

Archived Information

Merck Institute for Science Education

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Goal Area: Improving Teacher Knowledge

Our initiatives at the Merck Institute for Science Education (MISE) are based on a growing understanding about the ingredients of effective classroom reform. Our strategy includes concurrent initiatives—all intended to improve student achievement—that involve professional development, school community, district policy, and the professionalization of teaching. At the classroom level, MISE provides high-quality professional development geared toward standards-based teaching practices. At the school level, we seek to build professional communities through the activity of cadres of Teacher Leaders. At the district level, MISE aims to align key district policies to support the individual teacher- and school-based strategies.

In collaboration with our external evaluators from the Consortium for Policy Research in Education, we have examined the relationship between professional development, teaching practice and student achievement. To examine the relationship between teaching practice (either self-reported or observed) and the amount of professional development the teachers received, we used several measurements of teaching practice, including extensive surveys of teachers and observations of teachers based on two different frameworks for measuring standards-based practice. To analyze the impact of professional development on teaching practice as reported by teachers, we constructed a model to attempt to establish a statistical relationship between standards-based teaching practice and MISE-provided professional development while controlling for certain teacher background and school characteristics.

The most striking result from this model is the statistically strong relationship between high levels of quality professional development and standards-based teaching practice. After adjusting for differences in teachers' content background, teaching experience, and school environment, teachers with more than 79 hours of professional development used significantly more standards-based teaching practices than did teachers with fewer than 79 hours of professional development.

Also notable is the relationship between content familiarity and standards-based teaching practice. Each additional semester of college science (a proxy for content familiarity) was associated with a statistically significant increase in the model's measure of standards-based teaching practice. This suggests that content-based professional development is important and bears further investigation. There was no significant relationship between years of teaching experience and standards-based practice. This finding casts doubt on the widespread assumption that experienced teachers are more reluctant to change their practice than relatively new teachers.

We have also tried to document the association between the use of standards-based teaching and student achievement using several measures of student achievement. Results from these analyses indicate a relationship between teaching practice and student performance. After adjusting for student and teacher background characteristics and differences between schools, there was a statistically significant increase in student performance associated with each additional standardized unit of teaching practice.

Our plans for future work include:

- Begin intensive, long-term work with new districts, including an urban district
- Extend work to the high school level
- Expand policy and communications activities
- Focus on education research