Facilitator Notes to Support the Analysis of Ziegler Video Clips

(see Slide 11)

The teacher supported students’ ability to work through the problem without taking over the thinking for them and thereby lowering the demand of the task. He did this by honoring students’ thinking while guiding it in productive, disciplinary directions (Ball, 1993; Engle & Conant, 2002). In so doing, he supported students’ authority while simultaneously holding them accountable to the discipline, hence sending the message to students that ***they*** were capable of finding a generalization to describe any pattern in the sequence and to relate it to the visual representation. While students in Ziegler’s class appeared to persevere in the face of struggle, there are other effective teaching practices in which Mr. Ziegler engaged that **supported** his students’ **productive struggle**.

The teacher **established clear goals for student learning** that he used to guide his decision-making during the lesson (Effective Teaching Practice 1). These goals focused not on what students would do during the lesson but rather on what students would understand about mathematics as a result of engaging with the task. Specifically, in his interactions with Group 1, he pressed students to come up with a generalization (goal 1) by encouraging students to find a way to determine the total number of tiles without counting (lines 39-40), and then later (lines 153-154) to connect the equation they found to the visual representation of tiles (goal 2). He consistently pressed Group 2 to connect their equation with the picture (lines 82-83; 103; 133-134). *(Goal 3 was not observable in the small group work.)*

The teacher selected and **implemented a** **task that promoted reasoning and problem** **solving** (Effective Teaching Practice 2). This high-level task required complex, non-algorithmic thinking and could not be solved by application of a known procedure (Smith & Stein, 1998). In addition, the figures in the sequence provided a way for students to **use and make connections between mathematical representations** (Effective Teaching Practice 3), in this case between the symbolic equations and the physical arrangement of tiles. As mentioned above, he consistently pressed students to connect their equations with the physical arrangement of tiles. Finally, the six questions in the task provided additional support for students who needed it. In particular, questions 1-3 may have helped some struggling students gain entry into the task, and question 5-6 may have provided extensions for students who finished the problem prior to the whole class discussion.

The teacher **posed purposeful questions** (Effective Teaching Practice 5). While some questions served to gather information and required little thinking (e.g., lines 28-38), other questions asked one student to explain what the other had said (lines 68; 145), challenged students to explain what they were doing and why it works (e.g., lines 162-167), and pressed students to make connections between the equation and the diagram (lines 153-154; 82-83; 103; 133-134).

The teacher **elicited and made use of student thinking** (Effective Teaching Practice 8). He began his interactions with both groups by trying to understand what students did (e.g., lines 8-9; 140-144; 54-58) and then using what he learned to push them further (e.g., lines 39-40; 152-154; 165-167; 83-85). In this way he first assessed what it was that students in a group did and then asked a question that would advance their thinking towards the goals of the lesson.