Connecting Elementary Mathematics Teaching to Real-World Issues

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Overview of the Project

There are long-standing calls to make mathematics more meaningful, relevant, and applicable both inside and outside of the K-12 classroom.

- there is a growing recognition that mathematics is a valuable tool for helping students understand important real-world issues that affect their lives and society.
- mathematics can support students in becoming mathematically literate and engaged democratic citizens.
- despite the increased interest in connecting mathematics to real-world issues in the classroom, many teachers feel unprepared to do so.

This project will

- **engage students and teachers in rich, real-world math tasks;**
- **support future teachers and mathematics educators in adapting, designing, and implementing similar tasks;**
- **provide a basis for further research on the most effective ways to design and implement real-world tasks in the mathematics classroom.**

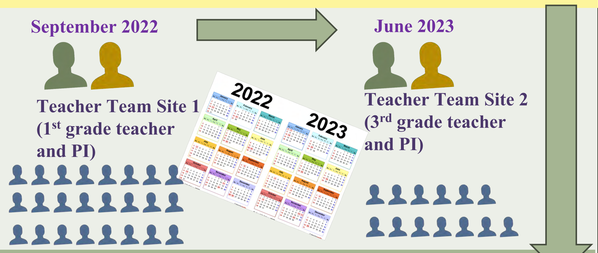
Year 1 – Year-long Collaboration

Design and pilot tasks that connect math to real world issues with teacher teams

Year 2– Year-long Collaboration

Implement tasks

Co-Teaching Math in 1st and 3rd grade to that connect math to real world issues



Year 3 – Year-long Collaboration

Retrospective analysis

Analyze implementation and refine tasks that connect math to real world issues with teacher teams

Creation of Records of Practice

What does it mean to connect math to the real world?

- **Word/Story problems about our world** (Gainsberg, 2008; Koestler, 2012; Lee, 2012)
- **WINDOWS: Analysis of real data, bring real-world issues into the classroom to allow students to learn about the world** (that is not necessarily relevant to the students in the class)(Bartell, 2013; Bishop, 1990; Frankenstein, 2012; Gainsberg, 2008; Gates & Jorgensen, 2009, Gutstein, 2006; Lee, 2012)
- **MIRRORS: Connecting to students' fund of knowledge to allow students to see themselves in the mathematics** (Bishop, 1990; González et al., 2005; Civil, 2007; Turner & Drake, 2016; Turner et al., 2012; Wager, 2012)

Teacher reflection on their view of what it means to connect math to the real world

You (today) in our Teacher Scholar group focused on connecting math to the real world and social justice...

When I started I feel like I was not exactly sure how ABAR work in math would last a whole year. As we began, I was then **questioning the 'real world' problems we traditionally use** and how could I use my ABAR work to make them a true real world problem that brought my students into the math.

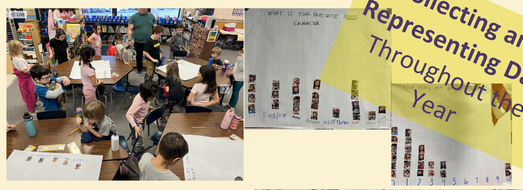
The idea that **real world problems aren't just using a chocolate bar for fractions,** but **using the identities in my classroom and community to build problems with their identities as well as building math around actual issues/problems in the communities and classrooms we serve.** If My World Was a The Village was eye opening and I learned so much of my own awareness or should I say lack of awareness in some areas.

Oh…**the social justice standards and that they are a thing!** This also makes my practice and helps me to reflect on what I can do or what I can do better.

this is a must in my practice. It brings me joy in my practice to bring the real world, identities, and social justice into my classroom over all content areas. I feel more comfortable, but I am still nervous about making mistakes. It is important for me to get the real world stuff correct.

Sample Mirror Lesson: Let's Learn About Ourselves/See Ourselves in Math

How many pets do we have? What is our favorite Sonic character?



Collecting and Representing Data Throughout the Year

How long are our names?

Sample Window Lesson : Learning About the World

Voting Implemented in November

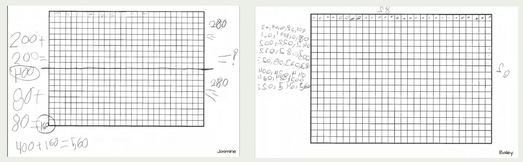
What are the core practices of designing and enacting tasks that connect math to the real world?

1. Integrate Mathematics and Real World Issues		
Designing MRWI Tasks		
Math Learning Goals	2. Establish Learning Goals	Real World Learning Goals
Important Mathematics	3. Select or Design Appropriate Tasks	Critical Literacy
Children's Math Strategies	4. Anticipate Children's Engagement	Connection to Context
Enacting MRWI Tasks		
Multiple Strategies	5. Maintain a Focus on Problem Solving	Multiple Perspectives
Analyzing and Comparing	6. Facilitate Meaningful Discourses	Examining Discourses
7. Elicit and Use Children's Thinking of Mathematics and Real World Issues		

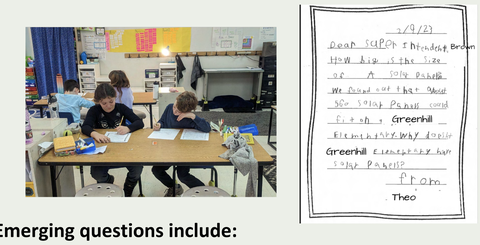
Sample Arrays in Our World Lesson: Solar Panels in Our District

What schools in our district have solar panels?
How much energy is produced? Why don't all schools have them?

How many solar panels would fit on the roof of our school?



Supporting children in developing their agency and critical literacy: using their knowledges to ask questions and to find out more.



Emerging questions include:

- How can task design and enactment create space for children's agency and development of critical literacy in mathematics and other content areas?
- How might an orientation towards "collaboration" build on children's curiosity and support their criticality? How is related (or not) to our existing core practices framework?

Building community; Understanding and drawing on children's and community FOK (Civil, 2007; Civil & Andrade, 2002; González, Andrade, Civil, & Moll, 2001. TEACH Math, n.d.)

Building a sense of wonder and agency; Wondering about the world in critical ways; Problem-posing (Cochran-Smith & Lytle, 2009, Freire, 1972; Gutstein, 2006)

Developing critical (mathematics) literacy (e.g., Vazquez, 2017; Vasquez and colleagues, 2019)

Records of practice

Real World Topics	Connecting	Math Context
Getting to know ourselves and others		Collecting, Organizing, Analyzing, and Representing Data
How to take care of ourselves and others		Reading Data Representations and Graphs
Representation		Counting/Tallying
Voting/Elections		Adding/Subtracting
Money/Currency		Multiplying/Dividing
Solar Panels		Shapes
Libraries		
Zoo/Animals		

Connecting Elementary Mathematics Teaching to Real-World Issues **Lesson Planner and Support Materials**

Video of lesson segments

Images of implementation

Jamboard

nearpod

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