Project MELD: MATH AND English Language Development for English Learners

Diane August and Rachel Garrett
American Institutes for Research

NABE
March 3, 2016
Overview of Session

- Project overview, Diane August
- Description of the intervention, Diane August
- Findings, Rachel Garrett
- Next steps and closing, Rachel Garrett
Project Overview

Diane August
Overview

- Project Goal: Help sixth-grade Spanish-speaking English language learners (ELLs) meet grade-level expectations in math and English literacy

- Methods
  - Use as a base open source curriculum developed for general education classrooms—the Pearson System of Courses
  - Add scaffolds for English language learners to develop their math and literacy skills and knowledge
  - Assess implementation; teacher dispositions towards teaching and student dispositions toward learning math; and student math and literacy outcomes
Research Questions

- RQ1. To what extent can Project MELD be implemented successfully? What programmatic changes and enhancements are needed to improve the intervention?
- RQ2. How does Project MELD affect teachers’ dispositions towards teaching and students’ dispositions toward learning math?
- RQ3. How does Project MELD affect students’ math learning and development of math-related academic language?
Timeline: Development Phase

**Development Phase** (Study Years 1 and 2): Partner with eight teachers in each year

- **Study Year 1**
  - **Fall 2014**: Project start up, recruited sites; developed winter/spring 2015 intervention and training materials, developed instruments
  - **January–May 2015**: Trained and coached teachers, implemented and iteratively revised intervention materials, collected data
  - **June–August 2015**: Analyzed data; developed fall 2015 intervention materials; trained teachers
Timeline: Development Phase

- **Study Year 2**
  - **September-December 2015**: Implemented fall intervention; trained and coached teachers; revised spring intervention materials and instruments; collected and analyzed data.
  - **January-May 2016**: Implementing spring intervention materials; training and coaching teachers; revising fall intervention materials and instruments; collecting and analyzed data; preparing articles for dissemination.
  - **June-August 2016**: Analyze data; revise analytic plan, finalize instruments for pilot; finalize fall units and training materials.
  - **September-December 2016**: Implement revised intervention; collect and analyze data.
Timeline: Proposed Pilot

• Pilot
  ▪ **June 2017-December 2017**: Recruit 18 new schools, with two teachers at each school; randomly assign teachers to MELD or the base curriculum; implement MELD units and collect data
  ▪ **January 2018-August 2018**: Analyze data; make final revisions to units and training; prepare reports and articles for dissemination
Logic Model

**Initial preparation**
- Coordinate with local sites
- Consult with technical advisors

**Development**
- Curricular materials
- Professional development materials and methods
- Observation and assessment instruments
- Outcome measures

**Implement intervention cycle**
- Curricular materials
- Professional development materials and methods
- Data collection

**Analyze data**
- Classroom observation data
- Weekly teacher logs
- Teacher and student focus groups
- Teacher and student surveys
- Beginning and end-of-unit math and language assessments

**Prepare and disseminate**

**Revise**
Intervention
Diane August
Base Curriculum: Grade Six
Pearson System of Courses
Pearson System of Courses: Math

OVERVIEW:
The program leverages technology in the classroom to deliver what teachers need to support student learning, classroom management, assessment, and professional development.

http://pearsonsysteemofcourses.com
UNIT 1
Rational Numbers

Have you ever watched someone diving into water from the top of a cliff? Would it be exciting or scary to you? How would you express the diver’s altitude before she enters the water and after she enters the water?

In this unit you will learn how to use positive and negative numbers on number lines in the coordinate plane. You will also reflect figures in the coordinate plane.
Tasks Within a Lesson

- **Opening** —
  Task 1: Definition and Introduce Number Line Contraption
  Task 2: Math Mission

- **Work Time**
  Task 3: Explore Number Line Contraption
  Task 4: Questions about the Number Line Contraption
  Task 5: Prepare your Presentation

- **Ways of Thinking**
  Task 6: Presentation

- **Apply the Learning (not every lesson)**
  Task 7: More practice

- **Summary of the Math (not in Exploratory Lesson)**
  Task 8: Read and Discuss

- **Reflection** Task 9
MELD ELL Supports and Professional Development
MELD Supports for ELLs

- Teacher Guide
  - Vocabulary mini-lessons; Glossary; Cultural connections; Index of scaffolds; Student workbook inserts
- Student Workbook
  - Glossary; Lesson opening; Work time; Lesson summary
- Homework
- Foundational skills
### English Language Learners Scaffolds

<table>
<thead>
<tr>
<th>Task</th>
<th>Task Description</th>
<th>Scaffold</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Egginess Problem</td>
<td>Opening</td>
</tr>
<tr>
<td>3</td>
<td>Fix the Mixture</td>
<td>Work Time</td>
</tr>
</tbody>
</table>
Vocabulary mini-lessons prior to each lesson
- Focus: general academic vocabulary and context specific vocabulary
- Math is at end of each lesson, used as a review

Lesson 1

Just the Right Egginess
Minilesson for Introducing General Academic Vocabulary

- The glossary below displays general words and phrases students will encounter in the lesson. General words and phrases include high frequency general academic vocabulary and context-specific vocabulary.
- Pre-teach the glossary words and phrases that are unfamiliar to students.
- For each word, use the following routine.
  - Say the word.
  - Have students repeat the word twice.
  - Have students write the word in the space provided in the student glossary.
  - Review the definition.
  - Review the example.
  - Invite students to answer the question through partner talk.
- The context references the text in the lesson where the word appears. The context and type are for your information only.
Teachers pre-teach the glossary words and phrases that are unfamiliar to students.

For each word, teachers use the following routine:

- Say the word.
- Have students repeat the word twice.
- Have students write the word in the space provided in the student glossary.
- Review the definition.
- Review the example.
- Invite students to answer a question through partner talk.
### General Academic and Context-Specific Vocabulary

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
<th>Example</th>
<th>Partner Talk</th>
<th>Context</th>
<th>Type</th>
</tr>
</thead>
</table>
| **compare** | to say how two things are the same or different | The students compare recipes for chocolate chip cookies. Some recipes have nuts and some recipes do not have nuts. | How does the number of boys in the class compare with the number of girls in the class?  
The number of boys is [more than / less than / the same as] the number of girls. | How does your strategy for fixing the mixture compare with the one in the video? | cs   |
| **eggniness** | proportion of eggs in a mixture or recipe | The “eggniness” of the pancakes was just right, because there was the right proportion of eggs in the recipe. | Do you prefer food with a lot of “eggniness” or only a little “eggniness”? | You will explore the “eggniness” of a mixture, the glide ratios of birds, and the percentage of rainfall. | cs   |
# Math Vocabulary

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
<th>Example</th>
<th>Partner Talk</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ratio</strong></td>
<td>relationship that describes the relative sizes of two or more values</td>
<td>The ratio of boys to girls is 4:3.</td>
<td>In your class, what is the ratio of students who walk home to students who ride the bus?</td>
<td>You can say that the ratio of the triangles to stars is 3 to 10, or 3:10. (3.2.1)</td>
</tr>
<tr>
<td><strong>value of a ratio</strong></td>
<td>the number you get when you divide the two numbers of a ratio</td>
<td>If there is 1 boy and 3 girls, the ratio of boys to girls is 1:3. If you divide 1 by 3, you get the value of the ratio, which is .33. Thus, .33 of the group are boys.</td>
<td>What is the value of the ratio 4:5?</td>
<td>The value of a ratio is the quotient that results from dividing the two numbers in a ratio. (3.2.2)</td>
</tr>
</tbody>
</table>
For Spanish speakers, turn on the closed caption subtitles in Spanish (or use English subtitles if students are not bi-literate). Point out that the name “Nana” is an affectionate term for “grandmother” (like abuelita). After the video, draw a cultural comparison by discussing a recipe for making chili and getting the right level of spiciness. Invite ELLs who know of this food (or another spicy dish, such as enchiladas) to share how adding more or less chili powder (or actual chiles) and flour makes a difference in the taste of the dish. You are substituting the notion of “eggniness” with “spiciness.”
Use the glossary when your teacher is reviewing the glossary with the class; when you need help understanding the meanings of the words in the lesson; and when you are completing your homework.

<table>
<thead>
<tr>
<th>Word or Phrase</th>
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</thead>
<tbody>
<tr>
<td>egginess</td>
<td></td>
<td>proportion of eggs in a mixture or recipe</td>
<td>The “egginess” of the pancakes was just right, because there was the right proportion of eggs in the recipe.</td>
</tr>
<tr>
<td>“egginess” (no hay palabra en español, pero quiere decir el sabor de huevos en cualquier comida)</td>
<td>proporcion de huevos en una mezcla o receta</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MELD: Opening

**OPENING**

**ELL:**
When showing video, be sure that ELLs can follow the explanations contained therein by “chunking” the video. Pause video at key times to allow ELLs time to process the information. Ask students if they need to watch it a second time. Check for understanding by asking questions before moving on.

**SWD:**
Students with disabilities may not

**Task 1: Egginess Problem**

**LESSON GUIDE**

Today, you’ll whip up a recipe using eggs and flour and in the process learn about ratios. Have students watch the video about mixing eggs and flour.

**MATHEMATICS**

The video presents a problem situation that students will investigate in this lesson. The situation involves finding a ratio of eggs to flour (measured in tablespoons) that is equivalent to 2:3 and can be created with a minimum of 4 tablespoons of flour. Note that the concept of an equivalent ratio should not be directly taught during this lesson.
Lesson 1

Task 1: EGGENESS PROBLEM

Opening

Watch the video on your tablet. Use the Word Bank to fill in the blanks.

Word Bank

flour
2
2
3
4

eggs

Eggeness is the amount of eggs compared to the amount of flour in the family egg recipe.

What is the family egg recipe?

__________ eggs

__________ tablespoons of flour

What amounts of the ingredients did Dad use?

__________ eggs

__________ tablespoons of flour

✓ What is the problem presented in the video?
MELD Student Workbook: Work Time

WORK TIME

Task 4: Ms. Lee’s Class

LESSON GUIDE

Have students work in pairs on the problems and the presentation.

MATHEMATICAL PRACTICES

Mathematical Practice 2: Reason abstractly and quantitatively.

- Listen for students who use the problem situations to help them make sense of the values they are working with.

Mathematical Practice 6: Attend to precision.

- Listen for students who use the term *ratio* correctly or who discuss the correct usage of the term as they work together to solve the problems.
Lesson 2

Task 4
MS. LEE’S CLASS

Work Time

Read the information on your tablet. Use the Word Bank to fill in the blanks.

Word Bank

- 2
- 2
- 15
- 15:17
- 17
- boys
- boys

- How many girls are in Ms. Lee’s math class?
  The number of girls is ____________

- How many boys are in Ms. Lee’s math class?
  The number of boys is ____________

- What is the difference between the number of girls and the number of boys in the class?
  To find the difference between two numbers, you use ____________

- The equation is 17 – 15 = ____________
Here are the temperatures for five days in Portland, Maine.

<table>
<thead>
<tr>
<th>Day</th>
<th>Temperature (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>-5</td>
</tr>
<tr>
<td>Tuesday</td>
<td>-8</td>
</tr>
<tr>
<td>Wednesday</td>
<td>4</td>
</tr>
<tr>
<td>Thursday</td>
<td>10</td>
</tr>
<tr>
<td>Friday</td>
<td>-1</td>
</tr>
</tbody>
</table>

What is the difference between the lowest and highest temperature?

-8°F is the lowest. 10°F is the highest.
If I plot these on a number line, I can see the numbers are 18 degrees apart.

Look at Mia’s work.
Mia used the strategy of plotting the temperatures on a number line.
Why is that a good strategy?
You can see the ________________ from 0.
MELD Student Workbook: Worked Example (Incorrect)

Lesson 3

Task 3: TEMPERATURES IN BARROW, ALASKA

Worked Example

Here are the temperatures for five days in Portland, Maine.

<table>
<thead>
<tr>
<th>Day</th>
<th>Temperature (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>-5</td>
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<tr>
<td>Tuesday</td>
<td>-8</td>
</tr>
<tr>
<td>Wednesday</td>
<td>4</td>
</tr>
<tr>
<td>Thursday</td>
<td>10</td>
</tr>
<tr>
<td>Friday</td>
<td>-1</td>
</tr>
</tbody>
</table>

What is the coldest temperature?

The coldest temperature is 10°Ф.

Look at Denzel’s work.

Plot the temperatures on this number line.

Help Denzel correct his work.

What is the coldest temperature?

The coldest temperature is the one farthest to the RIGHT/LEFT on the number line.

The coldest temperature is __________°F.
MELD Student Workbook: Summary

SUMMARY OF THE MATH

Task 8: What I Know About Ratios

A POSSIBLE SUMMARY

Ratios allow you to compare quantities, but by themselves, they do not tell you the actual values of the quantities. Using a ratio to compare quantities is different from using subtraction to find the difference between quantities because it tells you the value of one quantity for a given value of the other quantity. For example, for a ratio of 3:2, you know that if the first quantity has a value of 6, the second quantity has a value of 4.

ADDITIONAL DISCUSSION POINTS

If there is time, discuss the following:

- A summary of different ways to compare numbers
- A definition of a ratio
- A description of what a ratio tells you and what it doesn’t tell you
Lesson 2

Task 8 WHAT I KNOW ABOUT RATIOS

Summary of the Math

Read the information on your tablet. Use the Word Bank to complete the sentences.

Word Bank
ratio
subtraction
ratio
relationship

You can use a __________ to compare quantities by division.

For example, you can use a __________ to compare the quantity of egg and the quantity of flour in a recipe. The ratio does not always tell you the exact quantities. The ratio tells you the __________ between the quantities. You can use __________ to calculate the difference between two quantities.
MELD Homework: Overview

- Teacher and student editions
  - Teacher edition has answers completed
- Homework Includes
  - Math problems
  - Vocabulary crossword puzzle
  - Vocabulary self-check
  - Student glossary
Homework: Vocabulary Crossword

Lesson 3

Vocabulary Crossword Puzzle

Student Name: ___________________________ Date: _______________________
Teacher Name: ___________________________

[Crossword puzzle image]
Homework: Vocabulary Crossword

<table>
<thead>
<tr>
<th>ACROSS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>to show how to do something</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>a short statement that tells the important information</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>length of time</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DOWN</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>a sign used to indicate something</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>to show or point out</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>how far a number is from 0 on a number line</td>
<td></td>
</tr>
</tbody>
</table>
Homework: Self Check

My score: ____________ correct out of 6.

Directions: Select the correct word from the Word Bank to complete the definition. Each definition is followed by an example of the word in a sentence to help you understand the definition of the word. Use the same word for both the definition and the sentence.

Word Bank

- period
- indicate
- summary
- symbol
- absolute value

1. The ________________ ________________ is how far a number is from 0 on a number line.
   
   **Example**
   
   Both 8 and -8 are 8 away from 0, so the ________________ ________________ of both is 8.

2. To ________________ is to show how to do something.
   
   **Example**
   
   Maria wanted to ________________ how to divide 9 by 3 to her friend.
## Task 1

<table>
<thead>
<tr>
<th>Word or Phrase</th>
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<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>absolute value</strong></td>
<td></td>
<td>how far a number is from 0 on a number line</td>
<td>![Number Line Diagram] “6” is 6 away from 0, so the <strong>absolute value</strong> of 6 is 6. “−6” is also 6 away from 0, so the <strong>absolute value</strong> of −6 is also 6.</td>
</tr>
<tr>
<td><strong>el valor absoluto</strong></td>
<td></td>
<td>la distancia desde 0 al número en la recta numérica</td>
<td></td>
</tr>
<tr>
<td><strong>indicate</strong></td>
<td></td>
<td>to show or point out</td>
<td>In math, the minus sign (−) is used to <strong>indicate</strong> subtraction.</td>
</tr>
<tr>
<td><strong>indicar</strong></td>
<td></td>
<td>mostrar o señalar algo</td>
<td></td>
</tr>
<tr>
<td><strong>symbol</strong></td>
<td></td>
<td>a sign used to indicate something</td>
<td>This <strong>symbol</strong> is used to indicate a negative number.</td>
</tr>
<tr>
<td><strong>simbolo</strong></td>
<td></td>
<td>un signo usado para indicar algo</td>
<td></td>
</tr>
</tbody>
</table>
Foundational Skills: Topics

- Comparing fractions in three ways
- Converting mixed numbers to fractions greater than one
- Converting fractions greater than one to mixed numbers
- Fractions in simplest forms
- Multiplying fractions
- Multiplication of fractions and whole numbers
- Multiplication of mixed numbers
Foundational Skills: Example

Multiplying Fractions

**Instructions:** Review the example with your teacher and then complete the worksheet by multiplying fractions. After the worksheet is completed your teacher will review it so you can correct any errors you may have made.

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>product</td>
<td>The answer to a multiplication problem.</td>
<td>4 \times 2 = 8. The product is 8.</td>
</tr>
</tbody>
</table>

1. \[ \frac{4}{5} \times \frac{3}{8} = \]
   - **Step 1.** Multiply the numerators. \( 4 \times 3 = 12 \)
   - **Step 2.** Multiply the denominators. \( 5 \times 8 = 40 \)
   - **Step 3.** Write the product of the fractions. \( \frac{12}{40} \)

2. \[ \frac{7}{8} \times \frac{1}{3} = \]
   - **Step 1.** Multiply the numerators. \( 7 \times 1 = \) ________
   - **Step 2.** Multiply the denominators. \( 5 \times 8 = \) ________
   - **Step 3.** Write the product of the fractions.
Peer Partnering

- Pair ELs with limited proficiency in English with bilingual partners
- Student pairs learn five core skills to make their conversations more academic:
  - Elaborate and clarify
  - Support ideas with examples
  - Build on and/or challenge a partner’s idea
  - Paraphrase
  - Synthesize conversation points
2015 Professional Development and Coaching

- Initial in-person professional development by project team to familiarize teachers with instructional materials prior to implementation (January and July 2015)
  - Mathematics System of Courses
  - MELD scaffolds
- Webinar-based professional development prior to implementation of each unit
- Mentoring by the study coach up to twice per unit per teacher
Questions?  Comments?
Data Collection and Findings

Rachel Garrett
Data Collection: Overview of Instruments

- **Classroom-level data**
  - Classroom observations (up to two per unit) and teacher debriefs

- **Teacher-level data**
  - Weekly logs during intervention implementation
  - Survey at beginning and end of each semester
  - Webinar-based focus groups at the end of each unit

- **Student-level data**
  - Focus groups at end of semester
  - Student survey at the end of each semester
  - Language and math assessments at beginning and end of units
Goal: Observe MELD implementation in order to refine methods and materials

Observations conducted by the project team with debriefings by mentor afterwards at a time convenient for teachers
- Up to two observations per unit

Observations focused on
- Implementation of core components of Pearson curriculum and MELD components
- Classroom context and technology use
Findings: Classroom Observations and Teacher Debriefs

- Classroom context
  - Class size ranged from 25-32 students per class.
  - Classes were composed of 23-28% EL students.
  - Three teachers were noted for particularly strong classroom management (two of those were high Pearson and MELD implementers).

- Technology use
  - Teachers used the Pearson digital curriculum, but incorporated other open-access online resources (e.g., blendspace.com, ixl.com/math) to provide students with more practice of the concepts and video (e.g., mathsnacks.com video)
Findings: Classroom Observations and Teacher Debriefs

- **Lesson Opening and Summary** tasks
  - MELD scaffolds helped highlight the key elements of lessons.
- **Worked Examples**
  - Incorrect examples and discussions around them were helpful.
  - Some teachers wanted less reading, while others wanted more explanations for what was incorrect.
  - Some teachers requested more suggestions for how to use worked examples.
Findings: Classroom Observations and Teacher Debriefs

- Students had access to MELD *Glossaries* and used them to create personal ones.
  - *Glossaries* were not needed for all students.

- Teacher responses to the vocabulary exercises were mixed.
  - Some requested more vocabulary activities for in-class and out-of-class.
  - Others reported direct instruction of vocabulary in class took too much time.

- Teachers requested specific language goals be added for the lessons.
Findings: Open-Ended Teacher Responses

- Most teachers found the language-focused activities helpful.
  - Language focused materials included pre-teaching vocabulary, lesson-opening activities, lesson-summarizing activities, student glossaries, and homework crossword puzzles and self-quizzes.
  - Teachers reported that language-focused materials enabled students to connect words with important terms and concepts in the lessons.
  - “[The summary framing] is like a graphic organizer that specifically tells students what to use to fill in the blanks, and then they read it.”
Findings: Open-Ended Teacher Responses

- Teachers suggested adding specificity to the materials
  - One teacher asked that the materials include more specific vocabulary activities for in and out of class.
  - Another teacher felt there was too much vocabulary work involved.
- Organizing vocabulary words by two categories—“math” words, and other general academic words
- Continuing the use of Cultural Connections in lessons to engage students in learning mathematics
Instrument: Teacher Logs

- **Goal:** Capture information about teaching experiences with core components of MELD scaffolds

- **Log Questions**
  - For each lesson: check the supports you actually used and check whether or not they worked well. If you made adjustments that made them work better, briefly note them.
  - At the end of each week, complete the following questions:
    - Are there other supports you are using to enhance student’s understanding of the math content or to develop student’s language? If so, please elaborate.
    - If there are challenges to implementing the MELD intervention, please elaborate.
Findings: Teacher Logs

- A total of 19 logs was submitted during spring 2015.
- Most teachers reported using the Lesson Openings, Worked Examples, and Foundational Skill Activities in the student guide, as well as the pre-teaching vocabulary in the teacher guide.
  - Worked Examples had the highest reported rate of use across logs (n=17), but 31 percent of logs indicated that they did not work well.
  - For logs in which teachers reported using Lesson Openings (n=15) and Pre-Teaching Vocabulary (n=14), all logs rated these activities positively.
- Teachers were least likely to report having used the Lesson Summaries in student workbooks, the Cultural Connections in the teacher guide, and Self-Quiz in the student homework.
  - Explanation: teachers not using Pearson lesson summaries or teacher guides. Homework was a new component added to Unit 6.
Instrument: Student Focus Groups

- Goal: Get feedback from students about the MELD components
- The mentor came to the classroom to conduct 30-minute group discussions once per semester with each participating classroom
- A total of seven student focus groups were conducted in June 2015.
- The project team created packets of example materials from the student workbooks for the study mentor to share with students.
- The mentor reviewed the materials with students, asking after each one if it was used in their class, if it was/would have been helpful, and suggestions for how it could have been more helpful.
Findings: Student Focus Groups

- All groups reported using *Pre-Teaching Vocabulary, Lesson Openings Worked Examples, Student Glossary, Lesson Summaries*, and *Crossword Puzzle*.

- *Cultural Connection* (n=4) and Graphic Organizers (n=5) were most often reported as NOT used.

- Students mostly expressed positive responses to the materials.
Findings: Student Focus Groups

- As with teachers, most students reported finding the language-focused activities helpful
  - Many students responded that language-focused materials were useful in teaching or reinforcing the meanings of words in the curriculum.
  - Students reacted positively to the Spanish translations.
  - “The glossary did help, because it has Spanish and English…., so mostly it’s helpful to other kids that don’t really understand English, so in Spanish when they see that word they are going to say, ‘Ooh, I know what this means.’”
Students in three groups suggested worked examples include more explanations (e.g., step-by-step discussions of how the problems were solved and where errors had been made), making questions clearer, and more space provided in student workbooks to work the problems.

Adding variety and specificity to the materials
- Students in one group asked for a greater variety of activities (math-related games) to be provided for each topic.
- They also asked for more detail in the student Glossaries.
  - “There should be more detail in the definitions and more examples.”
Instrument: Teacher Surveys

- **Teacher Surveys**
  - **Goal:** Understand the classroom context for MELD implementation
  - **Part 1:** Collect information about teacher and student backgrounds
  - **Part 2:** Scales to capture teacher’s self-report of strengths and challenges in teaching math and language to classrooms composed of diverse learners.
  - **Approximately 15-minute survey at the beginning and end of the spring semester**
## Findings: Teacher Survey Attitude and Perception Scales

<table>
<thead>
<tr>
<th>Scale Name</th>
<th>Description</th>
<th>Start of Spring Semester</th>
<th>End of Spring Semester</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Math Topics - General</strong></td>
<td>Confidence in ability to teach specific mathematical topics in general</td>
<td>3.82</td>
<td>3.59</td>
<td>-0.23</td>
</tr>
<tr>
<td><strong>(9 items)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Math Topics - ELL</strong></td>
<td>Confidence in ability to teach specific mathematical topics to ELLs</td>
<td>2.58</td>
<td>3.41</td>
<td>0.83</td>
</tr>
<tr>
<td><strong>(9 items)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Difference: General vs. ELL</strong></td>
<td></td>
<td>1.24</td>
<td>0.18</td>
<td>-1.06</td>
</tr>
<tr>
<td><strong>Pedagogy Knowledge</strong></td>
<td>How knowledgeable T feels about the CCSS and teaching mathematics to middle school/ELL students</td>
<td>2.60</td>
<td>3.04</td>
<td>0.44</td>
</tr>
<tr>
<td><strong>(5 items)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Findings: Teacher Survey Attitude and Perception Scales

<table>
<thead>
<tr>
<th>Scale Name</th>
<th>Description</th>
<th>Start of Spring Semester</th>
<th>End of Spring Semester</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limiting Factors (6 items)</td>
<td>Degree to which classroom and student factors limit teacher’s ability to conduct specific activities in class</td>
<td>2.37</td>
<td>2.36</td>
<td>-0.01</td>
</tr>
<tr>
<td>Teaching Confidence (7 items)</td>
<td>Teacher’s confidence in teaching mathematical language, enhancing understanding of students with different levels of English proficiency</td>
<td>2.83</td>
<td>3.27</td>
<td>0.44</td>
</tr>
<tr>
<td>Teaching Difficulty (4 items)</td>
<td>Difficulty of helping students with different levels of English proficiency to meet state mathematics this year vs. previous years</td>
<td>1.60</td>
<td>2.00</td>
<td>0.40</td>
</tr>
</tbody>
</table>
Instrument: Student Assessments

- Goal: Study how students are progressing in their math and language skills
- Three types of assessments
  - Pre-Unit foundational skills diagnostic (district-developed)
  - Post-unit math assessments (part of Pearson curriculum)
  - Academic and math vocabulary (AIR-developed): brief multiple choice assessment given at the beginning and end of each unit.
- Assessments were delivered digitally
- The study team is analyzing the data, provided by the district in December 2015
Audience Questions and Comments

Questions?
Comments?
Next Steps and Closing

Rachel Garrett
Next Steps

- Continue to refine the MELD methods and materials
- Share the findings with practitioners and researchers
- Prepare for and conduct a more formal pilot study
Acknowledgements

- Department of Education for funding this work
- Advisory board for their valuable input
- Learning in Motion for a productive collaboration