

Young Mathematicians K-3 Resource: Video Guide

Module 1 -Understanding and Supporting the Mathematical Learner

In this module, we invite you to explore how young children express their mathematical thinking – in play, talk, gestures and in classroom work. We also invite you to explore the power of a growth mindset and the role that learning tools, including technology, can play in helping children develop as young mathematicians. **Each provocation is comprised of guiding questions, quotes, video clips and links to resources to dig deeper.**

Provocation 1a: Growth Mindsets and Classroom Conditions

How do children develop a positive disposition to mathematics?

How do classroom conditions contribute to a growth mindset?

- **Listen to Researchers**
 - Jo Boaler – Mindsets and Mistakes
- **Voices from the Classroom**
 - Mistakes are Part of Mathematical Thinking
 - Persevering at Blocks
 - The Mathematics Learning Environment

Provocation 1b: Thinking and Communicating Mathematically

How do we know that young children are thinking and communicating mathematically?

- **Listen to Researchers**
 - What Does It Mean to be a Mathematician?
- **Voices from the Classroom**
 - Playdough Play – Students engaged in play demonstrate mathematical thinking.
 - Ways to Make 40 Cents – A student explains his problem-solving strategies.
 - Survey Says – A student interprets survey results and determines next steps.
 - Gestures as Mathematical Thinking – A student explains mathematical thinking using gestures.

Provocation 1c: Learning Tools and Models

How can learning tools and models support thinking, meaning-making and problem-solving?

- **Listen to Researchers**
 - Cathy Fosnot – Models and Powerful Tools
 - Alex Lawson – Models with “Mathematical Legs”
- **Voices from the Classroom**
 - Comparing Measurements
 - Spatial Reasoning in Number Sense

Provocation 1d: Technology

How might technology deepen mathematical thinking and learning?

- **Listen to Researchers**
 - Cathy Fosnot – Adaptive Learning & Digital Environments
- **Voices from the Classroom**
 - Technology Examples From the Classroom

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Module 2 – Planning with Young Mathematicians in Mind

In this module, we invite you to plan your program keeping your students' development first and foremost in mind. Rather than pre-planning your mathematics program a whole year in advance, we encourage you to make practical connections between the “big ideas” in the curriculum (and related conceptual understandings), and students' thinking and learning. We encourage you to ask, “Why this learning, for this child, at this time?” as you reflect on the appropriate next mathematical steps and levels of support.

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Provocation 2a: Shifting Roles

What is our role as educators in making mathematics learning happen? What is the role of students? How together can we meet the expectations of the curriculum?

- **Listen to the researchers ...**
 - Doug Clements – Bringing the Math Knowledge Out
 - Dan Meyers – Productive vs Unproductive Struggle
- **Voices from the Classroom**
 - Educators Reflect
 - Socially Constructed Learning

Provocation 2b: Deepening Understandings and Connections

Why do primary educators need to have a deep understanding of both the curriculum and how children learn mathematics? How can we uncover what they understand about mathematics and where misconceptions might lie?

- **Listen to the researchers ...**
 - Doug Clements - Play: Seeing the World Through Mathematical Eyes
- **Voices from the Classroom**
 - Studying Learning Trajectories
 - Multiplication Strategies in Problem Solving

Provocation 2c: Uncovering Thinking Through Pedagogical Documentation

How can we move from simply observing and recording student work to actually uncovering student thinking and identifying where they need to go next in the learning process?

- **Listen to the researchers ...**
 - Carol Anne Wien on Pedagogical Documentation
- **Voices from the Classroom**
 - Play Dough (with annotations)
 - Photo Documentation of Block Play (with annotations)
 - Noticing and Naming
 - Counting and Explaining Thinking

Provocation 2d: Responsive Pedagogy

How can pedagogical documentation help us to become more responsive to children's learning needs and to identify with greater precision the structures, strategies and learning opportunities that will support their mathematical development?

- **Listen to the researchers ...**
 - (no videos for this provocation)

- **Voices from the Classroom**

- Pedagogical Documentation for Planning and Provoking Math Learning
- Reflecting on Mathematical Learning at the Light Table
- Mathematizing and Descriptive Feedback

Provocation 2e: Variety of Contexts

How can we use the evidence of children's mathematical thinking in a variety of contexts to support their mathematical learning?

- **Listen to the researchers ...**

- Doug Clements –Using Games to Explore Mathematics
- Doug Clements – The Importance of Blocks

- **Voices from the Classroom**

- Children Learning from Each Other
- Board Game Learning