IMPROVING MATHEMATICS ACHIEVEMENT ACROSS A HIGH POVERTY INNER CITY SCHOOL DISTRICT

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Haberman, 1991; Ladson-Billings, 2003; Knapp et.al. 1995; and Ferguson, 2003, note that the poor achievement levels that have been documented regarding low income minority students may be due, at least in part, to differences in the ways in which they are taught. Haberman, 1991, talks about the "pedagogy of poverty" wherein he notes that while an observer of urban classrooms may see many different types of pedagogical practices taking place, there still remains a typical form that has become accepted as basic—one that is characterized by a directive, controlling pedagogy. The work in this study is based upon the premise that if teachers teach in ways that encourage the development of mathematical thinking and reasoning, students, particularly those whose abilities and achievements often go unnoticed in inner city settings in which more traditional approaches take place, can achieve at significantly higher levels. Such teaching practices include: having students share ideas and explanations; defend and justify solutions; solve challenging problem activities; grapple with complex ideas, probe each other for ideas, etc. (see Schorr and Lesh, 2003; and Schorr et. al for additional references). Consistent with this goal, the initiative that is the subject of this paper, the Newark Public Schools Systemic Initiative in Mathematics (NPSSIM), was designed to provide professional development for K-8 teachers to help them to encourage the development of mathematical ideas throughout the district. Based upon our research hypothesis, this should result in increased achievement for students across the district. It is to this issue that we address this paper as we share results of a longitudinal analysis of student assessment data that documents the positive impact that has occurred thus far.

Methods

The school district is the largest district in the state of New Jersey, and serves a population characterized by, amongst other things, high poverty, high student mobility and poor student achievement on local and state assessments (approximately 85% were classified as not competent or minimally competent in mathematics before implementation of the initiative), and 83% of the residents are African American or Hispanic (2000 U.S. Census).

The initiative began in 2000 and is deliberately planned to stimulate all learners (teachers, students, teacher educators, etc.) to refine, extend, test and share their evolving models for teaching over extended periods of time. All professional development aspects involve multi-layered interactions amongst students from local schools, students at the University, teachers, administrators, and researchers, who work together to consider mathematical content, pedagogical content knowledge, as they consider how students build representations, formulate justifications, and build understanding (see Schorr, Warner, Gearhart & Samuels, in press). All sessions use complex problem solving activities – for both students and teachers – that encourage answers that involve constructions or explanations that reveal aspects of the thought process. In addition, district and University researchers and/or mathematics specialists often accompany teachers as they implement ideas in the context of their own classrooms and discuss the mathematical ideas that may be elicited, implementation strategies, classroom culture, and maintaining high cognitive demand.

Results and Conclusions

While not presented here, qualitative analyses have been done to assess the nature and types of changes that have occurred in teachers' classroom practices (see Warner, Schorr, Gearhart & Samuels, 2005, Schorr, et.al, in press, for examples). Quantitative results thus far indicate that indeed, district students are achieving at significantly higher levels. For example, at the fourth grade level in 1999 (before implementation of the initiative), there was no statistically significant difference between schools who were participating in the program and those who were not. In subsequent years, the non-project schools did not improve at the same rate as schools involved in the Project. By 2002, the differences between the groups of schools were statistically significant, i.e., schools involved in the Project dramatically improved and schools not involved showed little improvement, if any. In 2004 at the request of both principals and teachers, all schools joined project NPSSIM. Further, in grade 4, initial equivalence/differences across groups can be measured (and accounted for) using students' reading/writing achievement scores. Reading/writing achievement scores have tended to be highly correlated to mathematics achievement scores in Newark, and are not likely to be affected by NPSSIM; therefore, they serve as an ideal covariate. In 2004, the rate of change in reading/writing scores (9.3% increase) for the New Jersey Assessment of Skills and Knowledge of grade 4 (NJASK4) from 2003 was not significantly different than the rate of change in mathematics scores (11.1% increase). In both 2005 and 2006, the rate of change in reading/writing achievement scores (0.7% decrease in 2005 and 2% decrease in 2006) for the NJASK 4 was significantly different than the rate of change in mathematics achievement scores (5.6% increase in 2005 and 3.8% increase in 2006). Considering the lack of improvement of reading/writing achievement scores and the significant gains made by mathematics achievement scores, this preliminary data suggests that the rise in standardized test scores can be attributed to the NPSSIM Project. In comparison to other school districts in the state of New Jersey, NPSSIM has had a significant impact on grade 4 and grade 8 NPS students, as measured by New Jersey's state-mandated NJASK4 (Grade 4) and GEPA (Grade 8) assessments.

The results gleaned thus far provide cause for great optimism. We contend that such projects can and do make a difference in the classroom practices of teachers, and in turn, influence the overall mathematical achievement for students throughout the district.

Endnotes

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