

Different Paths and Similar Problems in Mathematics Education Reform In the United States and China

Abstract

Mathematics education in different countries is strongly influenced by cultural and social factors that build goals, beliefs, expectations, and teaching methods (An., Kulm., Wu., Ma. & Wang, 2003). In the past three decades, both the United States and China have experienced mathematics education reform. New K-12 mathematics principles and standards have been released in each country. Although their paths of reform are different, they are facing similar problems. Both countries' reforms are adapting each other's strategies. For example, China is trying to abolish the middle school entrance examination, and teachers are required not to assign homework to lower grades in elementary school. The U.S. realizes that proficiency is a problem in mathematics education reform (Rand, 2002). Teachers' professional development that aims at implementing mathematics curriculum and improving teachers' knowledge as well as textbooks are the common problems for both countries. Research has shown the importance of ongoing support for teachers' practice (MSMP, 2001). However, the question of how professional development helps teachers implement standards-based mathematics curriculum and what textbooks influence teachers' teaching are challenging questions for both countries.

In order to answer these questions, a series of studies are underway in a cooperative research program involving faculty and graduate students at Texas A&M, California State University-Long Beach and institutions in China, including the National Institute for Educational Research, Beijing Normal University, and Nanjing Normal University. The results of a study of middle school mathematics teachers in the U.S. and

China indicate that mathematics teachers' pedagogical content knowledge in the two countries is different. Chinese teachers take traditional approaches to demonstrate solutions to problems, while U. S. teachers use manipulatives to promote creativity. Chinese teachers focus more on procedural development to give students more practice in order to be fluent, and the U.S. teachers create various teaching approaches to reach out to all students (An, Kulm & Wu, in press).

Textbook analysis is being conducted in both countries. In the U.S., few middle school textbooks meet standards of instructional quality (Kulm, G., Roseman, J. E., & Treisman, M., 1999). The results of comparative analysis show that there are three major differences in the primary mathematics textbooks between China and US: mathematics content, how mathematics is organized, and mathematical representations. For example, the textbook "Math" published by Chinese People Educational Publisher in 1995 in China, and the textbook "Math in My World" published by the school-division of McGraw-Hill Publisher in 1999 in U. S. differ in definitions of particular mathematics content, connection between mathematics knowledge and real-life, and representation used in different ways in terms of graphs and language (Sun, 2001).

In order for standards-based curriculum materials to reach their full potential in both countries, professional development programs need to provide teachers with knowledge and skills to use appropriate materials to engage students in appropriate ways (Show-me, 2002). Therefore, the focus of professional development for teachers implementing a standards-based curriculum is to enable teachers to understand the content and pedagogical knowledge and to use appropriate textbooks.

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