvement at scale

• Implementing improvement strategies reliably
  – improvement science
  – practical measures
The Current Project

• 3 Research Practice Partnerships (RPPs) working to **improve** the quality of secondary mathematics instruction
The Current Project

• 3 Research Practice Partnerships (RPPs) working to improve the quality of secondary mathematics instruction
  – Challenging, non-routine tasks
  – Launch
  – Individual or Small Group Work
  – Whole Class Discussion
    • students to explain and justify their reasoning
    • students make connections between different solutions

• Substantial teacher learning -- requires sustained support
How can practitioners assess their instructional improvement efforts easily and rapidly?

Practical Measures

- **Measures of/for improvement** (Carnegie Foundation for the Advancement of Teaching)

- Provide practitioners with frequent, rapid feedback
  - e.g., 3 minutes or less to administer
  - Easy to analyze

- Enable practitioners to assess and adjust their practices

- **Conjecture:** Can also serve as levers for improvement
Practical Measures: Assessing Key Aspects of High-Quality Mathematics Instruction

- **Launch**
  - Quick, easy to administer student surveys (2-3 minutes)
- **Small-group discussion**
  - Developed in partnership with teachers, coaches, and district leaders
- **Whole-class discussion**
  - 5+ rounds of design, administration, analysis, and revision
Practical Measures of Mathematics Instruction:
Development Process

**Initial design**
- Meetings with partners about their improvement focus
- Review existing research & survey items

**Observe a range of classroom instruction**

**Revise survey items**

**Administer surveys**

**Cycles of revision**

**Formal qualitative analysis of interviews & survey responses**

**Cognitively interview students**
Aspects of Productive Mathematics Discussions

• Selecting and implementing cognitively demanding tasks that engage students in mathematical reasoning
  – Ex: What did you need to do to be successful in your math class today?

• Establishing a classroom culture in which students feel safe to share and respond to ideas
  – Ex: Were you comfortable sharing your thinking in the whole class discussion today?

• Pressing and supporting students to explain their reasoning in ways that other students can understand
  – Ex: Did you have trouble understanding other students’ thinking in today’s whole class discussion?
Example Practical Measure: Students’ Perspectives of Whole-Class Discussion

Please view our presentation handout via the Summit mobile app!

WHOLE CLASS DISCUSSION SURVEY: STUDENT COPY

For each question, select one response that best describes your experience in the whole class discussion in today’s math class.

1. What did you need to do in order to be successful in your math class today?
   - Solve problems using the steps the teacher showed me
   - Listen to and make sense of other students’ reasoning

2. Was there only one right way to solve the problem(s) today?
   - Yes
   - No

3. Were you comfortable sharing your thinking in today’s whole class discussion?
   - Yes
   - No

4. Did you have trouble understanding other students’ thinking in today’s whole class discussion?
   - Yes
   - No

5. Did listening to other students in today’s whole class discussion help make your thinking better?
   - Yes
   - No

6. What was the purpose of today’s whole class discussion?
   - Share how we solved problems using the steps our teacher showed us
   - Learn the way the teacher showed us to solve the problem
   - Learn different ways that work to solve a problem from other students
   - Share a mathematical idea we came up with on our own
   - Check to see if our answers are correct

7. Who talked the most in today’s whole class discussion?
   - Students
   - The teacher

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VERSION: 04/11/16, proofed 10, Whole Class Discussion 10
Edsight.io

A visual analytics platform for improvement and research efforts in teaching, learning, and education

Sign in
- Enter your email
- Enter your password
- I forgot my password
- Login
1) What did you need to do in order to be successful in your math class today? (Choose one item that best describes your experience.)

- Solve problems using the steps the teacher showed me
- Listen to and make sense of other students' reasoning
- Finish all of my work
- Invalid Answer

By Section  All Sections

6th grade math Period 1

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9) Did you have trouble understanding other students' thinking in today's whole class discussion?

- Yes
- No

By Section  All Sections

6th grade math Period 1

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Turn and Talk (with a neighbor)

• What do you notice in these representations?

• What other information or details about the class would you need to know more about?

• What might you do in a future class, and how do you think the charts would change?
Case 1: Using Practical Measures to Enhance One-on-One Coaching

Metro Nashville Public Schools
Vanderbilt University
Exceeding Great Expectations

Our STUDENTS
Our PEOPLE
Our ORGANIZATION
Our COMMUNITY
Initiative: Supporting Coaches’ Professional Learning

• High-quality one-on-one coaching is demanding work that requires significant learning and ongoing support.

• Designed monthly professional development sessions aimed at supporting coaches’ learning
  – Eight sessions spread out over the school year
  – Novice and returning coaches
  – 35 school-based elementary, middle, and high school coaches
Our Aim: One-on-One Coaching Cycles

- **Debrief** (e.g., analyze instruction, set new goals)
- **Co-planning** (e.g., set goals, select tasks)
- **Classroom Instruction** (e.g., model, co-teach, observe)
Embedding Practical Measures in One-on-One Coaching Cycles

Debrief (e.g., analyze instruction, set new goals)

Co-planning (e.g., set goals, select tasks)

Classroom Instruction (e.g., model, co-teach, observe)
Practical Measures as Indicators of Improvement

- Data from practical measures can provide evidence that teachers and coaches can use to **determine whether changes in teachers’ instruction are improvements**
Practical Measures as Indicators of Improvement

Did you have trouble understanding other students’ thinking in today’s whole class discussion?

Coach: ...I notice when a student will share, you would rephrase what they were sharing. I wonder if --”

Teacher: “-- Having another student rephrase?”
Practical Measures as Indicators of Improvement

Did you have trouble understanding other students’ thinking in today’s whole class discussion?

Teacher: “That’s great. Put that on my resume!”
Key Conjecture:
Practical Measures as Levers for Improvement

• Embedding data from practical measures in one-on-one coaching cycles can enable coaches to be more effective in supporting teachers’ learning beyond determining whether a change is an improvement.
Practical Measures as Levers for Improvement

- Productive debrief conversations connect student learning goals, students’ thinking, and instruction.

1. **Debrief** (e.g., analyze instruction, set new goals)
2. **Co-planning** (e.g., set goals, select tasks)
3. **Classroom Instruction** (e.g., model, co-teach, observe)

- Analyze evidence of students’ thinking and learning in relation to student learning goals.
- Analyze instruction in relation to evidence of students’ learning.
- Set instructional improvement goals and student learning goals.
Practical Measures as Levers for Improvement

• Common types of evidence:
  – Students’ work
  – Teachers’ recollections
  – Coaches’ recollections and/or notes
Practical Measures as Levers for Improvement

• Common types of evidence:
  – Students’ work
  – Teachers’ recollections
  – Coaches’ recollections and/or notes

Diagram:
- Coach’s perspective
- Teacher’s perspective
- Analyzing Instruction
- Students’ perspectives
**Thinking about your own context:**

*In what ways might practical measures enable instructional leaders (e.g., coaches, teacher leaders) to better support teachers in improving their instructional practices?*
Case 2: Using Practical Measures to Improve a Curriculum Guide Writing Initiative
Federal Way Public Schools
Practical Measures

one
THE EARLY YEARS

two
WHOLE CHILD

three
ACTIVE LEARNERS

four
CONTENT-AREA COMPETENCE

five
PERSISTENCE TO GRADUATION
District Improvement Strategy

Curriculum Guides
(includes lessons)

District-wide PD for Teachers

School-based Professional Learning
(e.g., grade-level planning, coaching)

Improvements in teaching

Student learning
Student Voice
CURRICULUM GUIDE WRITERS DRAFT GUIDES

DISTRICT MATH LEADERS PROVIDE SUPPORT TO WRITERS, INFORMED BY DATA

UW TEAM AND DISTRICT MATH LEADERS ANALYZE SURVEY RESULTS & COGNITIVE DEMAND OF WRITTEN MATERIALS

EARLY IMPLEMENTERS (TEACHERS) PILOT CURRICULUM

TEACHERS ADMINISTER PRACTICAL MEASURE(S)/UW TEAM OBSERVES INSTRUCTION
Using Practical Measure Data to Inform Curriculum-Guide Writing Initiative

Question: Who talked the most in today’s discussion?
- Students who knew the right answer
- Students who shared their ideas
- Students who asked questions
- The teacher

Lesson with low cognitive demand
- 24 (39.3%)
- 19 (31.1%)
- 14 (23.0%)

Lesson with high cognitive demand
- 9 (15.0%)
- 14 (23.3%)
- 33 (55.0%)

n=61
n=60

8th grade
3 classrooms
**Question 6:** What was the purpose of today’s discussion?

- **Option 1, 2, or 5 (Producing Correct Answers):** Share how we solved problems using the steps our teacher showed us; Learn the way the teacher showed us to solve the problem; Check to see if our answers were correct.

- **Option 3 or 4 (Sensemaking):** Learn different ways that work to solve a problem from other students; Share a mathematical idea we came up with on our own.

![Graph showing cognitively demanding levels of lessons](image)
The Value of Practical Measures

- You can’t improve what you can’t see
Stepping Back
Stepping Back

*Using Practical Measures to Inform Instructional Improvement*

- Improving the core of instruction
  - Measure of the quality of key aspects of instruction
  - Measure of time coaches actually work with teachers

- Importance of embedding the measures in supports for professional learning
  - Indicators of improvement
  - Levers for improvement

- Importance of using only for improvement purposes
Stepping Back

Multiple users involved in instructional improvement initiatives at different levels of the system

- Coaches working with individual teachers
- District math leaders working with curriculum guide writers
  - Supports coherence
    - Measures and data as boundary objects
- You can’t improve what you can’t see
Future Work

Long-term goal: System of measures

• Key aspects of classroom instruction that prior research has linked to student learning

• Key aspects of supports for professional learning that prior research has linked to teacher learning
  – One-on-one coaching
  – Teacher collaborative meetings
Questions?

• Visit our website (where you can download the practical measures): https://www.pmr2.org