Science, Technology, Engineering and Mathematics (STEM): How bad is the crisis in STEM education – and what can we do?

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1. Jobs requiring STEM degrees are projected to increase four times as fast as overall job growth. Many job openings will not be filled by United States citizens (BHEF 2005).

2. K-12 students from the United States perform below students from other industrialized countries on international tests of math and science. In the report issued Dec. 4, 2007 by the Organization for Economic Cooperation and Development, the US was classified as "statistically below OECD average" in both science knowledge and mathematics in the 2006 PISA survey of 400,000 15-y.o. students in 57 countries!

3. Within the United States, there is an achievement gap between under-represented minority students and majority students at a time when underrepresented groups are becoming an increasing proportion of the national labor force.

4. Less than 40% of students intending to major in STEM fields upon college entrance actually complete a degree in these fields. For underrepresented minorities the rate is below 25%.

5. Internationally the US has far fewer STEM graduates compared to other industrialized countries.

6. Foreign STEM graduates are working less in the United States due to increased immigration regulations and increased resources in their countries of origin.

7. The 2007 report *Rising above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future* states: In a world where advanced knowledge is widespread and low-cost labor is readily available, U.S. advantages in the marketplace and in science and technology have begun to erode. A comprehensive and coordinated federal effort is urgently needed to bolster U.S. competitiveness and pre-eminence in these areas. [We make] four recommendations along with 20 implementation actions that federal policy-makers should take to create high-quality jobs and focus new science and technology efforts on meeting the nation's needs, especially in the area of clean, affordable energy:
    - Increase America's talent pool by vastly improving K-12 mathematics and science education;
    - Sustain and strengthen the nation's commitment to long-term basic research;
    - Develop, recruit, and retain top students, scientists, and engineers from both the U.S. and abroad;
    - Ensure that the United States is the premier place in the world for innovation. Some actions will involve changing existing laws, while others will require financial support that would come from reallocating existing budgets or increasing them.

9. The Business-Higher Education Forum issued its second report *An American Imperative: Transforming the Recruitment, Retention & Renewal of Our Nation's Mathematics and Science Teaching Workforce* in 2008. Based on US projections of 280,000 *new* math and science teachers needed by 2015, it recommends a coordinated reform effort involving the federal and state governments, school districts, higher education, business and foundations. Specifically, it states that, "it is critical for the business community and higher education to become more actively engaged in efforts to improve mathematics and science teaching. BHEF calls on leaders from these two groups to influence, energize, and drive change."

Sources and Recommended Reading:

To understand the crisis in STEM education and its relationship to business and higher education download these reports: Business-Higher Education Forum (2005), A Commitment to America's Future: Responding to the Crisis in Mathematics and Science Education [the source for many of the above facts]; BHEF (2008), An American Imperative: Transforming the Recruitment, Retention & Renewal of Our Nation's Mathematics and Science Teaching Workforce. http://www.bhef.com

The four TIMMS reports and Video Study reports can be accessed at http://nces.ed.gov/timss/. This longitudinal data documents trends. A detailed analysis and comparison of these data and the OECD PISA results (next entry) is also available.

To review the OECD PISA 2006 results, download its brochure, and examine plans through 2015, visit www.pisa.oecd.org.

The National Science Teachers Association provides an overview of the *National Science Education Standards*, the current reform in Science Education and the way that research indicates science should be taught at http://www.nsta.org/standards.

For an overview of the *National Council on Teaching Mathematics Standards*, the current reform in Math Education and the way that research indicates mathematics should be taught, go to http://www.nctm.org/standards.

Need some additional "good quotes" to help make your points in grantwriting? Try these:

Upstate NY was well represented for years by Congressman Sherwood Boehlert, longtime chair of the House Science Committee. That committee commissioned the report "Rising above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future." A powerful tool and a continuing guide to the public and private sectors, this report's Executive Summary is available online at http://www.ppinys.org/innovation/nas-gatheringstorm-sum.pdf and several other sites. The complete report can be downloaded for personal use at http://books.nap.edu/openbook.php?isbn=0309100399.

The current administration has developed detailed agenda summaries to guide policy priorities and action. Those provided under Education http://www.whitehouse.gov/agenda/education/ and Technology http://www.whitehouse.gov/agenda/technology/ make strong statements about the need for committed action to make math and science education a national priority, and to prepare all our children for the 21st century economy.