

Authentic Problem Solving

How and Why to Provide Context to Mathematical Content

“The great thing about giving students tasks in the form of a problem is that **problems lead to questions. Students learn to ask the right questions because I don’t give them anything more than a rough outline of the problem to be solved. And those questions lead to **ownership of the task** by the students. And that ownership leads to **independent thought**, which is our goal”**

-Ted McCain, *Teaching for Tomorrow: Teaching Content and Problem-Solving Skills*

This session considers the power of context to foster real-world thinking skills, deep learning, continuing motivation, and long-term recall.

Guiding questions:

How does placing course content in the context of a real-world scenario help make the mathematical content and processes enticing, meaningful, and memorable?

How does applying mathematical learning to real-life situations *now* help students develop the skill of transferring such learning to the problem-solving, projects, and tests they will face *in their future*?

Why move from “telling” to realistic problem-solving, sense making, and discovery?

“...being good at mathematics involves many different ways of working...it involves asking questions, drawing pictures and graphs, rephrasing problems, justifying methods, and representing ideas *in addition to* calculating with procedures.”

-Jo Boaler, Professor of Mathematics Education, Stanford University

a chart/graph/visual is created in order to communicate or make sense of the mathematics,

Does the task entail...?

- ☐ asking questions
- ☐ drawing/creating pictures and graphs
- ☐ rephrasing problems
- ☐ justifying methods
- ☐ representing ideas/concepts/patterns
- ☐ calculating with procedures

the task is inquiry based.
Why does this work? Would doing _____ help address _____? What would happen if I _____?

the problem is reconceptualized in way that facilitates understanding

the need to apply mathematical reasoning and provide justification is embedded within the task

the task is multidimensional, requiring fluid representations of the mathematics in different ways (*visually, algebraically, in writing, organized in a table, using colors, etc.*).

the use of skills, computations, procedures, and algorithms.

Rich mathematical tasks

What is the problem asking?

How would I figure this out? (my method)

workspace / draw space

What information do I need to know?

M6.1.3

How can I get the information I don't have?

Planning guide for:

	Student Misconceptions	Guiding questions to support students
<p><i>How would I figure this out? (method/steps)</i></p> <p>-</p> <p>-</p> <p>-</p> <p>-</p>	<p>-</p> <p>-</p> <p>-</p> <p>-</p> <p>-</p>	
<p><i>What information do I need to know?</i></p>		
<p><i>How can I get the information I don't have?</i></p> <p>M6.1.4</p>		