Contents

2 Session

What Does High-Quality Instruction Look Like?

(Instruction)

Instruction plays a critical role in students' learning of mathematics. In order to deliver high-quality instruction in mathematics, teachers need to have a deep knowledge and understanding of the subject matter at two levels: (1) one that enables them to do mathematics themselves and (2) one that enables them to teach it. In addition, effective teachers of mathematics need both general pedagogical knowledge and specific pedagogy for the teaching of mathematics (including both a deep understanding of how students learn mathematics and the capacity to elicit and build on students' mathematical thinking). They also need to know the mathematics curriculum (within the grade level[s] they teach as well as across the K–12 grades).

This session focuses on what high-quality instruction in mathematics looks like. It also provides an opportunity to discuss research findings about how people learn mathematics, as the basis for recommendations about promising instructional practices. In addition, participants explore the connection between the "cognitive demand" of tasks and opportunities to learn mathematical ideas.

This session offers the opportunity to do the following:

- Examine what is known about how people learn mathematics
- Develop an understanding of instructional strategies that promote student learning in mathematics
- Examine the types of knowledge teachers need to effectively lead mathematics instruction: (a) strong mathematics content for themselves, (b) the content needed to teach it to others, (c) pedagogy of mathematics, (d) students and how they learn, and (e) and curriculum, at and across grade levels
- Consider how various types of mathematical tasks directly affect what mathematics students have the opportunity to learn.

READING 3.2

Working Inside the Black Box

Assessment for Learning in the Classroom

Paul Black

Christine Harrison

Clare Lee

Bethan Marshall

Dylan Wiliam

In their widely read article "Inside the Black Box," Mr. Black and Mr. Wiliam demonstrated that improving formative assessment raises student achievement. Now they and their colleagues report on a follow-up project that has helped teachers change their practice and students change their behavior so that everyone shares responsibility for the students' learning.

In 1998 "Inside the Black Box," the predecessor of this article, appeared in this journal.[1] Since then we have learned a great deal about the practical steps needed to meet the purpose expressed in the article's subtitle: "raising standards through classroom assessment."

In the first part of "Inside the Black Box," we set out to answer three questions. The first was, Is there evidence that improving formative assessment raises standards? The answer was an unequivocal yes, a conclusion based on a review of evidence published in over 250 articles by researchers from several countries.[2] Few initiatives in education have had such a strong body of evidence to support a claim to raise standards.

This positive answer led naturally to the second question: Is there evidence that there is room for improvement? Here again, the available evidence gave a clear and positive answer, presenting a detailed picture that identified three main problems: (1) the assessment methods that teachers use are not effective in promoting good learning, (2) grading practices tend to emphasize competition rather than personal improvement, and (3) assessment feedback often has a negative impact, particularly on low-achieving students, who are led to believe that they lack "ability" and so are not able to learn.

However, for the third question—Is there evidence about how to improve formative assessment?—the answer was less clear. While the evidence provided many ideas for improvement, it lacked the detail that would enable teachers to implement those ideas in