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1. The Space Age

On October 4, 1957, with the launch of Sputnik 1 by the Soviet Union, the world entered the Space Age and the United States became quite concerned that the Soviet Union had a head start in the space race. A year later, realizing that the support of gifted and talented mathematics and science students was critical to national security, the United States federal government passed the National Defense Education Act (NDEA), providing aid to education in the United States at all levels, primarily to stimulate the advancement of education in science, mathematics, and modern foreign languages. Also, during this time, "new math" was introduced with an emphasis on more abstract concepts and unifying ideas. One of the most unique of the projects developed during that time, the *Comprehensive School Mathematics Program* (CSMP) from McREL, Mid-continent Research for Education and Learning, continues to be available online at http://ceure.buffalostate.edu/~csmp/. Although never fully implemented as intended, some of the "new math" projects along with the NDEA contributed to the dominance of the United States in science and technology in the latter part of the twentieth century as they inspired thousands of students to enjoy mathematical investigations and to pursue degrees in mathematics, science and technology.

On July 16, 1969, the Apollo 11 launched from the Kennedy Space Center and on July 20, 1969, Commander Neil Armstrong became the first man on the moon and said the historic words, "One small step for man, one giant leap for mankind." The sixth and final manned moon landing occurred in December 1972, and the United States declared victory in the space race. For fifteen years, Americans had supported gifted and talented students interested in learning mathematics and science, especially as related to space technology, but what has happened since that time?

2. The Growth of Technology

Partially in reaction to the "new math", the 1970s saw a strong "back-to-basics" movement with an emphasis on basic skills such as computation. In 1980, the National Council of Teachers of Mathematics (NCTM) published *An Agenda for Action* noting that the most important basic skill was problem solving. The following statement, from this same report pointed to the growing recognition of the importance of the development of gifted mathematics students.

> The student most neglected, in terms of realizing full potential, is the gifted student of mathematics. Outstanding mathematical ability is a precious societal resource, sorely needed to maintain leadership in a technological world.
> NCTM, 1980, p. 18

In 1983, The National Commission on Excellence in Education warned in its report, *A Nation at Risk*, that the skills and knowledge of the U.S. workforce would have to improve dramatically in

order for the nation to remain internationally competitive. In 1989, the first President Bush convened an Education Summit with the nation's Governors and adopted six National Education Goals. The fifth goal was: "U.S. students will be first in the world in mathematics and science achievement by the year 2000." In spite of the public acknowledgement of the importance of students with high-level skills in mathematics and science, little has been done in the past 25 years to support our most promising students.

3. The Information Age

In 1993, Richard Riley, the U. S. Secretary of Education, in the introduction to *National Excellence: A Case for Developing America's Talent*, stated, "All of our students, including the most able, can learn more than we now expect. But it will take a major national commitment for this to occur." (Ross, 1993, p. iii) The report goes on to point to a "quiet crisis in educating talented students" with the following statement.

> The United States is squandering one of its most precious resources – the gifts, talents, and high interests of many of its students.
>
> Ross, 1993, p.1

The year after this report came out, the NCTM appointed a Task Force on Mathematically Promising Students to analyze this issue specifically for mathematics. The Task Force agreed that a major national commitment was needed to turn around this quiet crisis for mathematically promising students who were defined as "those who have the potential to become the leaders and problem solvers of the future". The Task Force called for a strategy that seeks to greatly increase the numbers and levels of mathematically promising students by maximizing their ability, motivation, beliefs, and experiences/opportunities. The report pointed out that these four factors are all variables that could and should be increased with proper support and encouragement. Noting research on brain functioning that demonstrates that significant changes in the brain are due to experiences, the report called on administrators, teachers, parents and students themselves to make sure that all students have the opportunity to experience the joy of solving challenging mathematical problems on a regular basis and that high-level mathematics courses are available to all students regardless of where they go to school. Recognizing that the culture in the United States often works against students' desire to excel in science, technology and mathematics, the report also noted the importance of students' realizing that excellence in mathematics is not only possible, but also leads to careers in fulfilling and intriguing areas. (Sheffield, et al, 1995) The recent popularity of the television series *Numb3rs* goes a long way toward supporting this goal, but much more is needed.

4. The Twenty-First Century

By 2000, it was evident that the United States was a long way from the goal of being first in the world in math and science. The Trends in International Mathematics and Science Study (TIMSS) in 1995 and the repeat of the study in 1999 and 2003 showed that not only were we not first, but top students in the United States were not at the same level as top students in other countries. In1995, 9% of U. S. fourth graders and 39% of Singapore fourth graders scored above the 90^{th} percentile on the mathematics portion of the TIMSS test. That year, 5% of U. S. eighth graders and 45% of Singapore eighth graders scored above the 90^{th} percentile on the TIMSS mathematics test. By 2003, 40% of the eighth grade students in Singapore, 38% of eighth graders in Taiwan, and 7% of U. S. eighth graders scored at the most advanced level. Although this was

an improvement for students in the United States, it was still far behind other developed countries.

Similar results were found by the Program for International Student Assessment (PISA). In 2003, U.S. performance in mathematics literacy and problem solving was lower than the average performance for most OECD (Organization for Economic Co-operation and Development) countries. Even the highest U.S. achievers (those in the top 10 percent in the United States) were outperformed on average by their OECD counterparts. (National Center for Education Statistics, 2003)

The *No Child Left Behind Act of 2001* had as a major purpose that all students reach proficiency on challenging state standards and assessments, closing the achievement gap between high and low-achieving students. But what happens to students for whom moving toward proficiency is moving backwards when there is a goal to close the achievement gap between high and low-performing students?

In a study of the effects of teachers and schools on student learning, William Sanders and his staff at the Tennessee Value-Added Assessment System put in this way:

> "Student achievement level was the second most important predictor of student learning. The higher the achievement level, the less growth a student was likely to have." DeLacy, 2004, p. 40

Certainly one way to close the achievement gap between high and low-performing students is to slow down the learning of high-performing students, but is that a goal that we can afford?

> The United States is losing its edge in innovation and is watching the erosion of its capacity to create new scientific and technological breakthroughs. …If America is to sustain its international competitiveness, its national security and the quality of life of its citizens, then it must move quickly to achieve significant improvements in the participation of all students in mathematics and science.
> Business-Higher Education Forum, 2005, p. 1, 3

In 2005, the Annual Conference of the National Association of Gifted Children (NAGC) featured a special strand on Mathematics and Science with a keynote address by Jim Rubillo, the Executive Director of the National Council of Teachers of Mathematics and Gerry Wheeler, the Executive Director of the National Science Teachers Association, and NAGC appointed a Math/Science Task Force to continue this work. If the United States is to maintain leadership in this technological world, it is critical that we collaborate to take immediate drastic action to recognize, support, create and develop the mathematical promise in large numbers of students and their teachers - male and female; black and white; preschool through graduate school; rich and poor; rural and urban. As we approach the fiftieth anniversary of Sputnik and the National Defense Education Act, let's join together to inspire a new generation of students to excel in these areas critical to the welfare of our country and indeed of the entire world.

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