Digging Deeper Series

Exploring Mathematical Practice #4: Model with Mathematics

FACILITATOR GUIDE

To utilize this video and its materials as a professional learning opportunity, consider the following recommendations and guidelines:

The Administrative Rules of Montana (ARM) define legal parameters for professional development of educators in the following items:

- 10.55.714
- 10.57.215
- 10.57.216

Although informational, the video does not meet the requirements outlined in ARM and therefore does not qualify for Professional Development Unit Certificates. There are, however, many ways in which the video could be utilized strategically by a facilitator in order to elevate it to a professional learning opportunity. Here are some suggestions for how this may work:

FOR ADMINISTRATORS AT PUBLIC SCHOOLS:

- Consider using this video with the adjoining facilitator outline (page 3) as a school-wide professional learning opportunity for your staff. Some appropriate groups include:
  - all elementary educators;
  - mathematics department educators (6-12 appropriate);
  - curriculum coordinator or instructional coaches (K-12 appropriate); and
  - special-education teachers (k-12 appropriate);
- At a minimum, this video, paired with 30 minutes of discussion and activity engagement, could be translated to a 1 PDU certificate. However, there are examples where this could be extended into further professional learning. Some examples include:
  - an ongoing participation in each math practice deep-dive by staff members;
  - educators meeting to develop rich learning tasks that emphasize Math Practice Standard #1; or
  - a follow-up group discussion and check-in where conversations around the challenges and successes in applications of Math Practice Standard #1 in the classroom setting take place;
- If you are a registered provider of professional development for your school, you can issue professional development unit certificates to educators who have completed the session in compliance with your expectations, district policies, and the Administrative Rules of Montana items provided above. If you are not yet a provider and would like to become one, please visit the "Become a Professional Learning Provider" webpage

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Facilitator Guide Continued

FOR EDUCATORS WORKING IN PUBLIC SCHOOLS:

- Submit a request to your building administrators to see if they can issue you a professional development unit certificate for completing this work. Consider sharing this facilitator guide with them and review any relevant district policies for submitting such requests.
- With your administrator, consider potential applications for this professional learning. Some suggestions include:
  - An independent professional learning experience where you watch the video, complete the activities, reflect on the prompts, and participate in a conversation with your administrator about the topic, what you learned, some key resources you discovered, and some ways you'd like to experiment with this topic in your classroom instructional practice.
  - A department-wide professional learning experience where you share this video with your department and discuss its content during your regularly scheduled PLC time, following the facilitator outline on page 3.
  - A professional learning event where you practice your teacher-leader skills and host a session for interested individuals in your school or district.

FOR EDUCATORS NOT CURRENTLY WORKING IN PUBLIC SCHOOLS OR THOSE WHO ARE BUT WHOSE REQUESTS HAVE BEEN DENIED BY THEIR ADMINISTRATORS:

- Unfortunately, a pathway does not yet exist for these individuals to receive OPI Professional Development Unit Certificates for watching this video. However, keep an eye out on the Teacher Learning Hub and the Math Standards Webpage for new updates and opportunities.
- Although they may not receive formal units for this, educators can still learn from this video by simply watching and reflecting on the prompts. We hope these educators will still consider engaging in this learning for the intrinsic value it presents.

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Facilitator Guide Continued

The following outline is recommended for instances where 'traditional' professional learning is taking place. That is - where a 'host' or 'facilitator' is conducting a professional learning event for participants and where a conversation is happening between participants and the facilitator. Please note that modifications may need to be made dependent upon the chosen application of this training.

ACTIVITY:	TIME ALLOTTED:
Open the session, welcome educators, and provide background information on the mathematical practice standards and their application in instruction. Then, begin the video.	2 Minutes
Pause the video at **01:38** and allow participants time to reflect on the prompt: "Look at the language between the two practice standards. What similarities and distinctions do you see?" This can be elevated through the use of a turn-n-talk or other instructional tool.	~ 5 minutes for video and conversation time
Re-start the video, and allow participants to hear the next question. Pause the video at **09:31**, allowing time to reflect on the prompt: "Reflect on the students you teach. What specific skills and behaviors do you observe in students who are demonstrating grade-level mastery of MP4? How do students who are processing toward mastery differ? What about those who are just beginning to develop the foundational aspects of MP4? Allow 2 minutes of initial reflection. (We will address this again shortly)	~10 minutes for video and quiet reflection
Restart the video, then **Pause** the video at **15:54.** Create two posters or workspaces where educators can write one characteristic of each student group. Have these visible where all can see, then ask participants to comment one one element identified by another participant that they notice in their students as well. Allow ~5 minutes for recording responses and 5 for conversation.	~17 minutes
Pause the video at **16:50**. Allow approximately 2 minutes of self-reflection. This can be strengthened through an instructional activity such as a round-robin.	~4 minutes
Pause the video at approximately **28:30** and ask participants to address ONE of the reflections. Consider having groups select which one they will all consider sharing their responses. Provide time for educators to engage in the activity. Next, direct the educators to complete the activity provided at the end of the video, this can be an independent or collaborative process depending on the culture of the team. **Clearly communicate the time they have to complete this task, defined by how many PDUs you are offering.** Note: It may be appropriate to finish at the reflection prompts piece depending on the timing of your event, or, it may be appropriate to complete the activity as a second hour of PDUs. This should be determined by the facilitator.	~12 minutes (video) ~10 minutes (activities) if issuing 1 PDU.

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Facilitator Guide Continued

FACILITATOR MATERIALS:

- The facilitator will need the following items to be successful -
  - The facilitator outline
  - A projector screen
  - Access to the video
  - Working Audio/Video
- The facilitator may choose to use -
  - Their district ISAP, to challenge participants to consider how MP1 aligns with their district goals and profile of a graduate
  - The Call to Action Handout with the activities for educators
  - Collaborative workspaces
  - Printed copies of the materials for reference, either for personal or participant purposes.

PARTICIPANT MATERIALS:

Participants will need access to the following files:

- Webinar video (if self-guided)
- Accommodations for accessibility (e.g., subtitles for video)
- Writing implements

MATERIALS NOTE:

Please keep an eye out for these great materials, currently in development:

- Teacher Learning Hub Course
- Additional Math Practice Deep Dive Webinars

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Participant Activity

This page is structured to allow participants in an independent or facilitated activity to record their thinking. If participating in a facilitated course, please follow any additional instructions from your facilitator.

Pick one reflection to respond to:

REFLECTION #1:

Reflect on how MP4 can be used to explore mathematical modeling within the context of Indigenous knowledge, culture, and traditions. How might you incorporate examples of Indigenous mathematical practices or culturally significant scenarios (e.g., environmental stewardship, traditional design patterns, or tribal election data) to help students make sense of scenarios, mathematize problems, and verify their solutions?

REFLECTION #2:

Consider how MP4 can be utilized beyond “math time” or the mathematics classroom. How might you collaborate with colleagues to help students apply mathematical modeling to contextual problems or scenarios in other disciplines? What are some specific interdisciplinary tasks or projects you could design to foster cross-curricular connections?"

REFLECTION RESPONSE:

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Participant Activity

This page is structured to allow participants in an independent or facilitated activity to record their thinking. If participating in a facilitated course, please follow any additional instructions from your facilitator.

ACTIVITY:

Scenario: Your school is organizing a fundraiser to support community cultural preservation initiatives, such as restoring traditional artwork, funding language programs, or creating educational materials. Students are tasked with designing and planning different aspects of the fundraiser, such as calculating costs, determining resource needs, analyzing attendance trends, and planning layouts. The mathematical modeling will vary by grade level, with opportunities for geometry, data analysis, and cultural and community relevance.

Step 1: Analyze the scenario: What would this project look like in your classroom and grade level? You do not need to define the entire lesson plan, just consider which mathematical concepts you'd like the students to utilize within the modeling task.

What modeling task, centered around this scenario, would you create for your students? Identify the task you will create along with the possible problems students may identify.

Step 2: Identify student levels: Think about students at 3 levels of content standard understanding:

- Developing: Struggling with foundational skills. Requires support or highly structured tasks.
- Proficient: Understands the concepts, and is ready to apply modeling, but may not yet be able to apply them fully, requiring support in refining and verifying.
- Highly Proficient: Confidently engaging in modeling tasks and is ready for challenges that extend their reasoning and understanding of content specific skills.

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Participant Activity

Step 3: Develop Intervention and Differentiation Strategies How might you intentionally design interventions and differentiation strategies within your chosen modeling tasks for each student level?

I*f needed use the following guiding questions:*

- What supportive resources can you provide to help developing students make sense of the scenario and identify the problem?
- How might you guide developing students in mathematizing the situation (e.g., breaking it down into steps or using visuals, equations, tools, etc.)?
- How can you help developing students verify their responses when they may not yet be ready to recognize errors?
- How might you challenge all students appropriately?
- How might you encourage highly proficient students to explore real-world constraints or variability
- How might you incorporate opportunities for collaboration or peer review appropriately for developing, proficient, and highly proficient students?

Developing Students

Proficient Students

Highly Proficient, or Mastery Students