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ABSTRACT

A conference sponsored by the National Institute of Education (NIE) examined some of the issues associated with the shortage of science and mathematics teachers. This report discusses problems related to the shortage and reviews strategies that have been undertaken to alleviate the shortage. Solutions are proposed and priorities are identified. These include: (1) curriculum improvement directed to make instruction more meaningful for the average student; (2) increased research on classroom learning and instruction; and (3) recruitment and retention of more competent teachers in the areas of science and mathematics. (ML)

U.S. Department of Education

The National Institute of Education

RESEARCH IN BRIEF

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Problems in Math and Science Education

How is it that America, which competes so successfully with the rest of the world in the fields of science and technology, is facing a crisis in science and mathematics education?

That is one of many questions experts wrestled with at a conference the National Institute of Education (NIE) sponsored to discuss the shortage of science and math teachers in America's classrooms, a shortage affecting virtually every state in the country. In California, for example, only 97 of 400,000 1982 college students were preparing to teach high school math. In New Hampshire the figure is even more dismal: only one college graduate planned a math teaching career.

NIE's conference on this critical teacher shortage was especially timely because while schools across the nation are requiring students to take more science and math courses in order to graduate, more and more teachers are leaving that field for better paying jobs in high technology industries.

Besides a lack of teachers, America's students also lack basic knowledge about science and math. Students in other industrialized countries spend three times the class hours on science and math that students in this country do. While it isn't necessary for every high school student to be an Einstein, today's technological world does require a basic understanding of science and math. Achievement scores indicate that America's students lack that basic understanding.

The NIE conference not only provided a broader understanding of the problems in this area, but also produced examples of what some schools and industries are doing about the problem.

Houston, Tx., for example, had 47 secondary science and math teaching vacancies in the fall of 1978. By 1982 there were only 3. Houston eased its shortage by making the entire community aware of the problem and by giving stipends to teachers willing to teach in curriculum areas or schools with shortages. The business community has supported the plan and put several million dollars into it.

In Rochester, N.Y., (a high technology center), schools and business have joined hands to increase minority student enrollment in science and math courses. Students enrolled in the program make monthly visits to industrial sites and have after-school activities in which faculty and industry experts participate.

Conference participants discussed various solutions to the problems and concluded that if we are to improve science and math education in this country, educators must do three things:

1) Improve the curriculum to make science and math instruction more meaningful for the average student. Because many students develop a dislike for science in elementary school, merely increasing the number of courses students must take in these areas will not solve the problem. Also, participants agreed that the curriculum needs to be changed to meet the needs of the 'average' science or math student, rather than the gifted one.

The curriculum must provide students with enough basic science and math so that they are capable of using technology in intelligent and appropriate ways. Take the job market, for instance. Ford Motor Co. presently has more than 2,000 robots in their plants. The corporation expects that by the end of this decade (15 short

years) it will have close to 7,000 robots. Future generations must be able to handle technology such as this.

2) Do more research on classroom learning and instruction to improve science and math education. How exactly do teachers teach problem solving? Unfortunately, this is a topic researchers know little about. Conference participants therefore urged more research in this area. NIE, through its Far West Laboratory in San Francisco, already has responded to this recommendation by funding several projects that deal with this subject.

3) Attract and retain more competent teachers in the areas of math and science. To do this, many conference participants advocated restructuring the teaching profession and the duties of teachers (for example have them help develop a curriculum and train other teachers, etc.), and establishing better working conditions and salaries. Starting salaries for teachers are poor compared to those in other science and math related fields. Beginning electrical engineers, for example, start off earning $26,000 per year. Compare this to $14,000 for elementary or secondary school teachers.

The information, ideas and problems which emerged from this conference will be of value to school systems as they deal with these issues and to decision makers who face difficult but important policy challenges.

In order to share the conference proceedings with a wider audience, NIE has published the papers and discussions presented at the conference.

Included in the publication are presentations made by a member of the Army Science Board regarding the trends in science and engineering in the U.S.; a successful precollege education program supported by Argonne National Laboratory; and the use of museums to promote science education.

Dr. Thomas L. Good, a nationally recognized scholar in research on teaching, was principal author of the summary.

Copies of the proceedings, titled 'Teacher Shortage in Science and Mathematics: Myths, Realities and Research,' are available by sending a self-addressed label requesting a copy to Dr. John Taylor, NIE, 1200 19th Street NW, Mail Stop 5, Washington,. D.C. 20208.

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