

1 Mathematical Discourse

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2 Housekeeping

- Everyone is muted
- Webinar is being recorded
- Presentation will be emailed to all registrants
- Questions
 - Type in the question box
 - Questions will be addressed at the end of the webinar

- The interactive Padlet site is no longer active for this webinar.

3 Get to Know Each Other

Use the QR Code below or go to

<https://padlet.com/cpaleis/discourse>

- Tell us your name, where you are, and what you teach.

- Use the plus sign to add your comment.

4 Mathematical Discourse**5 Objectives**

Participants will be able to:

- Define mathematical discourse
- Understand the three key factors to mathematical discourse: questions, wait time, responses
- Incorporate mathematical discourse effectively

6 Mathematical Discourse**7 What is Mathematical Discourse?**

Using padlet, answer the following question:

What is mathematical discourse?

8 What is Mathematical Discourse?

Mathematical discourse occurs when teachers ask or pose questions and students respond through discussions, building simple skills into complex ones. Students actively listen to one another and either agree or disagree by explaining their reasoning.

Building Mathematics Discourse in Students, NCTM Publication, 2017.

<http://www.nctm.org/Publications/Teaching-Children->

[Mathematics/2017/Vol23/Issue6/Building-Mathematics-Discourse-in-Students/](#)

9 **Roles of the Teacher and Students**

10 **Key Factors of Mathematical Discourse**

- Questioning
 - What is the quality of the questions being asked?
 - How much variety is there in the questions the teacher asks?
- Providing Wait Time
 - How much time is provided for students to think before responding?
 - Is more wait time provided for more difficult questions?
- Responding
 - How are students responding to the questions?
 - Is there a procedure for responding?
 - Does the teacher follow-up responses with additional questions?

11 **Questions**

12 **Question Activity**

You will have one minute to type as many questions as you can. These should be questions you would use during math instruction.

13 **Asking Questions**

- Key to success for students in the 21st century classroom
- Most recognized method for increasing critical thinking
- More than 50% are lower level

Raising Rigor in Your Classroom, Edutopia Research, 2011.

<https://backend.edutopia.org/sites/default/files/pdfs/stw/edutopia-cochrane-schturnaround-PD-raising-rigor.pdf>

14 **Incorporating Higher-Level Questions**

- Plan out questions prior to the lesson
- Vary the types of questions
- Ask questions that raise questions
- Use hypothetical questions (What if...)
- Teach students to ask questions about their work and their classmates

15 **Mathematical Questions**

- [100 Questions from Curriculum Associates](#)

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17 **Wait Time**

18 **Providing Wait Time**

- Wait time includes providing time for students to
 - Generate their own solutions to problems or questions
 - Find the words for an explanation
 - Develop their own questions about the problem
- Wait time allows students to
 - Explore their own ideas
 - Face moments of increased problem-solving
 - Show our confidence in their abilities

Encouraging Mathematical Thinking, Math Forum Publication, 2004.

<http://mathforum.org/brap/wrap2/decisionsB.html>

19 **Incorporating Appropriate Wait Time**

- Typically wait time is less than one second.
- How long should we wait after posing a question?
- Be conscious of wait time
- Use a brisk pace for factual questions
 - 1 to 3 seconds
- Increase the wait time for higher level questions
 - 3 to 8 seconds

20 **Responses**21 **Responding Options**

- Whole Class Response Options
 - Thumbs up/Thumbs down response
 - All students respond with a thumbs up or thumbs down.
 - Popsicle sticks
 - All students have a popsicle stick with their name on it, teacher picks up a stick and calls on that student.
 - Show Me
 - Students write response on whiteboard or paper and show response when directed.
 - Choral Response
 - On signal, students respond in unison.

22 **Responding Options**

- Partners
 - Think-pair-share
 - Give individual wait time. On signal, pairs share answers. Then, pairs share responses with whole class.

- Turn and Talk
 - The students turn to their partner and discuss the answer.
- Small Groups
 - Numbered Heads
 - In teams, students number off 1-4. The team puts their heads together to discuss answer(s). Teacher calls out a number 1-4. All students with that number respond for their group.

23 24 **Planning for Mathematical Discourse**25 **Increasing Mathematical Discourse**

What strategies can teachers use to increase the mathematical discourse in their lessons?

- Use the standard and learning objective to guide discussion
- Plan for mathematical discourse
 - Questions
 - Wait Time
 - Responses

26 **Use Standards to Guide Discussion**27 **Use Standards to Guide Discussion**28 **Plan for Mathematical Discourse**

- Questions
 - What questions can I ask that will move my students towards mastery of the standard?
 - How will I use questions to clarify misconceptions?
- Wait time
 - How much wait time should I provide for each question I want to ask?
- Responses
 - How will I have my students respond to the questions I ask?

29 **Plan for Mathematical Discourse**30 **Mathematical Discourse**31 **Share about Mathematical Discourse**

On the padlet site, share:

- Two new ideas you learned
- One way you will increase discourse in your instruction

32 **Questions to Consider**

- Is there a factor of mathematical discourse you are missing? If so, how will you add it to your instruction?
- What could you do to increase the mathematical discourse in your classroom?
- How can you assist your colleagues to increase discourse in their classrooms?

33 **Survey**

- Help us improve our professional development.
- Please go to goo.gl/bVCEEY and complete the survey.

34 **Thank you!**

- Questions
- Contact Information

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