

Pomona Unified School District  
Harvey Mudd College

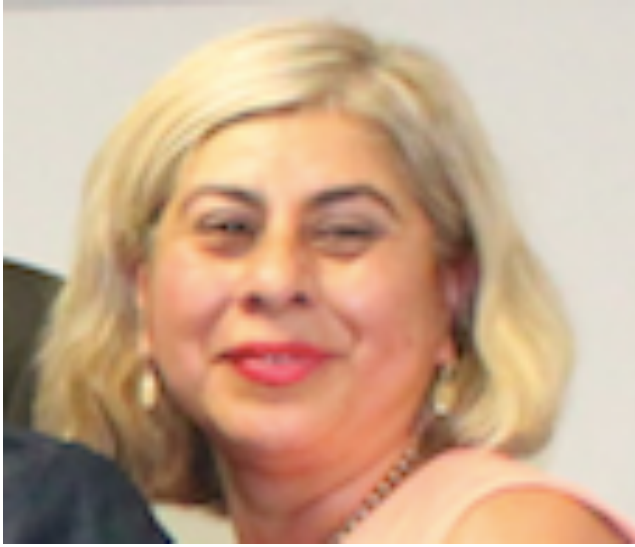
Proud to be PUSD!  
November 18, 2015

IMMERSION teachers:  
Please fill out the final survey  
you will receive by email.

Many thanks.

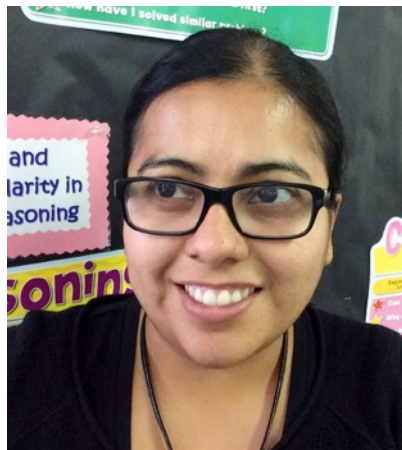


**Gabriela Gamiz**  
**Director for Community Engagement**  
**Harvey Mudd College**



**Lilia Fuentes**  
**Director of Elementary Education**  
**Pomona Unified School District**

# Teacher Study Group Facilitators



Grace Greenleaf   Laura Pahler   Sabrina Jordan-Ortega   Stacy Brown   Rachel Levy

And most importantly...



# Today's Agenda

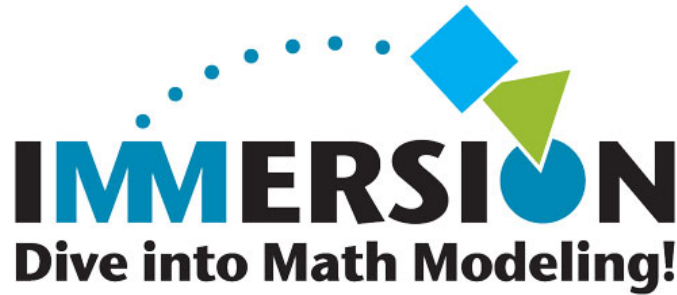
A bit about IMMERSION

Teacher study groups will describe their projects

Congratulatory gifts!

Time to explore centers  
teachers rotate  
explain/explore





Three year project in California, Montana, Virginia  
National Science Foundation Grant 1441024 \$1.3M

How can the mathematical practice  
“Model with Mathematics”  
be enacted in the elementary grades?

Why engage elementary school students  
in mathematical modeling?

**Mathematical  
Vocabulary**

**Interdisciplinary  
Connections**

**Quantitative  
Literacy**

**Creativity**

**Collaboration**

**Critical Thinking**

# **Mathematical Modeling Motivates**

**Communication**

**Formalizing &  
Mathematizing**

**Problems Solving**

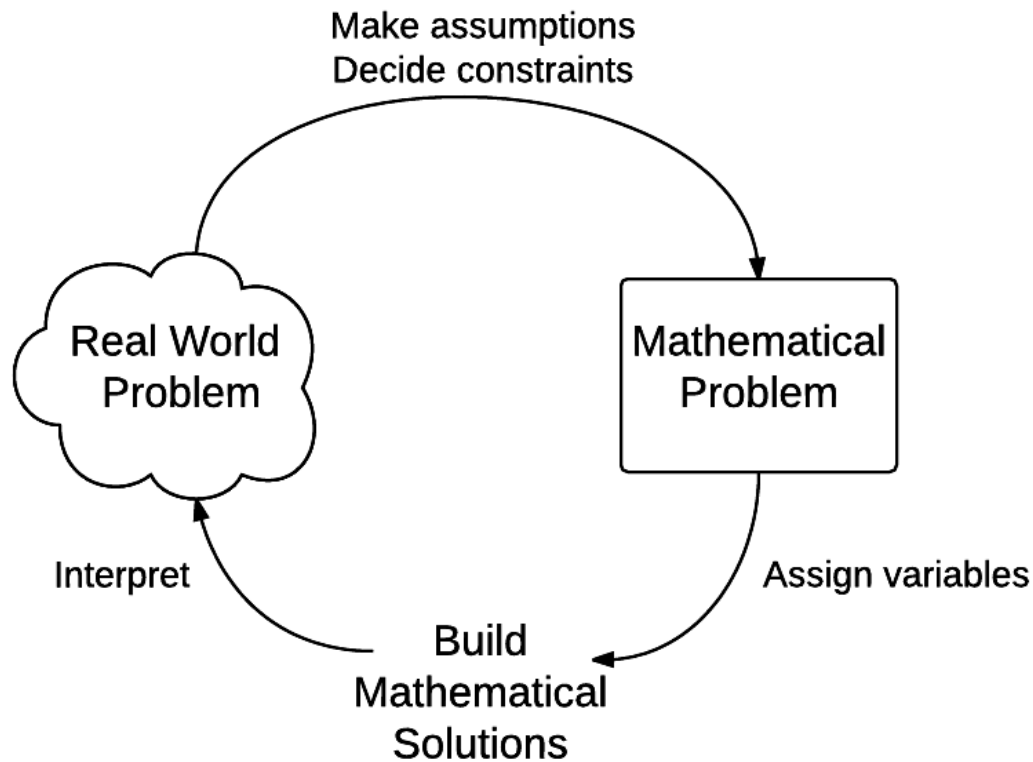
**Iteration &  
Revision**

**Computation**

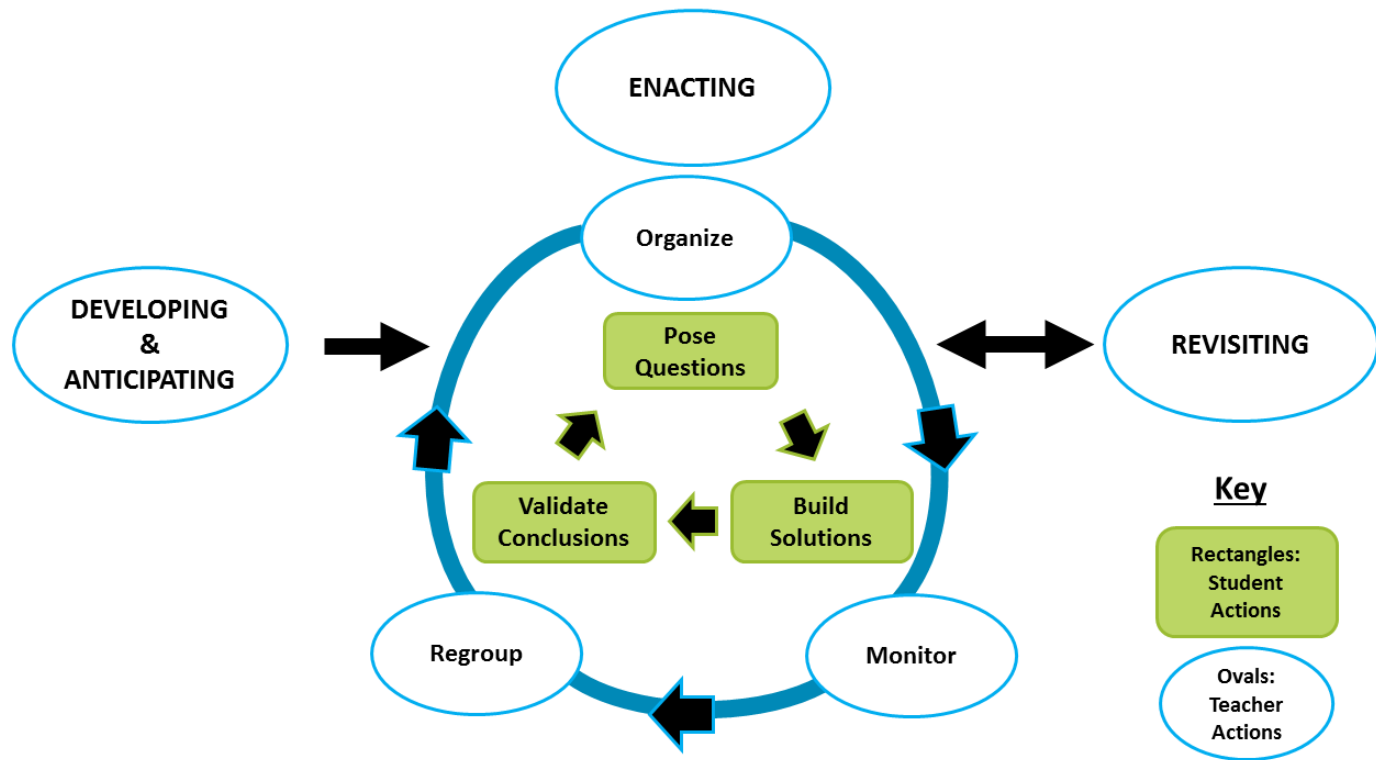
**Multiple  
Representations**



# Mathematical Modeling: The Student Cycle



# Mathematical Modeling: The Teacher Cycle



# Local attention for IMMERSION



Superintendent  
Richard Martinez

# National attention for IMMERSION

EDUCATION WEEK

**GAIMME**

Guidelines for Assessment and  
Instruction in Mathematics Modeling Education



 **Discovery**  
EDUCATION™



And now for the main event!

# Group 1

Cindy Yuen	Alcott	3rd
Jacquelyn Coe	Alcott	4th
Melissa Galvan	Lincoln	4th
Lillian Martinez	Lincoln	3rd

Facilitator: Sabrina Jordan-Ortega, PUSD

# A Trip to the Fair

## How much does it cost to go to the fair?

**Task:** Help the principal budget for the cost of awarding a student a trip to the LA County Fair.

**Day 1:** Teacher poses the question. Students brainstorm what should be included in a trip to the fair (i.e. ticket to enter, meals, rides etc.)

**Day 2:** Students research costs of entry, meals and tickets to go on rides. Students work together in groups to create a budget. Teacher facilitates groups' sharing out of ideas to class and narrowing down options.

**Day 3:** Students create poster to display their group budget and calculations for determining how much it costs to go to the fair.

### Student Learning

- Trips to the fair are not cheap, so a budget is important.
- There are a lot of factors to consider:
  - Admission costs vary by day and time.
  - Some rides require more tickets.
  - Wristbands are only an option during certain hours of operation.
  - The cost of food varies and the number of meals needed would depend on the length of time someone was at the fair.
- Discover that not all information available is important in solving the problem.
- There is ALOT of math to think about when planning a trip.

### Teacher Learning

- Math modeling is not easy.
- Students are very engaged in real-life applications.
- It is difficult to embrace the concept of posing open-ended questions to students.
- Students are capable of higher level thinking.
- Helping students record their thinking is a challenge.
- Balancing when to intervene as students are working out math and when to allow them to learn from their mistakes is tough.
- Students need support with organizing their work.
- These types of tasks take a lot of time for the students to engage in higher level thinking.
- Modeling tasks support SMPs.

# Group 2

Jamie Santana	Armstrong	5th
Nicki Lew	Pantera	5th
Joe Shim	Diamond Point	6th
Yvette Harris	Westmont	4th
Mireya Jimenez	Westmont	3rd/4th

Facilitator: Rachel Levy, Harvey Mudd College

# Carnival Fun

**Immersion**

# Carnival Games - Summary of Findings

Students modeled the use of mathematical skills through the budgets they used and the rules they created. Calculations were made by hand or use of spreadsheet program. They used weights of attributes to assist in determining which game was most engaging to play. They used a ratio of success to failure as a metric to determine whether their game would be profitable.

Students learned to use mathematical modeling as a way of expressing their mathematical knowledge. They reflected and revised their games to what should be improved. They engaged in various levels of SAMR and DOK.

We as teachers need more time in preparing and practicing mathematical modeling tasks to be more proficient in teaching it to students. We learned that this activity could be used again next year with a few modifications such as focusing on ratios, measurement and other mathematical standards.

# Group 3

Maura Cuevas	Cortez	4th
Marlene Harrer	Cortez	3rd
Diane Hubbard-Knight	Cortez	4th
Kristina Sandberg	Cortez	4th

Facilitator: Laura Pahler, PUSD (and Cortez!)

# IMMERSION Project: AR Word Count Goal

Maura Cuevas

Diane Knight

Tina Sandberg

Laura Pahler



Accelerated Reader

## ***The task:***

- Student choice in setting Accelerated Reader goal for 1<sup>st</sup> quarter
- Timed their words read per minute
- Calculated how many minutes per day and calendared which days they would read

## ***Student learning:***

- Greater understanding of place value up to one million and the base ten system
- Greater facility with multiplication: repeated addition and skip-counting (multiples)
- Knowledge of when and how to use “friendly” numbers (estimation) to make the task easier
- Discovered that there are different ways to solve a problem and different possible answers

## ***Insights into teaching:***

- With an authentic, open, and collaborative task, students of all abilities are able to find an entry point and confidently engage in complex math tasks.
- When the task is relevant and meaningful, students show ownership and are motivated to discuss the task in and outside of class.
- Spreading the task over several days and weeks gives students time to process, discuss, and adjust their calculations.
- The mathematical modeling process fosters a deep understanding of math concepts that transfers easily to a writing task.



# Group 4

Robyn Clark	Lexington	4th
Diana Escalante	Lexington	2nd
Simon Hill	Lexington	5th
Lisa Moseley	Lexington	3rd
Karina Thomas-Ulrich	Lexington	3rd

Facilitator: Grace Greenleaf, PUSD

## **Our math modeling task:**

Our students were tasked with creating table arrangements for a given number of people in a banquet hall. Grades 3-5 were asked to then figure the cost of tables & chairs for the arrangements.

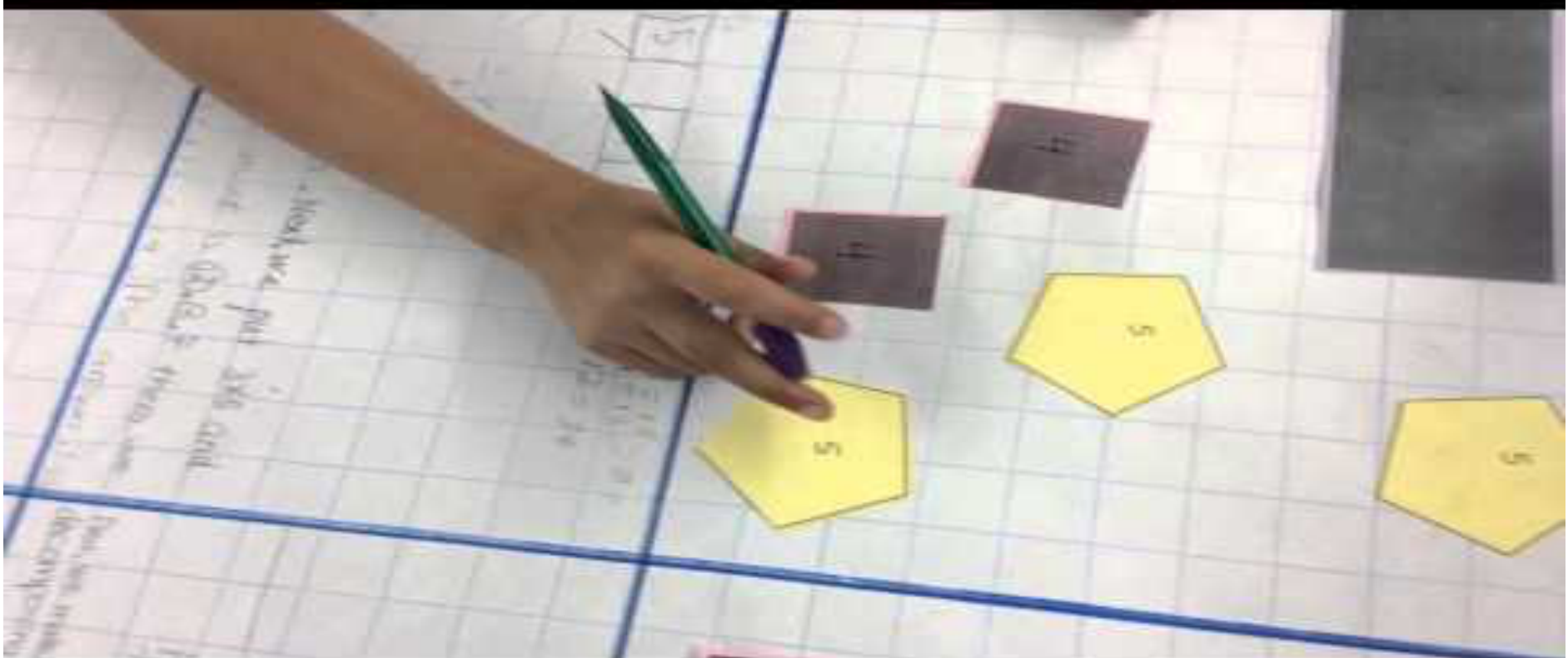
**Group 4 Banquet Hall**  
Grades 2, 3, 4, & 5

## **The student math learning:**

The students learned to work cooperatively in groups to solve a real world problem. They applied math strategies to derive equations and multiple solutions. Students used tape diagrams, number bonds, arrays, number lines, and charts. They used repeated addition & multiplication.

## **The teacher learning:**

We learned that math modeling allowed students to use different, various, and multiple strategies to solve the problem; and it provided an opportunity to observe students' strengths & weaknesses in their mathematical thinking, for example, organizational skills, creating models, their approach to the problem, & explaining their thinking.



# Group 5

Jody Britten	Kingsley	5th
Misael Jimenez	Kingsley	4th
Marka Carson	Montvue	3rd
Erika Villegas-Jimenez	Montvue	4th

Facilitator: Stacy Brown, Cal Poly Pomona

# Re-Engineering Our Playground

What modeling task did your students engage in?

- 3rd to 5th Grade students looked at efficiency, allotment of space, elements of design, and measurement (area and perimeter, for example) in our school playgrounds at Montvue and Kingsley Elementaries.

What did your students learn about mathematics and/or mathematical modeling?

- Students learned that they had to make many decisions in their reasoning as they relate to math concepts.

What did you learn about teaching mathematics and/or mathematical modeling?

- The teaching of math modeling showed that students enjoyed the exploration, cooperation, and felt enthusiastic about the application of their learning to a real-life situation but this definitely requires constant analysis of the trajectory of the class

Jody Britten, Marka Carson, Misael Jimenez, and Erika Villegas-Jimenez

Kingsley and Montvue Elementary Schools

What next?

Please keep in touch...

Time to visit our centers and  
enjoy the refreshments!