Leaders in Mathematical Thinking
Marian Small - Visual Representations

>> One of the presentations I did today was called Picture It, and it focuses on presenting concepts visually, mathematical concepts. But not just presenting pictures to make kids happy and engaged, presenting pictures that evoke ideas. I talked to the audience about how important it is not only to have pictures that just everybody will say the same thing, but how important it is to have pictures that I call "provocative," in the sense that different people will respond different ways, and they'll learn by the question, rather than me just assessing them by asking the question. So a lot of what I shared with teachers today is, it didn't matter if you were a kindergarten teacher or if you were a grade eight teacher, or if you were higher, that we can present ideas in mathematics visually. What the value is is not only engagement -- but that is a value -- but it's also better recall. There's tons of evidence that students to recall things better when they've seen them visually. And it's also what I'm going to call "more dramatic." So it's my experience that kids just hear too much stuff in a day, and they can't keep that all in their heads. And so if you really care about an idea, go dramatic, and that'll be the one they keep. So if you have a picture that evokes an interesting discussion, that's what they're going to remember. If I just sort of say it in passing, it's not happening. So I tried to share lots of different kinds of visuals that will help kids see mathematical ideas. Using visuals is also a way for students to communicate. So it's not that I want them to draw a picture of a problem every time I give them a problem. But I want them to represent that problem visually, either with concrete materials or with pictures, so that they see what's going on, and that actually will help them be a better problem solver. So it's kind of a two-way street. I see visuals as important for the teachers to initiate, but I also see visuals as important for the kids to respond with, as well as respond to. I think that drama does work for kids. So you'll present a visual, and, "Do you see this, or do you see this?" And there's disagreement in the room. That's pretty exciting. Then we have a discussion. So, like, "Do you agree with her?" Or, "Do you agree with him?" Or, "What do you think? Should we take a vote?" And all of that is the kind of stuff that kids respond to. I mean, kids are pretty malleable and they like action, and this is, essentially, action. Mathematics is, by its very nature, a fairly abstract subject. Part of the role of a teacher is to make it concrete or real. This is a way to make something that is very abstract real. I don't think any of us, whether we're old or young, are so good at seeing things abstractly. We like to kind of pull it into something real that we can make sense with. And I think visuals are a great way for kids to make sense of concepts that are generally pretty abstract and pretty complex. I've co-taught with teachers, and we've used some lessons that I've created that were visual. There was one I'm just thinking of that happened this year that I still recall. There was a kid, and we had what we called "cakes," they weren't cakes, they were shapes. And they had to divide them into fractional pieces, and they had to do a bunch of stuff with it. Anyway, one boy had a pentagon cake, which is weird, but he did. And he divided it into three what he called "equal pieces." And I said, "So do you think those guys are equal?" And then he said, "Oh, yeah." So then I'm talking to him, so I said, "So do you think if this is chocolate cake, because you told me you

like chocolate cake, would you be okay if I took that piece over there?" And he said, "Well, no." And I said, "Well, why not?" And he said, "Well, because you have more." "So I guess you don't think they're equal." So you see kids -- having to do that makes them see it. If I had given him a piece of paper where things were already pre-divided, none of this happens. They have to do the thinking. And I think thinking visually is a powerful way for those kids to think. So that happened to me just this year, and it was because there was something for us to look at, that it made so much difference.