

## **Mathematics, the Common Core Standards, and Language: Mathematics Instruction for ELs Aligned with the Common Core**

### **Background**

The need for research-based recommendations for mathematics instruction for English learners (ELs), aligned with the *Common Core State Standards* (CCSS), cannot be overstated. The recommendations focus on improving mathematics learning and teaching through language for all students, and especially for ELs. Although it is difficult to make generalizations about the instructional needs of all students who are learning English, instruction should be informed by knowledge of students' experiences with mathematics instruction, language history, and educational background (Moschkovich, 2010). In addition, research suggests that high-quality instruction for ELs that supports student achievement has two general characteristics: a view of language as a resource rather than a deficiency and an emphasis on academic achievement, not only on learning English (Gándara & Contreras, 2009).

Research provides general guidelines for instruction for this student population. Overall, students who are labeled as ELs are from non-dominant communities, and they need access to curricula, instruction, and teachers proven to be effective in supporting the academic success of these students. The general characteristics of such environments are that curricula provide “abundant and diverse opportunities for speaking, listening, reading, and writing” and that instruction “encourage students to take risks, construct meaning, and seek reinterpretations of knowledge within compatible social contexts” (Garcia & Gonzalez, 1995, p. 424).

Research shows that ELs, even as they are learning English, can participate in discussions where they grapple with important mathematical content. Instruction for this population should not emphasize low-level language skills over opportunities to actively communicate about mathematical ideas. Research on language and mathematics education provides several guidelines for instructional practices for teaching ELs mathematics (Moschkovich, 2010). Mathematics instruction for ELs should:

- 1) Address much more than vocabulary
- 2) Support EL's participation in mathematical discussions as they learn English
- 3) Draw on multiple resources available in classrooms (objects, drawings, graphs, and gestures) as well as home languages and experiences outside of school

### *What is effective mathematics instruction?*

According to a review of the research (Hiebert & Grouws, 2007), mathematics teaching that makes a difference in student achievement and promotes conceptual development in mathematics has two central features: one is that teachers and students attend explicitly to concepts and the other is that teachers give students the time to wrestle with important mathematics. Mathematics instruction for ELs should follow these general recommendations for high-quality mathematics instruction—to focus on mathematical concepts and the connections among those concepts and to use and maintain high cognitive demand mathematical tasks, for example, by encouraging students to explain their problem-solving and reasoning (AERA 2006; Stein, Grover, & Henningsen 1996).

### *How can mathematics instruction align with Common Core State Standards?*

First and foremost, teach mathematics for understanding! Students should use and connect multiple representations, share and refine their reasoning, and develop meaning for symbols. Mathematics instruction for ELs should align with the CCSS, particularly in these four ways:

1. *Balance conceptual understanding and procedural fluency.* Instruction should balance student activities that address important conceptual and procedural knowledge and connect the two types of knowledge.
2. *Maintain high cognitive demand.* Instruction should use high cognitive demand math tasks and maintain the rigor of tasks throughout lessons and units.
3. *Develop beliefs.* Instruction should support students in developing beliefs that mathematics is sensible, worthwhile, and doable.
4. *Engage students in mathematical practices.* Instruction should provide opportunities for students to engage in mathematical practices such as solving problems, making connections, understanding multiple representations of mathematical concepts, communicating their thinking, justifying their reasoning, and critiquing arguments.

*CCSS Mathematical Practices:*

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

*Recommendations for Connecting Mathematical Content to Language:*

1. Focus on students' mathematical reasoning, not accuracy in using language.
2. Focus on mathematical discourse practices, not language as words, or grammar.
3. Recognize the complexity of language in math classrooms.
4. Treat everyday language as a resource, not as an obstacle.
5. Uncover the mathematics in what students say and do.

**References** furnished upon request.

**For More Information**

This summary was based on "Mathematics, the Common Core, and Language" Understanding Language: <http://ell.stanford.edu/>.

See <http://people.ucsc.edu/~jmoschko/>.