SCALE Key Concepts

Math Masters Change the Way Teachers and Professors Learn

Simply telling someone to think a new way rarely works. Merely being shown evidence that another way of thinking works better won't change most people. Researchers have found that realigning belief systems takes hard work. Learners must grapple with new information, testing it against old theories, seeing how the new learning works and fits in with their current understanding. This research has led to major changes in the way teachers receive professional development. Instead of isolated learning experiences, professional development based on research helps teachers learn a set of skills, processes, habits of mind and attitudes, along with deepening content levels. In a nutshell, this is what the SCALE-sponsored Math Masters Institute for middle school teachers in the Madison Metropolitan School District is all about.

One teacher who experienced this new way of learning in the Math Masters course explained it this way: "Instructors used a lot of open-ended questions and left us wondering and didn't always jump right in and give us the answer…It was like, ok, so why can't you tell me? …And then there was a lot of grappling going on which frustrated me a lot because I'm used to getting things pretty quickly and I didn't like the uncertainty of it all…The good thing was

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there was time to grapple and there was time to stop and think about it. And I think that the thinking was good. And it was good in another way in that I think I learned how frustrating it can be for kids and them not understanding and then leading them to answers as opposed to just telling the answers. And I think that I learned that that's a better way to do it because I think that there's more learning going on in the frustrated person's mind than in the non-frustrated person's mind."

Math Masters offered four content-related courses and three pedagogy courses to 58 middle school math teachers in the district in 2004-05. In the following year, more than 90 teachers enrolled. To test for content level effectiveness, pretests and posttests were given. Teachers showed statistically significant gains in all four content-related courses. High content, or knowledge levels, allows teachers to use large amounts of information in more productive ways in the classroom.

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SYSTEM-WIDE CHANGE FOR ALL LEARNERS AND EDUCATORS

Brian Sniff, MMSD K-12 Math Coordinator, helped co-develop and co-facilitate the Math Masters program, along with a resource teacher and UW-Madison math and engineering professors. "The professors had a more advanced, symbolic view of teaching math. We had to indoctrinate the professors on where the teachers were on content and share the pedagogy in workshops," he said. "We were not going to have lectures all day on Saturdays, so we coached them on pedagogy and how to write problems. Our pedagogy was well articulated by the *Principles of Learning—Accountable Talk*SM, *Organizing for Effort* and *Self-Management of Learning*." Principles of Learning is from the Institute for Learning, University of Pittsburgh.

One way teachers learned how to generate *Accountable Talk*SM in the classroom is by asking students for clarification or reasoning behind their statements. They also learned how to lead students to discover misconceptions in their thinking, among other aspects of the technique. One teacher who was learning about *Accountable Talk*SM appreciated viewing a videotape modeling the technique: "I enjoyed watching her teach. I always wonder how I'm doing and if I'm doing it right. I know that she is an experienced teacher and so I felt that I gained some new insights by observing her. As well, looking for moves that she did and commenting on them helped me clarify just what these moves are—not reading about them, but how do they look, how do they sound, what effect do they have on the teaching."

Organizing for Effort is making sure everything taught in the classroom is aligned with the standards and that there are clear and high expectations for all students. *Self-Management of Learning* is helping students recognize on their own when they don't understand something and teaching them to take responsibility for getting help or more information.

Taking an active stance toward learning and mastery is nothing new in education—it's only been recently that researchers have learned our attitudes about learning determine how effective we are in attaining this mastery. For the Math Masters in MMSD, SCALE provided the resources needed to put these powerful research findings into action. — *August 2007*

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For more information about ideas or concepts discussed in this article, go to these links:

http://curriculum.dpsk12.org/fr_principles_of_learning.htm

http://www.scalemsp.org/index.php?q=SCALE_Case_Study_MMSD