Elementary and Secondary Teachers' Questioning Patterns during Number Talks

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In our session at the AMTE 2022 Annual Conference, we presented highlights from three teachers' questioning patterns while facilitating Number Talks with elementary and secondary students and engaged in discussion around how to leverage teachers' questioning during Number Talks as a way of developing high level teaching practices. Further, we shared an emerging framework that names and describes seven specific question types we found in Number Talks, elaborating and expanding from those that are offered in Number Talk and questioning literature.

Number Talks are a 5- to 15-minute classroom discussion around a computational problem or sequence of problems (Humphreys & Parker, 2015; Parrish, 2010; Parrish & Dominick, 2016). Teachers facilitate this routine by posing a problem and allowing students to use mental math to solve in any manner that makes sense to them. Once the teacher records students' answers, they facilitate a class discussion where students share their strategies. Through the class discussion, students can develop flexibility in their approaches to solving problems, compare their ideas with one another, and make connections between solution strategies (Parrish, 2010, 2011; Sun, et al., 2018).

Thirty-six K-12 mathematics teachers participated in our Virtual Number Talk Project (Joswick et al., 2020) through enrollment in an online seven-week master's course. After reading about Number Talks and watching exemplar videos, participants planned and implemented three talks in their own K-12 classrooms, in addition to rehearsing two of those talks with peers in the course. They also engaged in cyclical reflection on their implementation, self-, and student learn-ing and engagement through responding to prompts about specific aspects of their Number Talk (e.g., the questions they posed). Due to the pandemic, teachers implemented their Number Talks in online, hybrid, and in-person settings; our project explicitly supported online implementation.

Using our three case study teachers, we highlighted the complexity of Number Talks through focusing on the different patterns of questions teachers posed. Beyond the routine questions of eliciting answers and strategies shared across all teachers, each teacher's patterns revealed different mathematical foci. Mr. K's (grade 7, rural school) questions focused on confirming whether his written representation matched students' thinking. Mr. K's questions also allowed students to engage with each other's ideas and investigate mathematical relationships. Ms. H's (grade 9, female students) questioning aimed to gain class consensus (through agree/disagree prompts) and to help students make connections between different strategies. Whereas the discussions in Mr. K and Ms. H's classrooms explicitly elaborated upon student solution strategies, but in different ways, Ms. R's (grade 3, Title I) questioning patterns included several procedural, funneling questions with a focus on capturing descriptions of solution strategies and procedures for solving. These variations in patterns of questioning highlights the complexity of being responsive to student thinking during a Number Talk and the different elements that are comprised in this mathematical routine. For example, responding to student thinking in ways that encourages students to connect their thinking to others or to make connections to mathematical ideas beyond the current discussion is complex. Further, strategic questioning is needed to tease out student thinking and their solution strategies, especially when translating their spoken ideas to be shared in a written form.

Our presentation discussion was guided by two questions: (1) How do these findings inform our work in supporting teachers to take up Number Talks? And (2) What would you prioritize in this work of questioning? We consider that our framework of questions can be used by teachers for planning questions based on anticipated student strategies, to set goals for the Number Talk discussion that go beyond solving specific questions, and to evaluate one's own practice and plan for iterative improvement.

References

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