



Ambitious Math Teaching

Professional Learning Modules

OVERVIEW

The goal of these Ambitious Math Teaching Modules is to support the learning of high school teachers and district and school administrators across the state of Oregon to reform high school mathematics content and pedagogy. Understanding the systemic inequities of schooling, how to disrupt them, and the nature of and strategies to enact ambitious math instruction are central to being successful with this reform. The modules offer a focus on equitable teaching practices and how to ensure success for all students, especially students of color, emergent bilingual students, and students from families of low income, all of whom have been historically underserved by schooling. The Modules are aligned with current Oregon state level policies and practices, including the redesign of high school math content, and the cornerstone principles of the Oregon Math Project, the Oregon Math Standards, and the Common Core Standards of Mathematical Practice.

ADAPTING THE MODULES FOR YOUR OWN CONTEXT

We expect and encourage facilitators to adapt the modules to meet the needs of their particular communities. Adapting the modules is critical to ensuring the modules are relevant to participants. Throughout the modules, we make notes about adjustments facilitators might make related to the timing and structure of activities. We also suggest incorporating curricular and district resources from your particular community wherever applicable. At times we suggest supplemental resources, should you decide to emphasize or dig deeper into a particular idea.

We recognize that facilitators across the state have varying amounts of time to work on the content of these modules. For some, the modules will be worked on in “full-day” professional development meetings. For others, the modules will be worked on in shorter PLCs across the year. We expect that most facilitators will have to make careful decisions about which ideas from modules they will emphasize with their particular group. To support facilitators in developing their own Ambitious Teaching scope and sequence, we have developed a detailed [Table of Contents](#) which highlights the key foci and purposes of each Module.



HIGH-LEVEL LOOK AT THE CONTENT OF THE MODULES

Below, we offer a high-level look at the content of the modules. Please see the [Table of Contents](#) document for details about the purposes, foci and content of each module, part and session.

Module 0

- **Part 1 (Supplements 1, 2):** *Supplemental resources to support facilitators in preparing for critical conversations with participants in Modules 1–3*
- **Part 2 (Supplements 3, 4):** *Supplemental resources for supporting teachers' instructional practice*

Module 1

- **Part 1 (Sessions 1–3):** *Ambitious math teaching, and our hopes for students as math learners*
- **Part 2 (Sessions 4–6):** *Tracking and a 2 + 1 model alongside our understandings of ambitious math teaching*

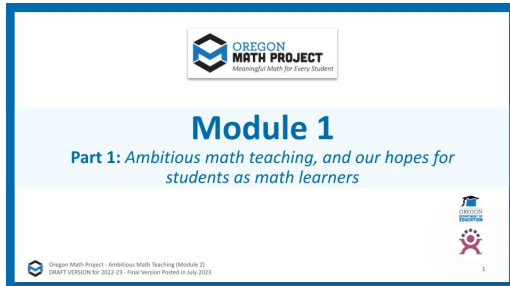
Module 2

- **Part 1 (Sessions 7–9):** *What ambitious math teaching looks like at the task level*
- **Part 2 (Sessions 10–11):** *What ambitious math teaching looks like at the unit level*
- **Part 3 (Sessions 12–13):** *What ambitious math teaching looks like at the lesson level*

Module 3

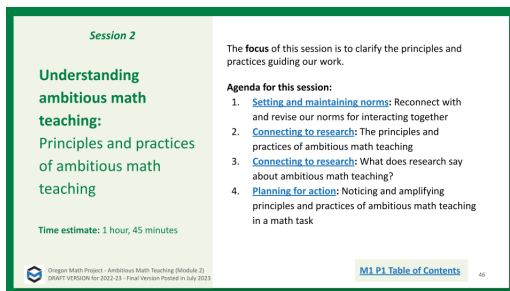
- **Part 1 (Sessions 14–16):** *Teaching practices to sustain ambitious math teaching*
- **Part 2 (Sessions 17–19):** *Planning and assessment practices that sustain ambitious teaching*

KEY FEATURES OF THE TOOLSET



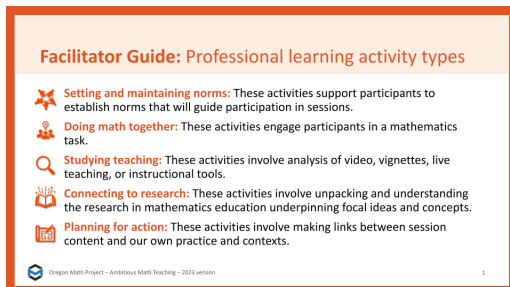
Module parts

Each module is divided into 2 - 3 slide decks, which represent “parts” of the module. A **blue** slide at the beginning of each deck indicates the purpose of the set of sessions embedded in the deck connected to the module’s essential questions.



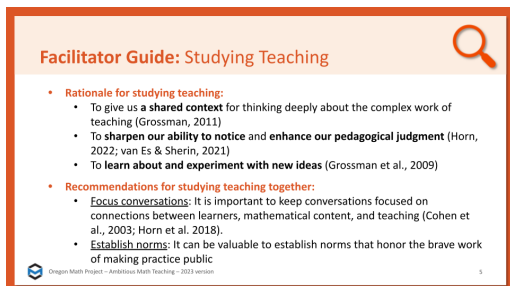
Sessions

Sessions range from 45-120 minutes. The beginning of each session is distinguished by **color**; each session within a slide deck is its own color. The session header slide indicates the focus of the session, a time estimate, and an agenda with links to each activity in the session. Facilitator notes share rationale for the session.



Facilitator guide slides

Orange slides are facilitator-facing and provide guidance about an upcoming section or activity type.



Activity types

The modules rely on five different activity types which research suggests are important for participants’ learning about math teaching in PD. Slides at the beginning of each activity describe rationale and recommendations for the activity type, with elaboration and additional resources in facilitator notes.

Facilitator Notes:

- Support participants in accessing a **Jamboard** or workspace slide. Ask groups to begin to fill out a trajectory that shifts from traditional to ambitious and equitable participation.
- Aspects of small group directions you might consider:
 - It may be helpful to specify roles for participants in the small groups. For example, you might:
 - Specify who will go first and in what order participants will share. For example, in a virtual session, you might say, "The second person who enters the breakout room will share first, and sharing will move counterclockwise until everyone has shared."
 - Specify who will record. For example, in a virtual session, you might say, "The first person who enters the breakout room will be the recorder and jot down ideas from the group onto the workspace slide."
 - Specify who will keep time. For example, in a virtual session, you might say, "The third person will be the time keeper and let each team member know if airtime goes over a minute and how much time is left."
 - It may be helpful to specify where participants will record and show them how to access it. As we have suggested, you might have an assigned Google Slide for each group which is a copy of this activity's workspace slide.
 - It may be helpful to specify how much time participants will have in their small group.
 - It may be helpful to preview what their workspace will look like.

Facilitator notes in the slide notes section under each slide provide rationale and suggestions for facilitating particular sessions and activities.



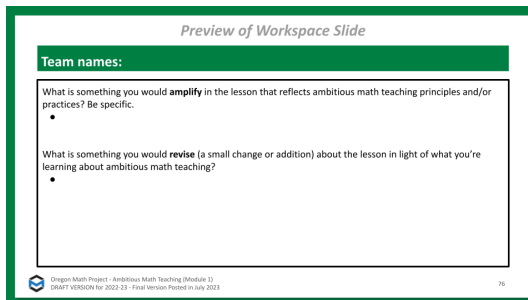
Small Group Activity

Directions: Use the workspace slide to identify something to *amplify* and something to *revise* in the lesson.

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Small group activity

Participants are frequently asked to engage in small groups. A slide will provide general directions for the small group activity, for you to adapt to your context. The facilitator notes on this slide provide suggestions for how to support productive small group interactions.



Team names:

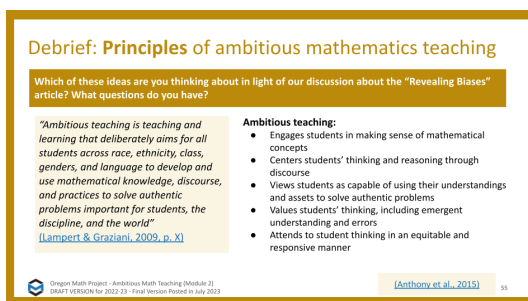
What is something you would **amplify** in the lesson that reflects ambitious math teaching principles and/or practices? Be specific.

What is something you would **revise** (a small change or addition) about the lesson in light of what you're learning about ambitious math teaching?

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Preview of workspace

Most small group activities include a workspace slide. You might create copies of this slide into a deck to share with participants. This can be an especially helpful way to engage in virtual spaces by making participants accountable for small group activity. In a face-to-face setting, you might turn workspace slides into printed handouts. Facilitator notes provide suggestions for whole-group discussion afterward.



Debrief: Principles of ambitious mathematics teaching

Which of these ideas are you thinking about in light of our discussion about the "Revealing Biases" article? What questions do you have?

"Ambitious teaching is teaching and learning that deliberately aims for all students across race, ethnicity, class, genders, and language to develop and use mathematical knowledge, discourse, and practices to solve authentic problems important for students, the discipline, and the world" (Lampert & Graziani, 2009, p. XI)

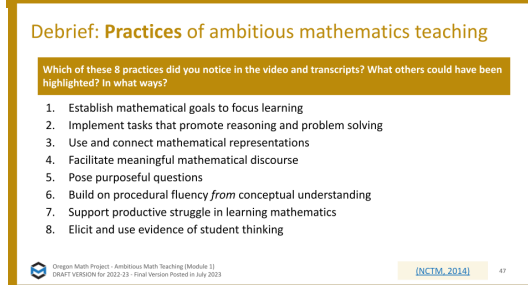
Ambitious teaching:

- Engages students in making sense of mathematical concepts
- Centers students' thinking and reasoning through discourse
- Views students as capable of using their understandings and assets to solve authentic problems
- Values students' thinking, including emergent understanding and errors
- Attends to student thinking in an equitable and responsive manner

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Debrief using the principles of ambitious math teaching

After each "Connecting to Research" or "Planning for Action" activity, participants will be asked to consider their experience through the lens of this definition from Lampert and Graziani (2009) and the five *principles* of ambitious math teaching listed on the slide.



Debrief: Practices of ambitious mathematics teaching

Which of these 8 practices did you notice in the video and transcripts? What others could have been highlighted? In what ways?

- Establish mathematical goals to focus learning
- Implement tasks that promote reasoning and problem solving
- Use and connect mathematical representations
- Facilitate meaningful mathematical discourse
- Pose purposeful questions
- Build on procedural fluency from conceptual understanding
- Support productive struggle in learning mathematics
- Elicit and use evidence of student thinking

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Debrief using the practices of ambitious math teaching

After each "Doing Math Together" or "Studying Teaching" activity, participants will be asked to consider their experience and through the lens of ambitious math teaching *practices*. You might choose to do this with NCTM's 8 practices of ambitious math instruction.

Debrief: Habits of mind and interaction

Which of these habits did you notice in the video and transcripts? What others could have been highlighted? In what ways?

HABITS OF MIND

- Mathematical Reasoning
- Connections
- REGULARITY PATTERNS STRUCTURE
- Integration Reasoning Quantification
- Mistakes & Stuck Points
- Persistence & SEEK MORE
- JUSTIFY
- GENERALIZE

Habits of Mind:
Things we do as individual mathematicians when solving problems.

HABITS OF INTERACTION

- Purposeful Private Reasoning
- EXPLAIN My Reasoning
- Listen to Understand
- Genuine Questions
- Multiple Pathways
- our LOGIC & IDEAS
- CRITIQUE & DEBATE
- MATH REASONING IN THE AUTHORITY

Habits of Interaction:
Things that we do when working with others to make sense of the math.

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Debrief using the Teachers Development Group (TDG) Habits, Routines, & Actions tool

If participants have experience using TDG tools, you might instead debrief “Doing math together” or “Studying teaching” through the lens of TDG’s Habits, Routines, & Actions tool.

Debriefing Session 19: Four cornerstone principles of the OMP

What connections do you see between any of the cornerstones and our work in this session?

Focus: Learning experiences in every grade and course are focused on core mathematical content and practices that progress purposefully across grade levels.

Engagement: Mathematical learning happens in environments that motivate all students to engage with relevant and meaningful issues in the world around them.

Pathways: All students are equipped with the mathematical knowledge and skills necessary to identify and productively pursue any postsecondary paths in their future. Students have agency to choose from a variety of courses, contexts, and applications they find relevant.

Belonging: Participation in mathematical learning builds students’ identities as capable math learners and fosters a positive self-concept. Students’ cultural and linguistic assets are valued in ways that contribute to a sense of belonging to a community of learners.

Any proposed instructional approach, curricular change, or system design element should be evaluated by the degree to which it builds on these four cornerstones. When new approaches are built within the framework of all four-cornerstone principles, we will be on our way to engineering a reimagined system.

FOCUS

ENGAGEMENT

PATHWAYS

BELONGING

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Debriefing a session (option 1) At the end of each session, facilitators might choose to debrief the session through the lens of the four cornerstone principles of the Oregon Mathways Project (OMP). This slide asks participants to connect their experiences from the session to the cornerstone principles.

Debriefing Session 19: Focus of the session

What new insights do you have related to assessment and feedback structures that sustain ambitious teaching?

Take a couple of minutes to reflect on our work in the session.

Activities in this session:

- Setting and maintaining norms:** Reconnect with and revise our norms for interacting together
- Connecting to Research:** Reviewing assessment and feedback structures to sustain ambitious teaching
- Planning for Action:** Designing assessment and feedback structures that sustain ambitious teaching

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Debriefing a session (option 2) Alternatively, or in addition, facilitators might choose to debrief the session through the lens of the focus of that session. This slide asks participants to consider new insights they have related to the focus of the session given their participation in the session’s activities.

Debriefing Module 1 Part 1: Important moments

Record **important moments** that impacted your thinking about ambitious math teaching and your hopes for students as learners.

Examples of important moments:






- AHA! moments you experienced
- Changes in your thinking
- WOW! ideas that you hadn’t considered before
- Contradictions to or affirmations of prior understandings

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Debriefing the “parts” of a module

At the end of each slide deck participants are invited to debrief all of the sessions from that part of the module. These slides ask participants to record “important moments which have impacted their thinking related to ambitious math teaching. **NOTE:** Facilitators might consider asking participants to reflect on and record important moments at the end of each session instead.



 Module 1 Resources
 Module 1 Part 1 
 Module 1 Part 2 

Resources for participants

Throughout the modules, participants will use a range of readings and tools. Many resources are located in the Google Drive folder for that module. Please note that some resources are “**facilitator-provided**” – facilitators will need to independently access and provide copies of the materials for participants. It will be helpful to have an NCTM membership, NCTM’s *Principles to Actions* book, and *5 Practices for Orchestrating Productive Mathematics Discussions in your High School Classroom*.

FREQUENTLY ASKED QUESTIONS

1. Can I use these modules with participants who are not practicing teachers, like instructional coaches, or administrators?

Yes! The modules can be used and adapted for any role group. A version of these modules have been used with teacher leaders, instructional coaches, and school administrators. Some adaptations to prompts and question stems will be necessary and helpful. (For example, places that ask for participants to reflect on their own classroom context might ask participants to reflect on their teachers' classroom contexts instead.) We have also included a set of supplemental resources and learning activities for leaders in Module 0 which may be helpful to weave into professional learning with participants in leadership roles.

2. Can I select a session from the middle of the modules to start with?

We recommend enacting the sessions and activities in the order contained within the Modules as they appear. Content in the modules builds and repeats strategically. Each time participants encounter particular content, they are working on different facets of complex ideas and developing stronger understandings and deeper connections to their practice frequently based on content that has come earlier in the Modules. Given the varying amounts of time available to work on the content of these modules in different contexts, you may not be able to facilitate every session. Please use the [Table of Contents](#) to support you in carefully building a scope and sequence for your particular participants. In any case, we urge facilitators to keep activities within a session together, and to enact those activities in the order specified in the table of contents for that session.

3. How much time will each session take?

We estimate that sessions will take between 45 and 120 minutes. Estimates are listed in the [Table of Contents](#) and on session header slides in the Modules. We occasionally also suggest estimates for particular portions of the sessions, but these are meant to be only estimates and we assume that facilitators will adapt and adjust session length for particular learners and contexts.



ACKNOWLEDGEMENTS

These Ambitious Teaching Modules exist because of the vision and hard work of a team led by the creative vision, development, and design offered by Kathy Pfaendler and Julie Fredericks, Math Professional Learning Specialists, Teachers Development Group, Cathy Martin, Denver, CO, Taylor Stafford, University of Washington, and Hannah Nieman, University of Washington. Their efforts were supported by the ongoing input and feedback of the entire staff of Teachers Development Group (TDG). These Modules, like all professional learning materials produced by our organization, are based on the collective knowledge, expertise, and ongoing learning of TDG'S Math Professional Learning Specialists and the teachers and leaders with whom we work. Thanks also go to Mark Freed, and Kama Almasi, Oregon Department of Education, and Rebekah Elliott, Oregon State University, who offered vision and feedback throughout the development and design process. Special thanks go to Sophia Vazquez, University of Washington, who did the accessibility formatting of these Modules.

*Ruth Heaton, CEO, Teachers Development
Group*