"DISCUSSION" COMMON IN SECONDARY MATH CLASSES

Initiation – Response – Feedback

Teacher [Initiation]: What kind of mathematical relationship does this equation [y = 2x + 5] show?
Student [Response]: A linear relationship.
Teacher [Feedback]: Okay. It's a linear relationship.

Funneling

Teacher: (0, 0) and (4, 1) [are two points on the line in graph B.] Great. What's the slope?
[Long pause – no response from students.]
Teacher: What's the rise? You're going from 0 on the *y* [axis] up to 1? What's the rise?
Students: 1.
Teacher: 1. What's the run? You're going from 0 to 4 on the *x* [axis]?
Students: 4.
Teacher: So the slope is ____?
Students: 0.25 [in unison with the teacher.]
Teacher: And the *y*-intercept is?
Students: 0.
Teacher: So, y = ¼ x? Or y = 0.25 x would be your equation.

What's going on that is leaving this discussion shallow? Can you think of anything the teacher could do to deepen the discussion?

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3 Norms I Try to Establish in My Courses

Norm or Value	What does this mean?	What do I try to do as an instructor?
We are a community of learners.	• We know each other's names. We use each other's names when talking about ideas. • We address each other, not just the professor. • We make sense of and address each other's thinking, in addition to offering up our own ideas. • We see each other as intellectual resources. When we turn to each other to answer our questions, we all develop a deeper understanding.	• I spend a little time in the first 3 classes with name activities. • I have them take a name quiz. • I call on students by name. I refer to idea's brought up in class by the student's name. "What about Megan's idea?" • I remind them to use each other's names, and that it's ok to ask someone their name if you forget. • I remind them about body language. I stand to the side or in back of the class when a student is presenting. • When a student has a question, I ask the entire class what they think. • When students work in small groups, I ask individuals, "Cameron, did you follow what Lizzie said? Can you explain it in your own words? Could you ask her to explain it again?"
Mistakes, mis-understandings, confusion, and half-formed ideas are all valuable to talk about.	• Teachers often say, if you have that question then someone else probably does, too – but even if someone doesn't have that question, that question might never have occurred to them. • Unpacking confusion helps us all to understand an idea in a more complete and complex way. • The way the discipline of mathematics grew is through examining areas of uncertainty and confusion, of pushing each other to be more precise, of offering ideas that are only half-formed. (Proofs and Refutations by Lakatos, for example.)	• I pursue incorrect ideas by asking what others think. We spend time in class figuring out whether something is right or wrong. • After a discussion, I bring attention to what we learned by an incomplete or incorrect idea brought up by a student. I thank the student. • Students have time to work in small groups. As I visit, if I hear an interesting beginning of an idea, question, or incorrect idea, I ask the student to bring it up to the whole class. • I reiterate that the first time you say something, it can come out confusing, but we work together to say it over and over again until it becomes clearer. I ask students to repeat their peers' ideas in their own words.
Everyone is expected to contribute	• Everyone contributes, everyday. • A contribution can be "I don't understand what George is saying." That's valuable because it pushes George to be more precise – and gives us all a chance to try to understand George's idea again.	• I use wait time. Sometimes I say, "I want to hear from someone who hasn't spoken yet today." • I warm-call students. That means, when they are in small groups, I tell them that I want them to be the reporter on a particular idea. I tell them to try to explain it to their small group as a dry run. • I cold call. Sometimes I cold call on a group, using the name of a student who hasn't spoken that day. Sometimes I directly cold call. When I cold call, it's an open question – "What do you think of Cassie's idea?" It's ok if they don't understand Cassie's idea – then I prompt them to ask Cassie to explain the idea again.

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