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Using the Video “Teacher Questions.”

The “Teacher Questions” video, 12 minutes, has a collection of 6 clips. All clips are related to Growing, Growing 4.1 and 4.2. The teacher’s questions have different purposes and consequences.

How Does the Teacher Know What to Ask? I have noticed that teachers are not ready to listen closely to student and teacher voices the first time they view the videos on *Making Sense of Symbols: Exponential Decay*. However, they often ask about how to improve their questioning skills. I think that learning to really listen is the first step in learning how to ask good questions.

The teacher on this video listens carefully to students’ words, often re-voices them to give an opportunity to clarify thoughts, and compares what students are saying to what she expected when she made her plans. The teacher expected two of the equation forms to come up so she was prepared to push students to explain these. She did not expect the form with the negative exponent, but she can draw on her experience to ask about this in a way that keeps students focused on making sense. The atmosphere is encouraging and cooperative.

How can teachers learn to orchestrate discussions so that they are not flustered by unexpected student responses? How can they involve students in a way that respects and builds on their contributions without losing sight of the mathematical goals?

Learning to Listen
(Note: Transcripts are needed)

I think that the collection of clips could be used, with a transcript, to help participants think about orchestrating discussions. This would be better done as a “homework” assignment, with teachers working in pairs, re-viewing as often as necessary.

Some Helpful Articles
(see [Appendix](#))

It may help to have some common vocabulary for analyzing what Kathy does. There are three articles that offer ways to think about discourse, specifically about the actions a teacher takes in her part of the discourse: “Making the Right Discourse Moves” (Springer et al, 2006) and “Questioning our Patterns of Questioning” (Herber-Eisenmann et al, 2005) and “Math-Talk Learning Community” (K.Hufferd-Ackles, 2004). Participants could use one or more of the bullet points below to analyze an interchange. Italicized words and phrases relate to the vocabulary used in these articles. These same questions could be asked in relation to any video.

Focus Questions on next page.

Questions to Investigate

- Find 2 examples of Kathy *re-voicing* what students said as a direct or implied question. What form does the *re-voicing* take (repeating, rephrasing, summarizing, re-casting)? What was the result of *re-voicing* (cognitive or attitudinal)? Compare the two examples. Was the purpose of the *revoicing* the same each time? Was the result the same each time? ^Ω
- What does the teacher do when students have a misperception? Does she always do the same thing? Give an example. ^Ω
- Find 2 examples of Kathy asking questions. Identify the mathematical idea in play. What does the student understand to begin with? Place the student on a continuum from “Understands nothing” to “Understands completely.” What is the purpose of the teacher question (review, assessing understanding, connecting, probing, extending)? What happens after the teacher asks a question? Does the question push students to think harder? Does it help them clarify or correct their thinking? Does it move the students on the “Understanding” continuum you created? Compare the 2 questions. ^Ω

Questions continue on the next page.

^Ω When students are checking the three equations on their calculators (Chapter 3) someone says that the third one won't work. Kathy repeats these words, non-judgmentally. “Third one won't work? *How* do I decide if they all work?” This gives everyone an opportunity to review calculator skills. She then recasts student words in a way that raises the cognitive level: “*Why* do they all work?” and “How are they all saying the same thing but written differently?” In chapter 4 Kathy again re-voices what a student has said about the graph: “Does this go into the negatives?” This causes James to check his graph and gives other students a chance to correct his statement. She ends by summarizing, “So you are just getting smaller and smaller numbers, James?” These questions start by re-voicing student words, but their purposes and results are different.

^Ω When students have a misperception sometimes Kathy just repeats their idea and waits for other students to contribute, and sometimes she points out a contradiction. For example, when she asks about the negative exponent in chapter 3 John says that a negative is going down and a positive is going up. Kathy points out that the other two equations also produced decreasing values, though they had positive exponents. This caused John, and others, to think harder about what was causing the decrease.

^Ω In chapter 6 Kathy uses two different types of questions. First she asks why 20% of 60 is 12. This seems solely computational, funneling students to a particular answer, but she follows up by asking “So your table, is it going to show what you are taking away or what you are keeping?” This focuses students on the meaning of the “12” and of the other numbers in the table, and they then take over the questioning themselves. The girl asks, “Where do you get 0.8?” The boy picks up on Kathy's words: “But you're leaving 80%. That's what it's showing.” It looks like the boy's act of explaining to the girl has had the effect of moving both students towards a better understanding of how the symbols in the equation relate to the context.

- Choose two questions. Place the questions on a “*Funneling*” to “*Focusing*” continuum. Justify where you placed the questions.
- How would you characterize the dynamic of each of these student-teacher interactions? Specifically, *where is the responsibility for asking questions*: solely/ mostly/partly with the teacher? Where is the responsibility for making sense: solely/ mostly/ partly with the teacher?
- Reflect on the questions you ask in your own classroom. Where would you place them on a “*Funneling*” to “*Focusing*” continuum? Do you usually ask questions with a particular purpose: review/ assessing understanding/ connecting/ clarifying/ probing/ extending? Is there a particular kind of question that seems to be missing in your classroom? What steps might you take to expand your repertoire?

Large Group Discussion

A large group discussion may be needed after this assignment, but I should ask participants if they would like a large group discussion; they can learn from this “homework” assignment without me “checking” on it.

If the group is supportive then teachers might overtly reflect on their own classrooms and ask advice and support from each other, in making changes in questioning techniques. I should be sure to say that change is difficult and slow, and more easily done with support than without. If participants in the workshop can continue to think about the idea of questioning and collaborate to support each other then I am confident that meaningful change can happen, and a satisfying sense of efficacy will be one of the results.
