mELd Design Framework & Math Language Routines

All of the lessons we design in this project are grounded in 3 principles:

1. Maintain consistent conceptual focus & use carefully chosen contexts
2. Interweave math & language learning goals
3. Use **language structures and routines** to promote equitable student engagement

Principles 1 and 2 will be described in detail elsewhere. Regarding Principle 3, what do we mean by language structures and routines? The mELd lessons were designed to promote mathematics learning among linguistically diverse groups of students through engagement in discussions. We noted that students who are fluent in the language of schooling tend to dominate mathematical discussions. Therefore to accomplish our goal of engaging more students in classroom discussions, we incorporated structures for promoting and managing student talk. We found a great collection of such supports called “Math Language Routines” in the works of Driscoll et al. (2016) and Zwiers et al. (2017).

Throughout the mELd lessons, you will see references to Math Language Routines (MLRs). The MLRs are “structured but adaptable format[s] for amplifying, assessing, and developing students' language" (Zwiers et al., 2017). Routines 1-8 and the framework for these routines are described in detail in the paper "Principles for the Design of Mathematics Curricula: Promoting Language and Content Development" by Jeff Zwiers, Jack Dieckmann, Sara Rutherford-Quach, Vinci Daro, Renae Skarin, Steve Weiss, & James Malamut. Link to full paper: https://stanford.io/2VkSoeg. Routines 9 and 10 are from the book “Mathematical Thinking and Communication: Access for English Learners” by Mark Driscoll, Johannah Nikula, and Jill Neumayer DePiper [Link to Book]

The framework and routines are beneficial for all students, and may be especially useful for teachers of English learners. This handout has a very brief summary of the Math Language Routines

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Math Language Routines

Name	Description
 **Stronger and Clearer**	**What it is**: A structured and interactive opportunity for students to revise and refine both their ideas and their verbal and written output **Example**: Ask students to write an explanation. Next, discuss as a class. Then, ask students to revise their explanation after the discussion.
 **Collect and Display**	**What it is:** Capture students' oral words and phrases into a stable, collective reference **Example:** Do a "notice and wonder" activity and record student answers on a poster.
 **Critique, Correct, and Clarify**	**What it is:** give students a piece of mathematical writing that is not their own to analyze, reflect on, and develop. **Example:** Ask students to comment on what is correct and incorrect about a mathematical argument from a fictional student.
 **Information Gap**	**What it is:** Giving partners or team members different pieces of necessary information that must be used together to solve a problem **Example:** Give students cards with different representations (e.g., graphs, tables, equations, stories). Ask each group to match the cards.

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 **Co-Crafted Questions**	**What it is:** Allowing students to generate mathematical questions for a situation. This creates space for students to produce the language of math questions. **Example:** Present a situation... “What do you notice and what do you wonder? Write a question.” Discuss. Then transition a problem to solve as a class.
 **Three Reads**	**What it is:** A structured reading routine to ensure students know what they are being asked to do. Creates opportunity for reflection on ways math questions are presented. **Example:** Read #1: What is this about. Read #2: What is this asking me to do? Read #3: What information do I have?
 **Compare and Connect**	**What it is:** Compare and contrast different mathematical approaches, representations, examples, concepts, and/or language. **Example:** Solve a problem individually or in groups. Ask students with different solutions to post publicly. Then ask the class to reflect on similarities and differences.
 **Discussion Supports**	**What it is:** A set of talk structures, routines, and moves for supporting participation and engagement. **Example:** Structured sharing (A-B partner sharing); Teacher using discussion moves such as revoice, repeat, press, wait time; Group and individual accountability.

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 Co-Constructed Word Wall	**What it is:** A public display of words that will support a discussion. This can help students use academic language more naturally. **Example:** Brainstorm terms related to a certain topic (e.g. interpreting graphs). Then post a list for discussion. **Non-Example**: “Frontloading” definitions.
 **Acting it Out**	**What it is:** When a problem involves an action or a story, ask students to enact the story while introducing the problem, or at the conclusion when the problem is solved. **Example:** Read a story problem about a race with a headstart. Then ask students to act out a race and show the difference (IRL) between a distance head start and a time-delay head start. [Next, use MLR7 to connect the different acting out routines to]

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