



## PRISM North Eastern Ontario (NEO) – Executive Summary

### Introduction

The purpose of the PRISM-NEO project was to provide Grades 7 – 10 mathematics and Special Education teachers with collegial support and professional development opportunities to assist them in creating appropriate mathematical learning experiences for their students identified as ‘at-risk’ in mathematics. The project design combined multiple professional development experiences, including collegial support within the same school and board; specific training on the *PRIME* developmental continuum; opportunities to implement new knowledge and skills in current teaching practices; and time to reflect on mathematics beliefs and practices.

### Research Questions

1. How has the PRISM-NEO experience influenced teachers’ conceptions of mathematics, their efficacy, and their teaching practices?
2. How has the PRISM-NEO experience influenced student attitudes and achievement in mathematics?
3. What do teachers and principals identify as factors inhibiting and supporting their efforts to improve mathematics instruction for students at-risk?

### Methodology

The PRISM-NEO participants were teachers and administrators from nine North-Eastern Ontario school boards and one School Authority. The project involved approximately 57 Teachers, 10 Resource Teachers, 20 Math Leads/Student Success Leads, 17 Principals, and 105 Students. Each board was asked to select one Special Education teacher, one or two Grades 7 and 8 teachers and one principal from the same school, in addition to one or two Grades 9 and 10 teachers from a nearby high school to create a “family of schools” within their board. The teachers selected the student participants. The student selection process varied depending on the goals of the board; however, the minimum selection criteria included students characterized as “at risk,” yet with a good record of attendance.

The treatment consisted of a combination of *PRIME* training and the establishment of Professional Learning Communities in each board. *PRIME* training (3 days) was provided for all teachers, focused on the development of mathematical content knowledge and pedagogical content knowledge. *PRIME* Administrative training (2 days) was provided for all principals and/or other administrators, focused on the developing an understanding of reform-based mathematics instruction. To provide sustainability for the project, *PRIME* facilitator training (4 days) was provided for two board-selected mathematics leads in each board. Throughout the Fall of 2005, the professional learning communities developed. The number of meetings and the focus of the meetings depended on the goals established by the teachers in the board.

At the beginning and end of the study, teachers and administrators completed surveys concerning their teaching efficacy and their beliefs about mathematics teaching. At the end of the study, teachers completed an additional survey providing feedback on their experiences in the project, and they participated in focus group interview sessions. Student achievement data (*PRIME* Diagnostic Tools: Number and Operations - Tool F) was collected at the beginning and end of the study. Students also completed an attitudinal survey and exit interview at the end of the study.

Unique to the PRISM-NEO project was the development of Geometer’s Sketchpad® sketches. The purpose of creating GSP® sketches was to provide students with an alternative means for exploring specific concepts as they develop conceptual understanding through the use of technology.



## Findings

Teachers and students were positively influenced through involvement in the PRISM-NEO study. The intervention influenced teachers' conceptions of mathematics pedagogy and their teaching efficacy, specific to at-risk students. The findings indicate that within a supportive, collaborative environment, short-term, concentrated professional development can lead to teacher change and, in turn, improved student knowledge and attitudes.

Teachers and their students who are at risk maintain similar beliefs regarding intervention strategies for supporting adolescent students who are at risk. In particular, they suggest that students would benefit from additional instructional time; one-on-one or small group assistance targeted to specific requisite skills, e.g., basic operations with whole numbers and fractions; and identifying, describing and comparing fractions/decimals; and manipulative-based activities focused on real life connections.

Finally, students who are at-risk are not necessarily disengaged and disinterested learners. Rather they expressed a desire to learn mathematics, and perceive it as significant and relevant to their lives and future success.

## Recommendations

Findings from this study draw attention to the necessary conditions required to nurture efforts to improve learning for students identified as at-risk in mathematics. These provisions include:

- the establishment of in-school and board-wide Professional Learning Communities specific to mathematics education;
- targeted in-service specific to strategies for improving mathematics learning for all students, for example, the *PRIME* materials;
- administrative leadership committed to supporting teachers and understanding effective mathematics pedagogy, e.g., as a minimum, an understanding of the Ten Dimensions of math reform;
- mathematics leadership either within the school or within the board in sufficient numbers to address logistical limitations such as expansive geographic regions;
- continued government support; and,
- sufficient time for active engagement in the learning process, sustained reflection on beliefs and practice, experimentation, and implementation (including lesson planning) within the teaching context, and opportunities to dialogue with colleagues.