NC COLLABORATIVE FOR MATHEMATICS LEARNING

NC²ML PRACTICE BRIEF

Discourse Moves for Fostering Confident Math Learners

WHY TALK ABOUT DISCOURSE?

"Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments." (NCTM, 2014, p.35)

Decades of research by learning scientists and critical scholars have consistently indicated communication is fundamental and foundational to *learning for understanding* (Bransford et al., 2000; National Academies, 2018). Classroom discourse refers to spoken and written communication between and among students and teachers, and our focus on mathematical discourse follows from five ideas.

1. **Mathematical identities, mindsets, and dispositions are produced and reproduced in discourse.** What counts as "smart", who is positioned as competent, and how one sees themselves as doers of mathematics are developed, reinforced, or challenged daily in classroom communication (Herbel-Eisenmann et al., 2013; Horn, 2012).
2. **Conceptual understandings are created and refined in classroom discourse** (e.g., Gallimore & Tharp, 1990). Externalizing and articulating ideas are key mechanisms for learning (Sawyer, 2005), and students' mathematical understandings become increasingly sophisticated and formal as they make mathematical observations and conjectures, offer explanations, and create representations to communicate their thinking to others. For example, Webb, Franke, and their colleagues (2014, 2021) showed that opportunities for students to share their thinking with others and engage with their classmates' reasoning was positively related to student achievement.
3. **Discourse is the foundation of many mathematical practices**. Mathematical argumentation, justification, proof, critiquing reasoning, definition, and precision are all specialized forms of mathematical discourse that students learn and enact in classrooms. Without frequent and regular opportunities to talk about mathematics and engage with other's thinking, students are unable to develop and enact the practices of mathematicians.
4. **Discourse in US mathematics classrooms is largely impoverished and teacher dominated**. Despite conclusive evidence, decades of policies, and professional learning, the majority of mathematics classrooms continue to offer few opportunities for students to share, discuss, and critique one another's ideas (Stigler & Hiebert, 2004; Weiss, Pasley, Smith, Banilower, & Heck, 2003).

DISCOURSE MOVES

Teachers' make intentional instructional moves (i.e., ongoing ways of repeatedly interacting with students (Curtis et al., 2021)) to support student discourse toward the development of both their mathematical understandings and mathematical identities. Instructional moves focused on discourse are referred to as *discourse moves*. These moves have the potential to develop classroom discourse that is *productive* and *powerful* (Herbel-Eisenmann et al., 2013; Curtis et al., 2021). By productive, we mean the ways in which discourse moves can support students' "access to mathematical content and discourse practices". By powerful, we mean the ways in which such moves can support students' "identities as knowers and doers of mathematics" (Herbal-Eisenmann et al., 2009). Productive and powerful discourse moves position students as powerful knowers and doers of mathematics. Research on the use of discourse moves has shown that a focus on these ways of talking and reasoning (discourse) dramatically changes the nature of the mathematical discourse as well as quantitative measures of student learning (e.g., Chapin & O'Conner, 2004; Chapin et al., 2003).

The identification, description, and study of mathematical discourse moves began at the upper elementary level (Chapin & O'Connor, 2004; Chapin et al., 2013). Since then, researchers have refined them based on the specific complexities that exist with respect to fostering meaningful discourse in high school math classrooms. In high school, the mathematical discourse is more complex as the language and meanings become more

A NOTE ABOUT TASKS

The tasks you pose during class determine the nature of the mathematics in which your students will engage. "Good" tasks not only provide your students opportunities to think, but are also worthy of discussion. Read more about selecting mathematics tasks here.

complex. In addition, because of the years of prior math experiences students have had, many have not developed strong math identities. In thinking about discourse moves with high school students, it is important to not only think about the growing language / meaning complexity, but also attending to the power (i.e., "teachers have more power than students to shape the classroom discourse" (Herbel-Eisenmann, et al., 2013, p. 183) and helping high school students see themselves as mathematicians (Curtis, et al., 2021). The discourse moves specific to high school mathematics that have come out of this work are defined in the table below.

There is a significant research base that shows that small changes - focusing on just 1 or 2 instructional moves - can make a big difference in the enactment of high quality and equitable instruction (e.g., Webb, 2018). These moves can be practiced in any context and with any content, so they are accessible to all. In addition, instructional moves are key to eliciting and formatively assessing the NC Mathematical Practice Standards. Most importantly, research has shown that teachers that use these moves have been able to create classroom cultures of respect and risk, so that all students might feel safe to make their mathematical ideas public for both the teacher and their classmates (Michaels & O'Connor, 2013).

NINE DISCOURSE MOVES FOR FOSTERING CONFIDENT MATH LEARNERS IN HIGH SCHOOL

(adapted from Herbel-Eisenmann, Steele, & Cirillo (2013); Curtis, LIndo, and Jansen (2021); Horn (2012); Webb & Wilson (2022))

Teacher Move	Description of Move
Inviting student participation	Providing students with the opportunity to share their ideas, solutions, or strategies. The goal is to make diverse solutions available for public consideration and to include multiple students in the discussion.
Assessing / **Probing** a student's thinking	This move is about following up with an individual student's solution, strategy, or question. The goal is to have the student elaborate on their ideas.
Advancing / **Pressing** a student's thinking	This move is about prompting students to reason further (advance their thinking). The goal is to have the student think more deeply about something they have just been talking about. This is that question you ask right before you walk away.
Orienting students to another's reasoning	This move involves asking students to engage with another student's idea.
Attributing student's mathematical ideas	Connecting students' mathematical ideas to the mathematical goal of the lesson and to one another's ideas.
Encouraging in-progress thinking	Encouraging students to share their thinking about a math problem at any stage in their work (i.e., encourage rough draft talk Jansen et al., 2016).
Assigning competence	A specific form of praise where teachers catch students being smart and praise them in a way that is public, specific to the task, and intellectually meaningful. This move is essential to interrupting assumptions based on simplistic views of smartness, developing math identities, and recognizing strengths in themselves and their peers.
Revoicing / Asking students to revoice	Revoicing occurs when a teacher restates or rephrases a student's contribution and offers an explicit opportunity for the student to respond to questions such as "did I get that right?" Similar to revoicing, asking students to do the revoicing requires that students listen to each other and gives them opportunities to revoice ideas in their own words.
Waiting	Provide students with the time to process teacher's questions and think about their responses. This includes waiting after a student responds to allow for others to process that response and react to it.

Questions for Discussion

1. Why do you think it is important that students have opportunities to talk about their mathematical ideas?
2. What can you do to help students feel more comfortable sharing their mathematical ideas in your classroom?

Go to nc2ml.org/high-school-teachers for resources related to using discourse moves.

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