

MATHEMATICS TEACHING PRACTICE 4:

Facilitate meaningful mathematical discourse

Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.

Strategy and Process for Students with Disabilities	Digital Learning Experience
<p>Implementing "What's the question?"</p> <ul style="list-style-type: none">• First, provide students with an answer. (For example, students might be told that the answer is 6 and a half.)• Then, allow students to develop a word problem, a question or a math scenario that could lead them to the given answer.• Most importantly, the teacher facilitates the discussion to make connections between the different types of questions, comparing and contrasting the different mathematical approaches that all lead to a common answer.• Add parameters with this task to focus the math skill, such as providing the answer but also asking students to develop a question or problem that involves the specifically targeted skill. <p>Visit the National Council of Teachers of Mathematics for more information on asking questions and promoting discourse.</p>	<p>The planning and initial implementation of this strategy is the same, regardless of the setting. Students are provided with the answer and any necessary parameters.</p> <p>Digital Considerations:</p> <ul style="list-style-type: none">• Ask students to respond in a collaborative slide deck;• Teach students to use virtual manipulatives or drawing tools to enhance the development of their question;• Provide students with an opportunity to collaborate via breakout rooms or other collaborative virtual workspaces; and• Allow students to share their responses during synchronous instruction time.
<p>Implementing talk moves</p> <ul style="list-style-type: none">• During development and implementation of math tasks, it might be helpful to pre-plan talk moves to promote explanation, elaboration and extension of student thinking.• Consider the purpose of the discussion: clarifying student thinking, students listen and think with peers, reasoning, providing time to think or student talk.• Intentionally have questions reserved for different situations that may come up in class.• Plan for common student misconceptions. <p>When students begin using student talk moves, they will need explicit instruction and modeling about how conversations might look and sound. Providing students with an opportunity to practice these could help build mathematical discourse into a classroom culture. Students may also benefit from having a reference of discussion stems.</p>	<p>Plan for talk moves during virtual instruction and intentionally dedicate time to this type of discussion in whole groups, small groups and one-on-one with students. Digital tools to help facilitate this discussion could include:</p> <ul style="list-style-type: none">• Personal written responses on slide decks or in chat boxes; or• Video or voice responses. <p>Considerations to facilitate peer-to-peer discourse in virtual settings:</p> <ul style="list-style-type: none">• Breakout rooms;• Collaborative slides or documents;• Discussion boards or threads; or• Video or voice responses.

Building a math community and mathematical mindset

- Discussions demonstrate mistakes are valuable.
- Provide time and opportunity for open questions.
- Provide time and opportunity for peers to speak directly with each other around math tasks and topics.
- Ensure all students have access to the discussion.

Visit the youcubed Mathematical Mindset Teaching Guide, Teaching Video and Additional Resources for more information on building a mathematical mindset. This resource elaborates on 5 Mathematical Mindset Practices, with emphasis on discourse strongly present in Practices 3 and 4. Video samples included in this guide show examples of strong student discussion.

Mathematical Mindset Practice 3: Challenge and Struggle

- Mistakes are valued and students feel comfortable sharing even if they are unsure.
- Questions are open and encourage multiple methods, ways of seeing and thinking.

Mathematical Mindset Practice 4: Connections and Collaborations

- Students collaborate and build off each other's ideas and all students are involved.
- Students talk directly to each other; the teacher is just one member of the mathematical community.

The planning and implementation of these practices remains largely unchanged in virtual or digital settings.

As teachers work through barriers to student discussion and engagement in a virtual setting, sharing these messages and implementing the Mathematical Mindset Practices can increase the level of engagement in live sessions, therefore encouraging students to unmute their mic and take a risk to share their thinking.

Additionally, opportunities for written communication can be provided via:

- Collaborative slide decks; or
- Virtual platform discussion streams.

Digital video or voice capture tools may be used to share thinking and respond to others.

Contact your special education regional cooperative for more information on using virtual tools and additional resources.

Reflection Questions

1. Have I intentionally built in opportunities for students to share their thinking individually, with peers and with instructor? How can those same structures support students in resource and co-teaching settings?
2. What talk moves do I plan to use to expand student thinking?
3. How do I or can I share the classroom's authority and autonomy with students?
4. How do I support students in articulating their thinking or problem-solving strategies, even if it is different from my own?
5. Am I providing appropriate tools and structures (e.g. graphic organizers, modes of responding, access to manipulatives and other math tools) to allow students to demonstrate flexibility in representing mathematics?
6. Have I provided the necessary accommodations for my students to successfully engage in peer-to-peer discourse?

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