

Representations and Tools for Learning Similarity - Extension

Module

THE FACILITATOR'S COMMENTARY

Session 1

Representations Module Session 1 Video clip #1

Watch the clip: [00003-3.mov](#)

Background Information

Teachers had completed a math task in preparation for viewing the Randy and Jensen clip. In the excerpt, the teachers just finished watching the clip and are discussing the video debriefing prompts.

The Facilitator's Commentary

My intent in this module was to encourage teachers to become aware of the mathematical significance of how representations and tools are used. In this discussion, after one teacher identified that Randy was solving the problem by finding the center of dilation, I probed further by posing a question about the mathematical foundation on which such a solution approach is built.

The teachers' comments that followed seemed to indicate two developments in their thinking. The first, teachers were beginning to understand how a dynamic view of similar figures enabled the students to justify claims about the triangles based on the distances from the center of dilation to corresponding vertices. In this case, the representations and tools supported the students' processing. And second, the teachers were becoming more reflective about their own understanding/thinking about the mathematics.

Throughout the LTG training, I have hoped teachers would be open to a more dynamic view of the mathematics involved without feeling they are being criticized for having taken a traditional approach in their teaching.

Representations Module Session 1 Video clip #2

Watch the clip: [00004.mov](#)

Background Information

This excerpt follows two clips teachers have watched, Josh Clip 1 and Josh Clip2, in which they've been asked to focus on Josh's and his students' use of gesturing. The debriefing questions prompt teachers to consider gestures as tools for students and teachers to express concepts and thinking and for teachers to discern students' understanding.

In this excerpt, I have asked the teachers to comment on what one student's gesturing might reveal about his understanding of angle. While gesturing is used quite naturally in teaching, we're often not aware of the type of information gestures can convey to others and how they can represent our thinking.

The Facilitator's Commentary

The discussion in this excerpt comes back to a common misunderstanding many students have about the magnitude of an angle, namely, that angles with longer rays are greater than angles with shorter rays. During the discussion, the teachers used many gestures in expressing their thoughts. I used gestures deliberately to contrast the measure of an angle as the amount of rotation with the measure of an angle as the distance between two points on the rays.

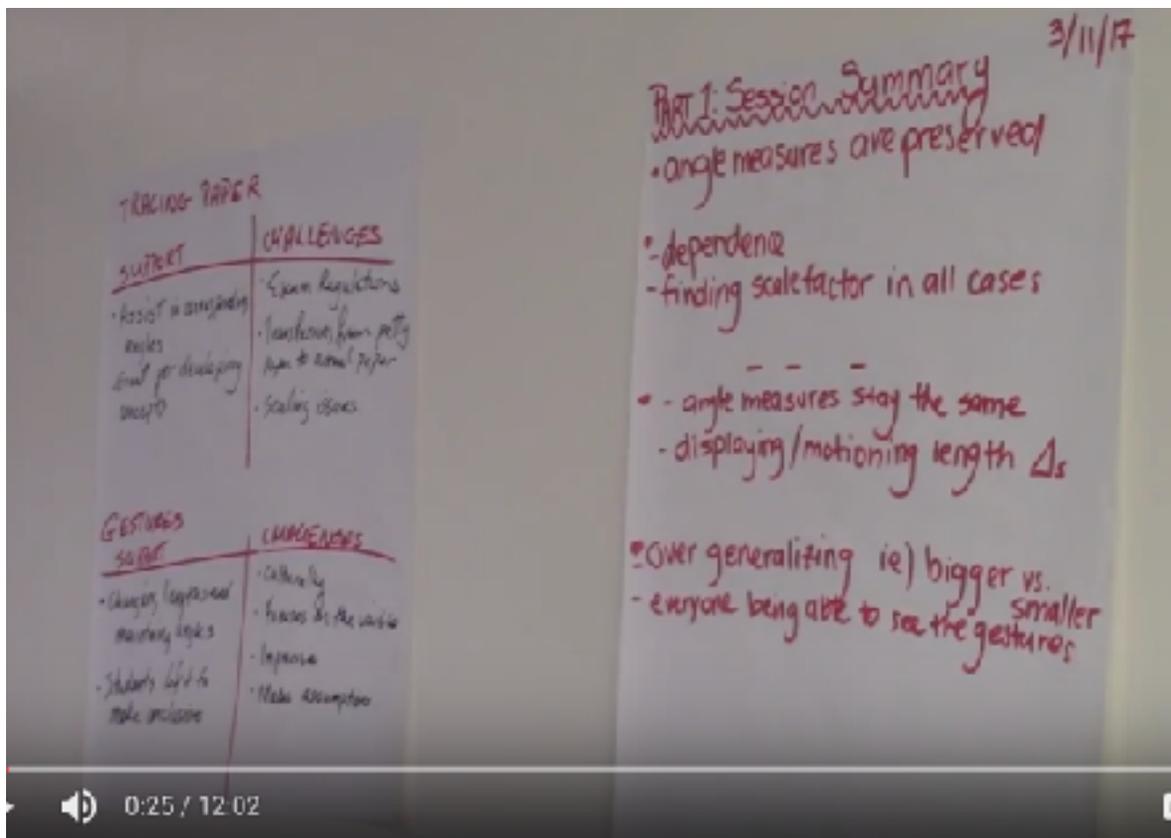
At the close of the discussion I pointed out that the teachers were using gestures. The intent here was to highlight how gestures can help to define concepts from a particular point of view—in this case, from a transformations-based perspective. I also wanted to set the stage for looking at gestures in conjunction with communication, the focus of the next day's module.

Representations Module Session 1 Video clip #3

Watch the clip: [00005.mov](#)

Background Information

The teachers were working on the Summary. They had worked in groups to prepare posters that were then discussed by all (see picture below).



In the conversation so far, teachers had made several references to the usefulness of choosing tools and representations that helped make mathematical ideas more concrete to their students. One teacher had talked about the importance of using such tools and representations in particular with her second language learners. Another added that demonstrating transformations with tracing paper helped her students even if they didn't have all the associated vocabulary because they could see what she was doing as she explained. For example, they carefully watched her turn the tracing paper as she spoke about rotations.

The Facilitator's Commentary

At the point of the excerpt's beginning, one teacher's comment seemed to turn the discussion from a listing of tools and representations to the pedagogical significance of gesturing. To me, as the facilitator, it was a signal that he had thought about it not being enough to merely use gestures, but it was also important to help students build an understanding of the connection between a gesture and the concept it was helping to describe.

While the excerpt is of only one teacher speaking, with nods and asides, the other teachers showed they understood what the speaker was talking about. This excerpt indicated a teacher's awareness of the intentionality needed in teaching and the

complexities involved in developing one's teaching practice. The summary discussion prompted the teachers to reflect more on their practice.

Session 2

Representations Module Session 2 Video clip #1

Watch the clip: [00007.mov](#)

Background Information

This excerpt comes after teachers had completed a dilation task. They watched Nelson's Clip and discussed the debriefing questions in their small groups. As teachers discussed the debrief questions, I walked between the tables and noted their comments about an error one of Nelson's students had made about locating one of the vertices of the dilated image.

The Facilitator's Commentary

The whole group debriefing discussion started with teachers' comments about what they noticed relevant to the question prompts. Several teachers spoke about the distance error Nelson's students had made and thought that the error was quite common, and one teacher mentioned that in her school's curriculum, dilations are usually done on a coordinate plane.

While the error is common with many students, I wanted the teachers to consider whether the tools or representations involved in a task could make a difference in how students think about dilations. I asked teachers to consider the opportunities for students to learn the content in the context of a coordinate plane compared to other environments. The question led teachers to distinguish between the level of generality afforded by more specific and less specific environments. For example, the coordinate plane usually specifies the center of dilation at the origin and can lead to a very numerical approach to dilation. Blank white paper, on which "You can set wherever zero (the center of dilation) is," emphasizes the critical function of the center in locating corresponding points of a dilation.

The teachers' discussion of progressing from the general to the specific or starting from the specific to the general was an indication of their pedagogical thinking. They recognized there are positive and negative consequences of each choice.

Representations Module Session 2 Video clip #2

Watch the clip: [00007.mov](#)

Background Information

The excerpt is a continuation of the debriefing discussion of Nelson's Clip.

The Facilitator's Commentary

At this point, I wanted teachers to think more about what Nelson's students' responses inferred about their understanding of dilation. One teacher questioned how well students understood what happens in a dilation. He made a distinction between recognizing that the slope triangle(s) on Nelson's diagram defined the distance each corresponding vertex was from the center of dilation and merely counting the repeated action of moving up and over a number of times.

The discussion in the remainder of the excerpt seems to move back and forth between focusing on student understanding and the teachers' personal understanding. I saw this section as one in which the teachers were working out some of the ideas of transformations that were not necessarily part of their school curriculums. And in this section, I was reminded about the close connection between a teacher's understanding, view of mathematics and her/his teaching.