

Mathematics Teachers Teaching English Language Learners: What Knowledge Do They Need? *Mark Driscoll, Education Development Center, Inc.; Dan Heck, Horizon Research; Kathryn Chval, University of Missouri*

Question(s) for Discussion: How does the changing social and political context affect the responsibilities of content teachers?

Session Description: Mathematics teachers of English language learners (ELLs) are increasingly expected to help ELLs learn academic language while learning mathematics. Many are understandingly challenged by this expectation, possibly viewing it as something beyond supporting student learning of mathematics content. A central premise of the two projects whose leaders will facilitate the session is that learning mathematics includes, and is strengthened by, communicating about mathematical thinking and reasoning, including attention to the meanings conveyed in precise use of academic language. This session will focus on the question, What knowledge do teachers of mathematics need in order to support the learning of ELLs? Teachers must develop and draw from numerous knowledge bases to effectively teach mathematics to all their students. Several researchers have conceptualized teacher knowledge and developed frameworks for consideration (e.g., Shulman, 1986; Grossman, 1990; Magnusson, Krajcik, and Borko, 1999; Hill, Ball, and Schilling, 2008). In addition, mathematics education researchers have studied knowledge for teaching over the past two decades (e.g., Carpenter, Fennema, Peterson, & Carey, 1988; Hill, Rowan, & Ball, 2005; Ma, 1999). Although these frameworks include components such as knowledge of context and knowledge of learners, they do not specifically address knowledge related to equity or teaching ELLs. Three principles can guide work toward identifying needed knowledge and creating opportunities for teachers to attain it:

1. No matter what category ELLs fit into—from students newly arrived in the country and just beginning to learn English to those who have advanced to “former limited English proficient”—it is both possible and important to engage all these students in regular mathematical work that challenges them to reason and solve problems, and to communicate their thinking.
2. Classroom environments that make ample use of multimodal communication strategies—pictures, diagrams, presentations, written explanations, physical models, technology-enabled models, and gestures—afford ELLs the means to express the thinking behind their mathematical reasoning and problem solving.
3. In the mathematics classroom, ELLs can learn to express their thinking and reasoning in precise academic language, provided mathematics teachers work to understand and apply the ways in which language is implicated in the learning of mathematics and support ELLs in connecting everyday and multimodal communication strategies that make sense to them to academic language, to ensure that it also makes sense to them.

These principles will serve as a guide for the session, which will begin with engaging participants in a mathematics activity designed to elicit awareness of how language is implicated in the learning of mathematics and how important it is for teachers of mathematics to learn to attend to and understand how ELLs make sense of mathematics and communicate their thinking and reasoning. A debriefing discussion on this activity will focus on the principles above, and consider relevant principles from the work of other participants in the session. The mathematics activity and debriefing will take up approximately two-thirds of the session, serving as a foundation for a group discussion about knowledge necessary to support ELLs’ mathematical learning during mathematics instruction and strategies for creating opportunities for mathematics teachers to attain this knowledge and apply it successfully.