

## CONFERENCE FOCUS

# A CHALLENGE TO ALL: RAISING THE PARTICIPATION AND SUCCESS OF WOMEN AND MINORITIES IN MATHEMATICS, SCIENCE, AND TECHNOLOGY

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This issue of our journal is the product of a Virginia Mathematics and Science Coalition (VMSC) conference titled, "Programs That Work" and held in March, 2000 on the issues of raising both the levels of success and the levels of participation of women and minorities in mathematics, science, and technology. Traditionally, these two groups have had low rates of participation in these subjects, and we believe this situation can and must be changed. The conference was to Coalition's first direct assault on the problem.

### **The Need for Change**

At the dawn of the millennium, we can see that ours is a highly technological age. Basic knowledge and literacy in the areas of science, mathematics, and technology is often required for informed private action and responsible civic life, and a high percentage of today's most rewarding careers require substantial levels of accomplishment in these areas. This holds true for professions ranging from telephone technicians to futures traders on Wall Street, from health professionals to designers of web pages. The nation's continued growth in this new economy demands a work force possessing levels of knowledge in the areas of science, math, and technology that are beyond those of any previous generation.

Without the education and skills required by the new technologically dominated economy, students will be denied access to rewarding and lucrative career possibilities. The costs to society of an underdeveloped work force are equally great. For example, our state and national economies are straining today with hundreds of thousands of high-tech positions that remain unfilled because of a shortage of qualified technical employees. This shortfall weakens the companies needing to hire and slows our nation's overall economic development.

Virginia's schools do a wonderful job of preparing our students for their futures. Unfortunately, however, women, African-Americans, and Latino-Americans have traditionally entered the technical fields at lower rates than those of other groups. To give just one example

of this, we observe a fact that is visible in engineering and computer science departments at most American colleges and universities. These departments have low percentages of minority undergraduates, and the scarcity of faculty from these groups is striking. To the extent that we fail to develop the scientific talents of these students, we also fail to develop one of our great resources for economic development and creativity.

### **Moving Forward**

Members of the VMSC strongly believe that many more students can be successful in mathematics and science. The question is how to go forward.

Too often, invisible barriers exist that keep more people from entering the fields of mathematics and science. A striking example of this is the almost universal neglect of girls in class question-and-answer sessions, as noted in Professor Sterling's journal article entitled, "What Does Research Suggest About Successful Programs for Women and Minorities?" featured in this issue. Female students are called upon much less frequently than are males, and their answers elicit relatively shallow responses from their teachers. Except for trained observers, few people are aware that this difference in treatment occurs. In mathematics and science classrooms, many of the students' rewards come with the feelings of pride and accomplishment at the moment of insight when they first understand "how it works." In light of this and the different treatment that girls receive, it may be more than coincidental that both authors have bright daughters who announced at an early age that they were not interested in science. These factors and their effects must be better understood by all in positions to help.

Professor Sterling of George Mason University began the conference by presenting current research concerning the barriers that limit participation and success in mathematics and science, as well as findings on what works to raise levels of success. President Freeman Hrabowski of the University of Maryland Baltimore County (UMBC) gave a moving address on the Meyerhoff Scholars program at UMBC and the remarkable success they have had in educating African-American males who now are reaching the highest levels of excellence in science. Former astronaut and University of Virginia Professor of Engineering Kathryn Thornton spoke on conflicts and opportunities faced by women scientists who are also wives and mothers.

The essential core of the conference was a focus on action, grounded by eleven exemplary Virginia projects that are raising the levels of student achievement in science, mathematics, and technology. Articles and interviews describing the work done in these “Programs that Work” are featured in this issue. These programs, their successes, and their leaders provide the strongest evidence that more students can succeed and that intelligent actions of individuals can make a difference. At the conference, representatives of these programs made presentations and held poster sessions describing their projects and their results. It is our hope that these programs will serve as models for similar efforts across Virginia.

On the second day of the conference, participants focused on policies and actions that can support greater student success. We believe that change occurs through individual actions, but that it will not become permanent and widespread unless it is sustained with systemic policies and support. Starting from this premise, participants formulated recommendations for action by the VMSC. These recommendations appear at the end of the special section of this issue.

Attendees noted on their evaluations that the conference had been a great success. It marked the moment when the VMSC raised questions of equity to the highest levels in its ongoing efforts to improve mathematics, science, and technology education for all students.

We thank all the individuals and organizations that helped make the conference possible. Dominion Resources Services, a long time supporter of the Coalition, hosted the conference at their outstanding training facility in Chester, Virginia. Virginia Secretary of Education Wilbert Bryant spoke to the group and helped us honor the Programs that Work in an awards ceremony. The Collis-Warner Foundation and the IBM Corporation provided generous financial support. Cindy Balderson, Bill Haver, and LaRay Mason did a wonderful job in organizing the conference; Cindy and LaRay did an equally impressive job of running the conference, together with Tracy Pettit and Amy Troup from the University of Virginia’s Center for the Liberal Arts.

To all these, and especially to the conference attendees, we extend our thanks. The conference was the first step of many for the Coalition down the challenging road of educational change. ■