Describing Levels and Components of a Math-Talk Learning Community

Overview of Shift over Levels 0-3: The classroom community grows to support students acting in central or leading roles and shifts from a focus on answers to a focus on mathematical thinking.

A. Questioning	**B. Explaining mathematical thinking**	**C. Source of mathematical ideas**	**D. Responsibility for learning**
Shift from teacher as questioner to students and teacher as questioners.	Students increasingly explain and articulate their math ideas.	Shift from teacher as the source of all math ideas to students' ideas also influencing direction of lesson.	Students increasingly take responsibility for learning and evaluation of others and self. Math sense become the criterion for evaluation

Level 0: Traditional teacher-directed classroom with brief answer responses from students.

A. Questioning	**B. Explaining mathematical thinking**	**C. Source of mathematical ideas**	**D. Responsibility for learning**
Teacher is the only questioner. Short frequent questions function to keep students listening and paying attention to the teacher.	*No or minimal teacher elicitation of students thinking, strategies, or explanations; teacher expects answer-focused responses. Teacher may tell answers.*	*Teacher is physically at the board usually chalk in hand, telling and showing students how to do math.*	*Teacher repeats student responses (originally directed to her) for the class. Teacher responds to students' answers by verifying the correct answer or showing the correct answer method.*
Students give short answers and respond to the teacher only. No student-to-student math talk.	No student thinking or strategy-focused explanation of work. Only answers are given.	Students respond to math presented by the teacher. They do not offer their own math ideas.	Students are passive listener; they attempt to imitate the teacher and do not take responsibility for the learning of their peers or themselves.

Level 1: Teacher beginning to pursue student mathematical thinking. Teacher plays central role in the math-talk community.

A. Questioning	**B. Explaining mathematical thinking**	**C. Source of mathematical ideas**	**D. Responsibility for learning**
Teacher questions begin to focus on student thinking and focus less on answers. Teacher begins to ask follow-up questions about student methods and answers. Teacher is still the only questioner.	*Teacher probes student thinking somewhat. One or two strategies may be elicited. Teacher may fill explanations herself.*	*Teacher is still the main source of ideas, though she elicits some student ideas. Teacher does some probing to access student ideas.*	*Teacher begins to set up structures to facilitate students listening to and helping other students. The teacher alone gives feed back.*
As a student answers a question, other students listen passively or wait for their turn.	Students give information about their math thinking usually as it is probed by the teacher (minimal volunteering of thoughts). They provide brief *descriptions* of their thinking.	Some students ideas are raised in discussions, but are not explored.	Students become more engaged by repeating what other students say or by helping another student at the teacher's request. This helping mostly involves students showing how *they* solved a problem.

[p.2] Level 2: Teacher modeling and helping students build new roles. Some co-teaching and co-learning begins as student-to-student talk increases. Teacher physically begins to move to side or back of the room.

A. Questioning	B. Explaining mathematical thinking	C. Source of mathematical ideas	D. Responsibility for learning
Teacher continues to ask probing questions and also asks more open questions. She also facilitates student-to-student talk, e.g., by asking students to be prepared to ask questions about other students' work.	*Teacher probes more deeply to learn about student thinking and supports detailed descriptions from students. Teacher open to and elicits multiple strategies.*	*Teacher follows up on explanations and builds on them by asking students to compare and contrast them. Teacher is comfortable using student errors as opportunities for learning.*	*Teacher encourages students' responsibility for understanding the mathematical ideas of others. Teacher asks other students questions about student work and whether they agree or disagree and why.*
Students ask questions of one another's work on the board, often at the prompting of the teacher. Students listen to one another so they do not repeat questions.	Students usually give information as it is probed by the teacher with some volunteering of thoughts. They begin to stake a position and articulate more information in response to probes. They explain steps in their thinking by providing *fuller descriptions* and *begin to defend* their answers and methods. Other students listen supportively.	Students exhibit confidence about their ideas and share their own thinking and strategies even if they are different from others. Student ideas sometimes guide the direction of the math lesson.	Students begin to listen to understand one another. When the teacher requests, they explain other students' ideas in their own words. Helping involves clarifying other students' ideas for themselves and others. Students imitate and model teacher's probing in pair work and in whole-class discussions.

Level 3: Teacher as co-teacher and co-learner. Teacher monitors all that occurs, still fully engaged. Teacher is ready to assist, but now in more peripheral monitoring role (coach and assister).

A. Questioning	B. Explaining mathematical thinking	C. Source of mathematical ideas	D. Responsibility for learning
Teacher expects students to ask one another questions about their work. The teacher's questions still may guide the discourse.	*Teacher follows along closely to student descriptions of their thinking, encouraging students to make their explanations more compete; may ask probing questions to make explanations more complete. Teacher stimulates students to think more deeply about strategies.*	*Teacher allows for interruptions from students during her explanations; she lets students explain and "own" new strategies. (Teacher is still engaged and deciding what is important to continue exploring.) Teacher uses student ideas and methods as the basis for lessons or mini-extensions.*	*The teacher expects students to be responsible for co-evaluation of everyone's work and thinking. She supports students as they help one another sort out misconceptions. She helps and/or follows up when needed.*
Student-to-student talk is student-initiated, not dependent on the teacher. Students ask questions and listen to responses. Many questions are "Why?" questions that require justification from the person answering. Students repeat their own or other's questions until satisfied with answers.	Students describe more complete strategies; they defend and justify their answers with little prompting from the teacher. Students realize that they will be asked questions from other students when they finish, so they are motivated and careful to be thorough. Other students support with active listening.	Students interject their ideas as the teacher or other students are teaching, confident that their ideas are valued. Students spontaneously compare and contrast and build on ideas. Student ideas form part of the content of many math lessons.	Students listen to understand, then initiate clarifying other students' work and ideas for themselves and for others during whole-class discussions as well as in small group and pair work. Students assist each other in understanding and correcting errors.

