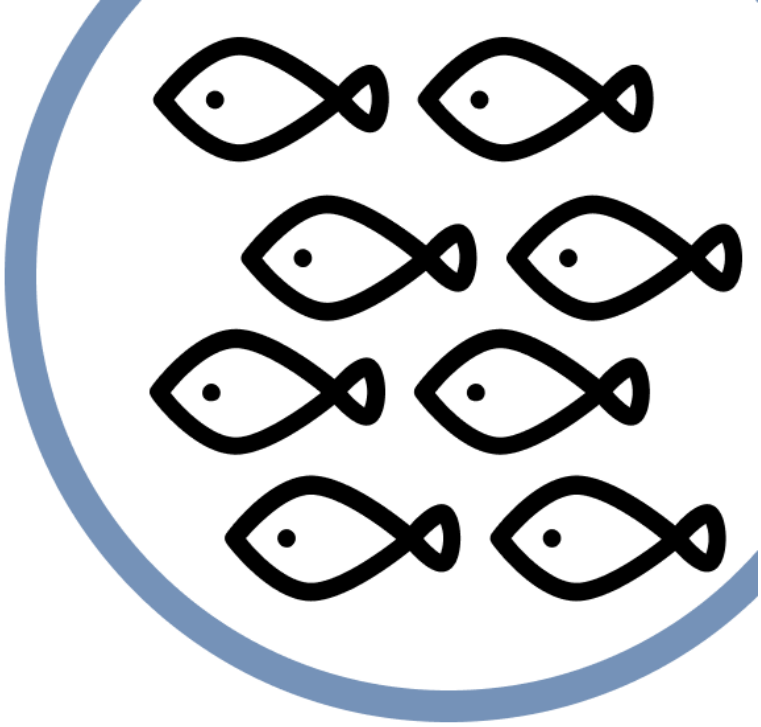
Practical Measures, Routines & Representations

Whole Class Discussion Survey



Thanks for your interest in the whole-class discussion survey!

In this document, you'll find a student-facing version of the survey and an annotated version of the survey, which includes the research informing each set of items and information for use of the surveys.

Please note that we are in the process of refining these surveys. It is important to us that we learn from those who are using them. We are currently operating under a Creative Commons license. As such, we ask that you track and share any revisions you make to the surveys.

If you'd like to read more about the survey, find the most recent version of this survey, or download other tools for instructional improvement, visit http://pmr2.org

A word of caution: This tool is intended to support inquiry about teaching and to inform instructional improvement efforts. It is not appropriate to use this tool to evaluate teachers' instruction.

Thank you!
The PMR2 Team

For each question, select one response that best describes your experience in the whole class discussion in today's math class.

1) What did you need to do in order to be successful in your math class today?
- ◯ Solve problems using the steps the teacher showed us
- ◯ Listen to and make sense of other students' reasoning

2) Was there only one right way to solve the problem(s) today?
- ◯ Yes
- ◯ No

3) What was the purpose of today's whole class discussion?
- ◯ Share how we solved problems using the steps our teacher showed us
- ◯ Learn the way the teacher showed us to solve the problem
- ◯ Learn different ways that work to solve a problem from other students
- ◯ Share a mathematical idea we came up with on our own
- ◯ Check to see if our answers are correct

4) Who talked the most in today's whole class discussion?
- ◯ Students
- ◯ The teacher

5) Did you have trouble understanding other students' thinking in today's whole class discussion?
- ◯ Yes
- ◯ No

6) Did listening to other students in today's whole class discussion help make your thinking better?
- ◯ Yes
- ◯ No

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7) Were you comfortable sharing your thinking in today's whole class discussion?

- ◯ Yes
- ◯ No

8) Would it have been okay to share thinking you were unsure about in class today?

- ◯ Yes
- ◯ No

9) Did you feel like other students really thought about your mathematical ideas in class today?

- ◯ Yes
- ◯ No
- ◯ I did not share today

10) Did you feel like your teacher really thought about your mathematical ideas in class today?

- ◯ Yes
- ◯ No
- ◯ I did not share today

Annotated Whole-Class Discussion Survey

Aspects of discussions that research indicates make a difference for students' learning opportunities *Items are assessing students' perceptions of ...*	**Survey items**	**Sample improvement goals & conversation starters**
Cognitive demand of the task as implemented Cognitively-demanding tasks can be solved in multiple ways, offer opportunities for students to explain and justify their reasoning, and/or prompt students to represent a mathematical relationship in multiple ways (Stein & Lane, 1996). Absent multiple strategies, it is difficult to press students to make connections between mathematical strategies – and doing so is pivotal in deepening students' conceptual understandings of mathematical ideas (Stein & Lane, 1996). In addition to selecting cognitive demanding tasks, it's critical to *maintain* the rigor of the task across the lesson. It is common for the cognitive demand of a task to be lowered across the course of a lesson (Stein & Lane, 1996). For example, teachers often suggest a procedure for students to use to solve the task, thereby taking away students' opportunity to reason. Students' responses to these items provides information about the cognitive demand of the task that was *selected* for the lesson and/or how the task was *implemented*.	**Item 1** What did you need to do in order to be successful in your math class today? ◯ Solve a problem using the steps our teacher showed us ◯ Listen to and make sense of other students' reasoning **Item 2** Was there only one right way to solve the problem(s) today? ◯ Yes ◯ No	*Note: In interpreting students' responses, it is critical to look at the task, alongside responses to these survey items.* **Selecting rigorous task(s):** ● How might we modify a t*ask to make it more rigorous? Note: Our team's* analysis of rigor of the task *tool might be useful here.* **Maintaining the rigor of the task(s):** ● What could we do to keep this task "open"? How do we anticipate students will solve the task? How can we encourage students to use multiple strategies? ● We started with a rigorous task ... what happened? ○ How could we launch the task so that we encourage multiple strategies? ○ How could we maintain the cognitive demand of the task in the discussion?

What students are accountable for in the discussion Mathematics discussions frequently focus on evaluating whether students' answers are correct (Cazden, 2001). Focusing exclusively on answers is unlikely to present students with opportunities to grapple with and make sense of other students' ideas, because answers alone provide little insight into students' thinking process. Attending to students' views of what they are accountable for in a discussion provides useful information about the extent to which discussions focus on students' thinking.	**Item 3** What was the purpose of today's whole class discussion? ◯ Share how we solved problems using the steps our teacher showed us ◯ Learn the way the teacher showed us to solve the problem ◯ Learn different ways that work to solve a problem from other students ◯ Share a mathematical idea we came up with on our own ◯ Check to see if our answers are correct *Note: We have found it useful to collapse options 1, 2, and 5 as "producing correct answers" and, separately, options 3 and 4 as "sense-making."*	**Questioning:** ● What questions might we ask in the discussion so students are reasoning about mathematical ideas? **Selecting students to share their ideas:** ● What ideas do we want to surface and why?
Extent to which discussions focus on students' ideas Productive discussions involve students sharing their strategies for solving problems and making sense of other students' explanations (Franke et al., 2007). While it is important that teachers facilitate discussions, the conversation should build on students' current ways of thinking. Therefore, students typically do most of the talking in productive whole class discussions.	**Item 4** Who talked the most in today's whole class discussion? ◯ Students ◯ The teacher	**Selecting students' strategies for whole class discussions:** ● How can we build from students' ideas and strategies? ● When might we have students repeat or revoice other students' contributions, and why?

Opportunities for students to listen to, reason about, and make sense of others' ideas Productive discussions involve students sharing their own ideas and strategies for solving problems. While having students share ideas is an essential aspect of mathematically productive discussions, sharing ideas alone does not guarantee that students' understanding of key mathematical ideas is advanced (Ball, 2001). It is also important that the teacher *presses students to explain and justify their reasoning in ways other students will understand* (Cobb, 1998; Thompson et al., 1994). For example, it is crucial that students both describe how they solved the problem and explain why they solved the problem the way they did (Kazemi & Stipek, 2001).	**Item 5** Did you have trouble understanding other students' thinking in today's whole class discussion? ◯ Yes ◯ No **Item 6** Did listening to other students in today's whole class discussion help make your thinking better? ◯ Yes ◯ No	**Supporting students to explain their thinking:** ● How can we support students to explain why they solved the problem in the way they did? ● How can we support students to talk about the *meaning* of the numbers they are manipulating? ● What key mathematical ideas do we want to make sure we have students repeat or revoice? **Pressing students to make sense of each other's ideas** ● What questions do we want to ask to highlight key mathematical ideas? ● How can we press students to elaborate on their explanations? ● What can you ask listening students to help them understand the explanation? **Representing students' strategies:** ● How could we represent this strategy in a way other students can make sense of?

Extent to which students want to share their ideas and feel their ideas are valued Engaging all students in productive discussion is complex work. It requires establishing a classroom culture in which all students see value in sharing their ideas and feel their ideas are valued. This involves establishing and negotiating norms regarding how students should treat each other and mathematical ideas (Horn 2012; Kazemi & Stipek, 2001). For example, it is important that students see themselves and each other as having valuable ideas their small groups can build on.	**Item 7** Were you comfortable sharing your thinking in today's whole class discussion? ◯ Yes ◯ No **Item 9** Did you feel like other students really thought about your mathematical ideas in class today? ◯ Yes ◯ No ◯ I did not share today **Item 10** Did you feel like your teacher really thought about your mathematical ideas in class today? ◯ Yes ◯ No ◯ I did not share today	**Establishing classroom norms for participation in whole class discussions:** ● How might we position students as having valuable mathematical ideas the class can build on? **Supporting students to see value in each other's mathematical ideas** ● How might we support students to see value in a range of strategies? **Supporting students to see that you value their mathematical ideas** ● In what ways can we position students' ideas as valuable/meaningful? How might you communicate that to students? ● Whose ideas do we want to strategically highlight, and why?
Extent to which students feel they can share tentative, exploratory (or "rough draft") mathematical thinking Engaging deeply in mathematics involves trying out tentative, exploratory ideas and revising those ideas with others (Jansen et al., 2016). Establishing a culture in which students are willing to take "intellectual risks" is especially difficult in mathematics, where students have often been taught that mistakes are to be avoided (Jansen et al., 2016). It is therefore important to support students to treat mistakes as opportunities for learning, rather than as something to be embarrassed about (Horn, 2012; Kazemi & Stipek, 2001). In classrooms where students	**Item 8** Would it have been ok to share thinking you were unsure about in class today? ◯ Yes ◯ No	**Normalizing tentative, exploratory thinking** ● How might we begin to normalize students' sharing tentative, exploratory ideas? ● What structures might we use to support students to see tentative, exploratory ideas as a valuable part of learning? ● How might we foster a culture in which students can take intellectual risks? ● How might we support students to see learning mathematics as involving revising their thinking over time?

willingly share tentative, exploratory thinking, they are more likely to persist in solving cognitively demanding tasks and engage in deep learning.		

References

Ball, D. L. (2001). Teaching, with respect to mathematics and students. In T. Wood, B. S. Nelson, & J. Warfield (Eds.), *Beyond classical pedagogy: Teaching elementary school mathematics* (pp. 11-22). Erlbaum.

Cazden, C. B. (2001). *Classroom discourse: The language of teaching and learning.* Heinemann.

Cobb, P. (1998). Theorizing about mathematical conversations and learning from practice. *For the Learning of Mathematics, 18*(1), 46-48.

Franke, M. L., Kazemi, E., & Battey, D. (2007). Mathematics teaching and classroom practice. In F. K. Lester (Ed.), *Second handbook of research on mathematics teaching and learning* (pp. 230–237). Information Age Publishing.

Horn, I. S. (2012). *Strength in numbers: Collaborative learning in secondary mathematics.* Reston, VA: National Council of Teachers of Mathematics.

Jansen, A., Cooper, B., Vascellaro, S., & Wandless, P. (2016) Rough-draft talk in mathematics classrooms. *Mathematics Teaching in the Middle School, 22*(5), 304–307.

Kazemi, E., & Stipek, D. (2001). Promoting conceptual thinking in four upper-elementary mathematics classrooms. *Elementary School Journal, 102*(1), 59–80.

Stein, M. K., & Lane, S. (1996). Instructional tasks and the development of student capacity to think and reason: An analysis of the relationship between teaching and learning in a reform mathematics project. *Educational Research and Evaluation, 2*(1), 50-80.

Thompson, A. G., Philipp, R. A., Thompson, P. W., & Boyd, B. (1994). Calculational and conceptual orientations in teaching mathematics. In A. Coxford (Ed.), *1994 Yearbook of the National Council of Teachers of Mathematics* (pp. 79-92). National Council of Teachers of Mathematics.