

## Day 3 Teacher Journal

### Planning

One of my primary goals while the students have been working on their systems was to monitor their activity and to try to make sense for myself what would be the best way to orchestrate the whole class discussion. This has to be a planful activity; I didn't want it to just become a show and tell where every group gets a chance to share. If you set the stage so that it's that way, all that the students are thinking about is what am I going to say when it's my turn. And it's really hard to get them focused on listening to the person that's actually giving their way. So, by giving the first one and then saying, "Who did it differently or can you tell the differences, similarities" etc., that kind of re-directs their attention on how the discussion is going to be focused. For me, personally in this situation, I started with one of the rate problems because it was simply add the two columns, take the sum, and re-rank. That I wanted to start with because I wanted to juxtapose that with the group that did the ranks and then to the average, because I wanted to go back and revisit it, and say, "Hmm, if the rate people had done the average, do you think the order would have been the same"? For me, this was my entree into the notion of, sum and average difference. So, I needed to get those two ways up so that I could talk about those.

After we sorted out the issue or discussed the issue of average and sum, then I wanted to move the agenda forward by trying to introduce the notion of weighted rates or ranks. That's why I asked the group that worked on the six columns to go next. For me, personally, it seemed a logical introduction to talk about, "Let's suppose that we think murder is much more significant than the other five categories, what might we do to this system to reflect that?" Now clearly, the students didn't see this in the same way that I did. We had some interesting discussions about how you might deal with that, but the notion of introducing a coefficient into their system to deal with one of the terms didn't occur. But that was my reason for my structuring the presentations in that way and again, this requires me, while they're working, to monitor their groups and make notes to myself about what I see. This is not a flawless activity because sometimes by my just stopping by the groups, my interpretation of what they're doing is not the same as what they're actually doing. A lot of times I get driven by my agenda and I think, "Wow, it would really be nice if I had a group that was doing a certain way", and so I'm looking to see if I have that and in my desire to get that I sometimes misinterpret what's actually there into thinking that's the way they're doing it. So it's, I have surprised myself before by asking a group to come and share and what they said was not what I was anticipating, but I don't think that lessens the importance of the teacher's role in planfully organizing the whole class discussion so that the mathematical agenda stays on the forefront.

When I think about this lesson sequence and the way that it's unfolded this time, I think I have really misjudged the placement of homework. I had developed a homework activity to be used at the end of the Sneakers problem and then the way the lesson unfolded I had thought maybe it would be an opportune thing to provide the students for homework for tonight. And it particularly got at looking at the relationship between sum and average so, my hope was that that would come up again in class today, which it did and then I would give the homework tonight. However, after their discussions I was so comfortable with where they are in that relationship, I kind of felt like it was almost going backwards because the data that I was going to ask them to look at was actually the values, that you actually did add and the calculations. So my sense was that we had made progress beyond that point so I chose not to give it. So I think that my first call was the better call and that was to give it at the end of the Sneakers problem and possibly just taking some time in class to let students work on that before introducing the first Crime problem in retrospect would have been a better idea.

In thinking about a homework problem that might fit with the two Crime problems, one of the issues that I really wanted to bring up was the notion of weighted ranks or weighted rates. And so wrestling with the problem that might give them an opportunity to see what happens if you, for instance, doubled the crime, the total crime rate or you multiplied the murder rate by ten, and so in thinking about that I thought it might be nice to use that problem at the end of the second Crime problem to get them to reflect back on that. Today, when I was up in front of the class I was thinking, "I wish I had that problem in my

hand now," because in light of the conversation we had today, that is problematic for them. There's no closure there and it would've been a really, an opportune time to give them that problem tonight. So, again, I have misjudged the placement of these activities and that clearly was poor planning on my part. I should've had that in my hip pocket just in case I needed it. So now I've got to go back and rethink how that problem may or may not fit after we have a discussion tomorrow about their second systems.

## Facilitating

I was pleased with the students' ability to share their systems with the class today. I'm seeing them become a little more outgoing and a little more confident in themselves, in their ability to share their mathematical thinking. They're able to talk about what they have done and how they represented that with respect to the work of the result of the activity on the poster boards. Instead of talking globally about, "well, we wanted to find which one was the best", they're able to actually point to the data sets and say, "we took these numbers and we added them and that gave us this total and then we did," thus and such. So the poster, their activity on the poster, does provide them a record that they can then refer to as they give their explanations, but I think they're very comfortable in that they understand what they've done and they feel pretty confident that was a good way because of their willingness to want to talk about it in class.

One thing that I will try to encourage them to do, I think, when I, after someone shares, I ask if the class has questions and typically they're talking to me. The students, if the students have a question about the system that's just been shared, they seemed to make eye contact with me as if I'm the mediator between them and the person who's just shared the system. I also have noticed that when the students are sharing their system, sometimes they're making eye contact with me instead of the class. So, I want to try to push them to realize they're talking to each other and that I'm not the mediator in this process.

In trying to symbolize the students' systems, I was a little concerned about my imposing the symbolic notation and how they would view that. I didn't want them to see that as trying to decode something that I had done, but I wanted them to view that as actually representing the activity of the students in their systems. And so I was trying to make an effort to actually do the symbolization above the columns to which they corresponded, and I think, I mean immediately some of the students said, "Oh, that makes sense, or I get it". And I'm hoping that the fact they were able to do that for some of the subsequent systems is a good indication that they'll be able to this on this next problem that I've assigned. So I have, in the second set of data, asked them in their groups to define what the symbol system would be that would explain their system.

In thinking about the context of this problem it had seemed initially the students were very engaged in this whole idea of looking at the crime of the cities or the safety of the cities and I was worried somewhat that their personal interests might then interfere with their ability to step back and reason mathematically about this. I think what happened was it just created some real energy and enthusiasm for the problem situation. I think, for the most part, the students were engaged and they seemed to be really interested in getting in the conversation and talking about this. So, when those things happen it makes the job of the teacher really fun because the banter is engaging for the teacher also, to see the students wanting so much to participate and share their ways. So, it seems in this particular situation that the scenario or the context really contributed favorably to the outcome of the problem.

In thinking about the students who participated in class discussions, I still think that I've got to attend to that more specifically tomorrow. One of the things that I did in asking the groups to share was trying to get people to share the systems at the board who had not done that before. And, even though some of the same groups came up, I made an attempt to note one person from the group who hadn't shared. So that was one effort on my part to try to get more people engaged in the conversation. Again, on some of these issues, I had the same few people raising their hands, and I'm not doing the job I should about waiting. I can think of one instance today, when I said "I've got one hand, are there others," but I need to do that more often. I think for me I get excited about the conversation, and I get engaged in it myself, and it's really hard for me to wait. I want to keep moving forward. So it's something that I really need to pay

better attention to in my own practice, because it's an important aspect. It doesn't make any sense to work really hard to develop these problems, that I think give all students an opportunity to engage, if I then personally not going to give the opportunities to engage in the whole class discussions.

### Understanding Student Thinking

In thinking about today's lesson, I think that there were some really mathematically significant issues that arose. In particular when I think about the issue of the sum and the average, I felt that there was progress in the students' understanding of that relationship. They were able to talk about the effect of averaging on those totals and how that might play out in terms of the ranks. They did this by making references to real life experiences or to situations that they were thinking about in an attempt to try to understand it, or at least that was my interpretation of their activity. So, I'm starting to get much more comfortable with their seeing that if you have a ranked list of numbers and you half each one of them, then the rank stays the same because they've all diminished by the same proportion. So, I really sense that there was progress in that area.

The second piece that I was pleased with was the students' ability to note the similarities and the differences, and the different ways. After I put the, had the first group share today, the other groups were able to say how their system was alike or how it was different from the one that had already been shared. And I think that's critical if we're gonna have discussions about what the different systems, how they act on the data differently. So, we kind of got into a difficult situation with Tina because she added the rates and then used a reverse order rank system, so the students that had also added the rates but used a same order rank system were able to clarify how their system was like Tina's but different. So I thought that was a really nice piece that happened today.

### Mathematical Content and Context

In thinking about this problem and how to introduce the notion of weighted ranks or rates, to me it made more sense to operate off of the ranks. So, when I saw what Sherika, and Caleb, and Gianni had done, I was really pleased because they had ranked each of the six categories. So, initially that seemed to provide a really nice segue into me talking about "so what if you thought murder was twice as important or car theft was twice as important", 'cause we can act on the symbol system that we created to represent their system. Now I'm wondering if a better way, a better entree to this problem is to have them actually look at the rates. For instance, if you look at the total violent crime rate and you compare that to the total property weight you see that the magnitudes are not comparable. So you can talk about the impact that has on the sum you're then using to rank the city. So, I'm now initially thinking that I want to go back and talk about how could we, how could we make these equitable, how could we make them have the same impact on the final result; at least the same impact if not more impact, so fortunately it's not until tomorrow so I have some time to think about this. But I really want to re-raise this issue of weighted ranks or rates and I'm gonna wrestle with how I think that might, most effectively emerge. I will have, obviously, groups that have operated on the rates, so that I can take their system and then we can work from there as opposed to me just raising the whole issue myself.

One of the things that I think I have to bring up tomorrow when we talk about developing a system is the notion of a system that would work with any set of cities. The two data sets that I have given, the first was created by the mayor and the second one was by his opponents. And so Tina's question becomes relevant again in that she wanted to know, "We're getting different answers every time, so how do really people do it?" So, I want to step back from this and talk about, in general, how do you create a system that would work with any set of cities-doesn't have to be twelve cities, it could be three cities, it could be fifteen cities. So I want to, I want to remove the discussion about the systems from the specific data sets and talk more generally about a system that's applicable with any data set.