

Minnesota Recognized in *Promising Practices* for Outstanding Performance on the Third International Mathematics and Science Study (TIMSS) Fact Sheet

World-Class Science Performance in Minnesota

The state of Minnesota participated in the Third International Mathematics and Science Study (TIMSS), allowing comparison with the United States as a whole and with other participating nations. Both Minnesota and the U.S. showed higher scores relative to other participating nations at the fourth grade level and declining relative scores at grades eight and twelve. There was, however, an exception in the science scores for Minnesota that led the National Education Goals Panel to commission a study to explore Minnesota's performance. Minnesota's 8th graders scored significantly higher in international rankings in science than they did in mathematics. Internationally, Minnesota 8th graders were outperformed only by Singapore, one of the highest performing nations overall in TIMSS.

The Goals Panel commissioned four papers to explore Minnesota's exceptional performance in 8th grade science. The Panel approached William Schmidt, executive director of the U.S. National Research Center, TIMSS, at Michigan State University, to do additional analyses of the Minnesota TIMSS data; Frances Lawrenz, Professor, at University of Minnesota, to interview leaders in mathematics and science education around the state about patterns in curriculum and instruction; Senta Raizen, at the National Center for Improving Science Education, to examine this evidence and present a synthesis of the findings; and Bill Linder-Scholer, executive director of SciMath MN, to report on how the state had used its TIMSS findings and on lessons learned from Minnesota's participation in TIMSS. Their findings are detailed in a case study entitled, *Minnesota & TIMSS: Exploring High Achievement in Eight Grade Science*.

Research results and state officials attribute the success to the following:

- **High Expectations for all students**
All Minnesota students in 7th and 8th grade took the same science courses, life and earth science respectively. Mathematics classes incorporated "curriculum differentiation", where students received different content on different levels of difficulty.
- **Focus & Coherence in Curriculum**
Fewer topics were introduced in the Minnesota curriculum in 7th and 8th grades science, allowing more time devoted to developing them in depth. The "de facto state standards" reflects coherence about science curriculum concentrating on a small number of topics all within a given area that cohered together within the broader sense of the discipline.
- **Alignment with Teacher Requirements and Professional Activities**
Teacher certification requirements were factors that influenced student performance; certification in earth science, for instance, was required to teach science in Minnesota in the 8th grade. A local consensus, described as "incremental but cumulative", in collaboration with statewide organizations; like SciMath MN,

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Minnesota Science Teachers Association and state agencies, led to science teachers in the middle grades using the same or similar texts and common instructional practices.

- **Continuity Over Time**

The process mentioned above occurred over time. It allowed time for classroom science teachers, administrators, and statewide leaders to evaluate various approaches to teaching science and to incorporate, modify, or reject various elements based on apparent effectiveness. There was also time for the developing consensus to gain acceptance with teachers throughout the state and for supporting activities, such as professional development, to align with it. Mathematics curriculum and instruction were characterized by repeated “pendulum swings” between new approaches and “back to the basics.” Minnesota math instruction was characterized by numerous, locally developed sets of standards or exceptions and a pattern of curriculum and instruction very similar to the rest of the nation.

- **Capacity Within the Profession**

The standards that were applied in Minnesota were developed organically among state science teachers and within their professional organizations. This demonstrates the capacity of educators to generate as well as implement overall educational improvement and shows what they can contribute to reform improvement initiatives. It also underscores the necessity of aligning teacher training, professional development, and other teacher support mechanisms with the overall reform process.

What is *Promising Practices*?

- A report that details successful practices and policies in place in the states that have made progress toward the eight National Education Goals.
- Highlights the programs and policies that state officials attributed for their success.
- Serves as a tool to help states and schools replicate the highlighted successes. By extension it encourages greater progress in education, focused attention on results and helps sustain public support for education improvement.
- For a copy of *Promising Practices*, please visit www.negp.gov or call 202-724-0015.

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