Instructional Policy Issues in Mathematics Education

The recent report of the National Commission on Excellence in Education (1983) decreed the low mathematics achievement of America's youth and recommended that school districts (1) require all students to take a minimum of three years of mathematics in high school, and (2) recruit better-qualified teachers of mathematics. How likely are these policy recommendations to improve mathematics education?

For the past year the Center for Educational Policy and Management at the University of Oregon has been engaged in research involving observation of mathematics teaching in approximately 50 elementary classrooms. The observations and review of research by my colleagues, Glen Fielding and Del Schalock, and me, suggest that the National Commission has oversimplified the problem of improving mathematics education. Improvements need to stem from careful analysis of the instructional policy issues that confront teachers and administrators. Policy makers who ignore these issues are likely to develop solutions that are ineffective or ignored.

Our starting point is the research of Tom Good and Doug Grouws, who identified teaching practices that improve student performance in mathematics as measured by gains on standardized achievement tests (Good, Grouws, and Ebmeier, 1983). They translated the results of their research into an inservice program to help teachers make greater use of these effective practices. In using this inservice pro-

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assignments and correlation of .49 obtained a fourth-grade Grouws' study of "Good and correlation for a very high achievement—a single teaching practice."
“Julian Stanley found that mathematically precocious students in junior high school can learn several years of high school mathematics in just a few weeks over the summer.”

toward mathematics, school absenteeism, and teacher stress from having to deal with recalcitrant learners.

Thus, instructional policy should focus on ways to increase the perceived usefulness of mathematics for students, rather than just increasing course requirements. This goal might be accomplished by hiring school counselors and teachers to conduct career and academic counseling on the utility of mathematics. Luchins and Luchins (1980) found that counselor encouragement was significantly related to the election of advanced math courses by male students, and that teacher encouragement was significantly related to the election of advanced math courses by female students. There is also evidence that high school students perceive a need for such counseling, but counselors do not satisfy it, especially in the case of female students (Richmond, Tucker, and Martin, 1979).

The Instructional Quality Issue

The National Commission’s report noted that the proportion of secondary students taking a general program of study increased from 12 percent in 1964 to 42 percent in 1979. Many of these students take only “general math.” Research has demonstrated that the quality of instruction in this course is much lower than in advanced mathematics courses. Michigan State University researchers found that “teachers lower their expectations for general math students, resulting in a tendency for them to teach general math classes in a distinctly different manner than higher-level algebra classes: with less direct instruction, less goal clarity, less assistance with seatwork, less encouragement, and less opportunity for discussion” (Institute for Research on Teaching, 1983, p. 1).

Finding a solution to these differences in instructional quality will be difficult. A policy of increasing mathematics requirements while ignoring instructional quality is doomed to failure. Low-track students might wind up receiving more of the same thing—poorly taught general math. A policy of recruiting highly qualified mathematics teachers may be no more successful since there is little relationship between teacher characteristics and student achievement in mathematics (Begle, 1979). Rather, better solutions may come from developing a differentiated mathematics curriculum that effectively serves students with different interests and abilities, accompanied by staff development for teachers and administrators and supervision to ensure instructional quality across curriculum tracks.

Conclusion

Policies for improving mathematics education must develop from a careful analysis of classrooms and schools. Students, teachers, and administrators seldom act unilaterally; their instructional behavior is constrained by school norms about academic expectations and instructional quality, by grouping patterns, and by learner characteristics. The National Commission’s recommendations concerning teacher recruitment and course requirements are a good starting point but are not sufficient to overcome these constraints.

Improvement of mathematics education requires instructional policies that address the constraints directly. These policies include schoolwide homework requirements, ability grouping, availability of academic and career counseling, staff development programs on effective teaching practices, and supervision to control instructional quality.

References


