THE QUALITY OF INSTRUCTION IN THE CONTEXT OF REFORM

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Research has identified elements of U.S. school capacity that directly affect instruction, sociomathematical norms that affect the learning environment, factors that support students' reasoning, ways to judge the intellectual quality of class work, and ways to examine cross-national differences in instruction. Remaining to be developed, however, are research methodologies that characterize instruction in ways that examine the impact of standards-based curricula on student achievement. This report focuses on the results of the development and use of a composite index that characterized and described the variation in instruction among teachers in a longitudinal/cross-sectional study using the reform curriculum *Mathematics in Context* (MiC; NCRMSE & Freudenthal Institute, 1997–1998).

Standards-based curricula present mathematics in ways often unfamiliar to U.S. teachers and require more planning for successful instruction than generally perceived necessary for teaching via traditional methods. In MiC, topics traditionally reserved for high school are introduced in middle school using real-world contexts, with an emphasis on student reasoning rather than on memorization of procedures, providing challenges to U.S. teachers, who are often accustomed to teaching mathematics as isolated pieces of knowledge (Romberg, 1997).

The index used to examine instruction discriminated differences in instruction among study teachers in two districts who used either standards-based or conventional curricula. Variation was found by grade level, curriculum, and district. These results confirmed (a) the significance of integrating assessment practice into instruction, with the content corresponding to content standards and emulating what it means to know and do mathematics; and (b) the need to develop instruction that emphasizes teaching mathematics for understanding, that is, developing classroom norms in which students value and participate in discussion, providing meaningful tasks, creating opportunities for students to articulate their thinking orally and in writing, and seeking multiple forms of evidence of understanding from each student in class. The results also suggest that even in classrooms using reform materials, students are rarely given opportunities to reflect on and express their own mathematical ideas or to listen to the reasoning of other students. Teachers' own understanding of the mathematics, the ways the mathematics is presented, and their developing pedagogical content knowledge related to the units have a significant impact on classroom instruction and on student achievement.

The findings in this study underline the need to take into account such variation in instruction in any interpretation of the impact of reform curricula on student achievement.

References

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