

PHIL TUCHER: Which one do you want to start with?

BARBARA SHREVE: Um...

PHIL TUCHER: You know what I'm going to recommend? Let's take a minute and look at the student work. Let's pull a few samples that help us think about any of these and then we'll make a decision about where to start.

BARBARA SHREVE: Perfect.

PHIL TUCHER: So the things we might look at are the "Who's Right?" and the issue of access, and whether it's the right start, and so forth. Um, the matching went well, but what about individual understanding, and what about closure? Um, looking at graphic representation, and how to include that more thoroughly throughout the lesson? And generalization statements - Were they there? Why? If not, why not? Where would you like to start?

BARBARA SHREVE: Um, I think I'm interested in starting with the individual understanding piece, and to me, I'm seeing it related to generalization as we're talking.

PHIL TUCHER: Let's do that. What did you pull?

BARBARA SHREVE: So I pulled a couple of pieces. These two are from the table where you had, um, where you were focused for a little while with the three boys. And then a couple of others where I just noticed students had made some notes. A lot of it were significant erasures of their matching, which I think is interesting. A lot of it, they're lines and I know that having been there when some of those were drawn, there was conversation and there were other things that happened but it's hard to tell from this written work exactly where those happened if I wasn't present. Um, but it's a little different with these two where I actually didn't spend a lot of time at this table talking to these guys. But they've got a lot of extra writing and little notes that they made on this sheet. Um, so I can see they start, some of them, this is where they started, actually trying to figure out what else should go there and maybe working backwards a little bit.

PHIL TUCHER: I can say some of those are notes that they made or additions and changes they made after or while I was sort of interviewing them about their answers. So I observed them for, let's say 5 minutes, and then I...they had flipped the paper and were working on the back, and I said, "Would you like me to check your work on the front?" They said, "Yes" and so we actually went through systematically 1 through 6 and I asked them to explain where their answers had come from. In a couple of cases that's where Terrence had some different answers, so I pushed them a little bit on the idea that they needed to be checking with each other. And that's also where I got to hear individuals explain their thinking on it. I think it's fair to say they have some different, um, well, just as you predicted, they have some different strength areas and some different gaps. Um, where do you...let's see, we were going to look at the generalization statements and at, um...

BARBARA SHREVE: Their individual...

PHIL TUCHER: Yeah. Closure. What...

BARBARA SHREVE: So when I think, looking at this and realizing how hard it is for me to tell exactly where they were individually, I wished that I had stopped with enough time to be able to ask them to make some kind of their own summary. To write three sentences about first steps that were the things that came clear today that they want to remember when they come back next...

PHIL TUCHER: Just taking that 5 or 6 minutes at the end, blow the whistle, stop, separate piece of paper, or you do it at the bottom, or what do you like?

BARBARA SHREVE: Um, I'd probably have them do it in their notebooks because that's where they're gathering things together. A lot of my students have taken those with them beyond the class, so that would be the place to...

PHIL TUCHER: So put in two or three samples ---

BARBARA SHREVE: Yeah, sample problems or "I know to start with zero when the directions look like..." That was the generalization I probably heard the most as I was going from group to group. "Well, if I'm finding the x-intercepts, I know there has to be a zero." Or when they got to...for groups that were on the other side, "If it's an x-intercept, it has to look like a point."

PHIL TUCHER: I wonder if listing some of these sentences would be useful. While you were doing the "Who's Right?" warm-up, I think the first one is the one that you felt wasn't kind of grabbing them as much as you anticipated. It occurred to me that maybe having some sample sentence stems at the end of that, giving them the actual words. Looking back, I don't know if they were ready for sentence stems. I even wondered about pulling...a closure activity that occurred to me was that you could use the "Who's Right?" that didn't go as quickly as you thought, pull that at the end and let them revisit it once they've done some of these matching exercises.

BARBARA SHREVE: It would be really interesting to see how many more reasons they could come up with at that point.

PHIL TUCHER: Or whether...yeah, how many more reasons or whether the reasons came a little bit easier to them. But what about a couple of just...brainstorming a couple of those sentence stems? Or I'm sorry, a couple of the sample summary statements that you can imagine them writing. I think if you work backwards that way, what do you think they might put in their notebooks at the end of the period today? And then work all the way backwards to what are the sentence stems that you could give them at the beginning of the class for them to try out.

BARBARA SHREVE: Right.

PHIL TUCHER: Let's just take a minute and brainstorm some of the summary statements. I think they're at the tip of your tongue. You said some of them already.

BARBARA SHREVE: So things like, "If I'm finding an intercept, I know that I need to substitute a zero."

PHIL TUCHER: Mm-hmm.

BARBARA SHREVE: That an intercept is one where the answer looks like a point.

PHIL TUCHER: So if I'm finding an intercept, the answer looks like a point?

BARBARA SHREVE: Like an x,y or a T-table. Rather than an "x equals."

PHIL TUCHER: So if I'm doing this then the, something... Let's try some of those.

BARBARA SHREVE: Oh, that kind of statement?

PHIL TUCHER: Mm-hmm. If I'm...

BARBARA SHREVE: If I'm finding a vertex, I'm looking to find something in the middle.

PHIL TUCHER: Do you want to be more precise with the x part of that or not at this point?

BARBARA SHREVE: Um, like in the middle of...

PHIL TUCHER: ...if I'm finding the vertex, I'm finding the middle of the x values?

BARBARA SHREVE: Of the x -intercepts, yeah. Of the x values.

PHIL TUCHER: These three needed that from the beginning but once we talked it through, once we talked it through, even once they had the first step of it they were like, "Oh, yeah. Okay." They fix that one up.

BARBARA SHREVE: At another table, we started talking about a vertex, where does it happen? If you know these intercepts, what do you do to find where the vertex is? And that's where they quickly said, "Oh!" and they saw a number line. "Oh, I need to find where that's going to happen."

PHIL TUCHER: I love that you made it one dimensional with the number line, um don't even worry about the y value. And I think once kids see that and they have that, it's theirs and it's really important. I don't think it's obvious, necessarily...at least the first time. Let's do a couple more. If I'm finding the intercept, if I'm finding a vertex, the answer needs to look like, or I need to do this first step?

BARBARA SHREVE: Um, I don't know if they would've said this from this, but I would've loved it, is if I'm solving a problem that's quadratic, it needs to equal zero.

PHIL TUCHER: What needs to equal zero?

BARBARA SHREVE: Um, the expression needs to equal zero, the quadratic expression needs to equal zero, or I need to get everything on one side of the equation. Um, the difference between that and you know, the first step here where we're starting to isolate things but it's not the useful direction to move.

PHIL TUCHER: That was a really good example - just to put it right out there, first thing to start with. And one more.

BARBARA SHREVE: If I'm just factoring, I still have an expression. My answer is an expression.

PHIL TUCHER: I loved your idea of "you need to know when to stop." "I'm glad you can show off setting it equal to zero and coming up with x values!" The answer is still an expression.

BARBARA SHREVE: Mm-hmm. Thank you for writing these.

PHIL TUCHER: I'm sure there are more. I think that's a good start. Do you like this language: "If I'm... then I..., or if I'm..."?

BARBARA SHREVE: I do. Because it's kind of their...it's also modeling this conjecture like, which helps later. If I can make this one decision then I've got a bunch of things I know I can do next or a logical thing I know I can do next.

PHIL TUCHER: Good. Yes. I like having the "I" in it that their...it's their own reflection or it's their own observation and statement.