

Innovation and Competitiveness: Keys to our Nation's Prosperity Recommendations for Scientists, Technicians, Engineers, and Mathematicians

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For the last year, I was an Albert Einstein Distinguished Educator Fellow in the office Congressman Rush Holt, one of two physicists in Congress. When I arrived in Washington, Members of Congress and key stakeholders were talking about Tom Friedman's book *The World Is Flat*, as well as multiple reports of a similar nature. The books and reports tend to agree that there is an emerging global *knowledge* economy that will include knowledge creators and users, as well as those who supply the resources to create, use, and share *knowledge*. Our ability to prosper in this global community is dependent on our ability to be active participants in the *knowledge* economy.

What role will the U.S. assume in this global knowledge economy? We are still trying to find our place. What actions are necessary to keep the competitive edge of our nation sharp? This is the challenge that faces not only our nation's leaders, but individual citizens—among them, scientists!

In 2005, Congress charged The National Academies' Committee on Science, Engineering, and Public Policy to determine concrete steps to keep America competitive in the 21st Century. The committee's recommendations were released in a report titled *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*. The Executive Summary includes the following:

This nation must prepare with great urgency to preserve its strategic and economic security. Because other nations have, and probably will continue to have, the competitive advantage of a low wage structure, the United States must compete by optimizing its knowledge-based resources, particularly in science and technology, and by sustaining the most fertile environment for new and revitalized industries and the well-paying jobs they bring (pg. 4).

A strong education system which produces citizens with the capability to think critically and make informed decisions—based on technical and scientific information—as well as which nurtures students who pursue innovative and creative work in scientific and technical fields, is critical in a knowledge-driven economy.

In 2001 our high school graduation rate was 68%, with students from historically disadvantaged minority groups having a 50-50 chance of graduating. As the current minority becomes the new majority, students suffering at the low-end of the achievement gap will not necessarily consider college, let alone the pursuit of a scientific or technical degree, the very fields that determine our competitiveness. In concert, nations around the globe *are* making necessary changes to augment their number of scientific and technical professionals to be competitive and innovative in the emerging global knowledge economy.

Members of the AAS have a role as citizens in our democracy, and a duty as scientists, to be involved in the future of our nation. To set the stage, according to the National Science Board's *Science and Engineering Indicators 2006*, the American public:

- Has an appreciation for the benefits of science and technology

However,

- Lacks a firm grasp of basic scientific facts and concepts
- Does not understand the scientific process
- Has not experienced a change in the level of understanding in the last few years
- Believes in pseudoscience
- Receives most of their information about science and technology from television

What can a scientist do to address the above troubling indicators? To begin, communicate with, and engage the public in, a discourse about the culture and practice of science. This is a necessity; scientific research is often supported by taxpayer dollars. As the public understanding and enjoyment of science and its practitioners grows, one can envision the federal budget for research and development growing as well. Do you think that you already do this? I think not, or at least not enough. In a 2005 survey, 82% of Americans said they did not *personally know* a scientist.

Here are a few areas to consider as avenues for engaging the public and communicating what scientists contribute to society:

Outreach

Outreach is offering to be of service to the public, and can take many forms. For example, you could run for a local political office such as the school board,

volunteer with organizations serving youth or adults, or volunteer at the library, museum, after school programs, or a program of your own creation.

Professional Societies

Until recently, I was against professional societies. In particular, I saw the annual dues as wasted money until I came to Washington D.C., where I observed and experienced professional societies being the voice for science in the clamor of advocacy and lobbying in Washington. Professional societies are conduits for outreach opportunities, educational experiences, networking, and professional development. There are multiple roles that one can assume within professional societies to have an impact on the public or the scientific community. How involved are you with your society—the AAS?

Congressional visits

Invite your Member of Congress to visit your department or laboratory, meet your graduate students and post docs, and tour your facilities. Are you funded by federal research dollars? Your results are the returns on the taxpayers' investment. You should also come to Washington D.C. and experience the environment in which our nation crafts legislation and meet the staff member who handles science as well the Member of Congress.

Education

Given the state of education in America, the opportunities for scientific professionals to contribute to education are, shall we say, astronomical. A few examples include hiring teachers who have no scientific experience to do research (if you have never *experienced* the process of science, it's hard to properly *teach* the process of science); offer to be of service to local schools and teachers; invite schools to tour your department or laboratory; collaborate with schools of education to create scientific and mathematical teacher professional development programs. If you are teaching, learn the latest research on how students best learn science and adapt your courses accordingly.

I have only scratched the surface of actions that science professional can do to keep America competitive, and to maintain our nation's prosperity, in the growing global knowledge economy. A web page of resources has been crafted for you to explore these issues further (www.astroed.org/koolbeck.shtml). In addition, please feel free to email me with questions or to engage in a more in-depth discussion (koolbeck@gmail.com).