PRISM KPR Executive Summary – 2006

Introduction

The focus of the KPR study was the improvement of student achievement, although the study also looked at effects on student attitudes and effects on teachers.

Research Question:

1. Did participation in PRISM in-service contribute to improved student attitudes, higher student achievement, and/or improved teacher beliefs and practices?

Methodology

The study was a true experiment: 52 schools were randomly assigned to either the treatment, i.e., teachers participated in the in-service during the study, or the control, i.e., teachers did not receive the in-service until after the study was over. Schools were ranked on the basis of their EQAO Grade 6 math assessments over the preceding three years. One school in each matching pair was assigned to the treatment and the other to the control. The prior achievement records of the schools were virtually identical and there were no significant differences between the treatment and control group students on the student achievement pre-test.

Grades 7 and 8 teachers who had not participated in voluntary mathematics in-service in the past two years and their students participated in the study. The achieved sample consisted of 86 teachers, 1770 students for the attitude measures, and 451 students for the achievement data – we focused on the six lowest achieving students in each classroom as identified by teachers.

The treatment consisted of in-service sessions on the use of manipulatives and cooperative learning strategies to improve student understanding of mathematical concepts. In-service features included active learning by teachers using examples from classroom practice; teachers worked in groups at the sessions; presenters demonstrated how to construct mathematical ideas using participant responses to student tasks and presenters. Teachers had opportunities for reflection, practise, and feedback. Explicit attention was given to the mathematical concepts embodied in each task and to alternative strategies for eliciting these concepts.

At the beginning and end of the study, students in the treatment and control groups completed the *PRIME* placement tests in Operations and in Number. Students in both groups also completed pre- and post-test standardized surveys that measured their attitudes toward mathematics learning. In addition, teachers completed surveys about their beliefs about teaching mathematics and their confidence in doing so at the beginning and end of the study.

Findings

At-risk students in classrooms of teachers who participated in the in-service learned more mathematics than at-risk students of control group teachers. There were small but significant differences favouring the treatment group on the *PRIME* Number test (a test of mathematical concepts). These student achievement gains were accomplished without any loss of computational accuracy. The two groups performed equally well on the *PRIME* Operations test.

The greatest benefits of the PRISM in-service were received by the least able students. Students who were identified by their teachers as the weakest student in the class were especially likely to learn more if they were in the treatment than in the control group.

Students in the treatment group showed greater improvement in attitudes to mathematics learning than students in the control group. Over the course of the in-service, students in the treatment group were less likely than students in the control group to fear failure in math class. In addition,

students in the treatment group were more likely than students in the control to move away from dysfunctional beliefs about mathematics learning, e.g., math problems can be solved in only one way. Students in the treatment group were more likely than students in the control group to develop positive beliefs about mathematics learning, agreeing with the statement: “In mathematics you can be creative and discover things by yourself.” These differences were small but statistically significant.

Teachers in the treatment group expressed satisfaction with the in-service and described ways in which they and their students had benefited from the in-service. All the comparisons on the standardized teacher measures favoured the treatment group over the control group but none of these differences was large enough to be statistically significant.

Recommendations

We recommend that other school districts consider implementing *PRISM* in-service activities because of the student achievement benefits of the program. The credibility of the recommendation rests on the rigor of the evaluation, especially the use of a true experiment that provides substantial protection from threats to internal validity. In addition, the study examined the effectiveness of *PRISM* in real life as opposed to ideal circumstances.