



PRISM NWO Executive Summary – 2006

Introduction

The North Western Ontario project was grounded in two assumptions which are detailed further in the research report. First, based on a significant body of literature, our premise is that quality teaching is important for all students and crucial for students at risk. Secondly, teacher capacity is a fundamental prerequisite and predictor of student success.

Research Questions

1. Are changes in beliefs and knowledge measurable after an eight month period of professional development?
2. Which measures are most useful for documenting such change?
3. Are there differences in measurable results between different types of treatments?

Methodology

Based on these assumptions, our project provided multiple opportunities for professional learning to participants who were volunteering Grade 7 teachers in North Western Ontario. In particular, we chose training in which the mathematical content itself was a primary component as recommended by Hill and Ball (2004). Teachers were from a number of school boards and the regional teachers had to travel to Thunder Bay and stay overnight to take part in the training. Some teachers had to drive up to five hours each way to participate.

All participants were given three full days of *PRIME* Number and Operations training delivered by Thomson Nelson Canada. As well, some of the teachers took one or two Additional Qualifications (AQ) courses in mathematics. These opportunities took place between May and November, 2005 and included time for pre- and post-test data collection. Participating teachers were very positive about the *PRIME* training.

Three instruments were used to examine change. *Learning Mathematics for Teaching (LMT CKT-M)* Middle School Form A was used to probe for change in mathematics knowledge for teaching. *Teacher Attitude and Practices to Teaching Mathematics* survey was used to examine beliefs about teaching. Also, *Perceptions of Mathematics (POM)* was used to examine teachers' knowledge of mathematics both procedurally and conceptually, as well as their beliefs about mathematics itself.

Findings

Learning Mathematics for Teaching (LMT CKT-M) showed a significant improvement in mean Number and Operation scores after the *PRIME* Number and Operations training, but did not show improvement in the strands of geometry or algebra in which training was not provided.

Beliefs about teachers' attitudes to teaching mathematics did not show significant change as measured by *Teacher Attitude and Practices to Teaching Mathematics*. Such beliefs may be distinct from learning opportunities such as those provided which emphasized the mathematical understandings. However, significant changes were seen in teachers' beliefs about mathematics itself, based on *Perceptions of Mathematics (POM)*. Mean scores indicated that teachers shifted towards believing in the value of conceptual mathematics learning more highly, and believing in the value or importance of procedural learning less. Such a shift is thought to indicate a more reform-oriented view of mathematics. For example, after the treatment teachers felt that having students being able to think through and discuss a variety of solution methods was more important than they did before the training. Also, they felt that having students being able to follow prescribed methods to generate correct answers quickly and accurately was less important than they did before the study.



In summary, the research showed a significant growth in content knowledge for teaching in the strands in which training was provided. Growth was not seen in the other strands, and hence, the obvious conclusion is that specific training is needed in all strands; providing training in one is a good start but it is not sufficient. The strand specific *LMT CKT-M* Middle School instrument was useful for measuring this growth. Changes in beliefs about what is important in mathematics itself shifted towards a more conceptual and less procedural view. The *POM* instrument was useful for showing this shift. Changes in beliefs about teaching were not apparent, and we conjecture that other interventions such as a whole school reform model or teacher mentoring might be required to support such changes.

Recommendations

We recommend that all teachers receive training similar to the *PRIME* training, and in all strands.

Opportunities for subsequent shared discussion such as AQ courses or Professional Learning Groups may allow teachers to continue to implement their new knowledge, but the time limitations of our study made this difficult to measure.

Teacher interest and quality of instructors providing the training may have been factors that contributed to the success of our project and should not be ignored when planning similar projects.