

**Oral testimony to
the House Science and Technology Committee
Subcommittee on Research and Science Education
by
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Workforce Steering Committee
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Thank you, Mr. Chairman, Ranking Member Ehlens and members of the subcommittee. I am honored to speak on behalf of the Aerospace Industries Association, which represents this nation's major aerospace and defense manufacturers and their more than 631,000 high-wage, highly skilled employees. I chair AIA's Workforce Steering Committee and lead The Boeing Company's Human Resources function. One of my responsibilities is ensuring that our company and industry help develop the future workforce.

Today I would like to focus on what can be done at the undergraduate and graduate levels to strengthen the pipeline of students who enter and stay in the STEM disciplines.

We in the aerospace industry are concerned about the United States' ability to sustain its leadership role in technology and innovation. As the need for complex problem-solving accelerates globally, this country faces a competitive gap that we can close only if more of our young people pursue careers in STEM-related fields. Unless we can close this gap, it will have grave implications for our nation's competitiveness, security, and defense industrial base.

Today, the average age of the U.S. aerospace workforce is 45, and it continues to increase. We expect that approximately 20 percent of our current technical talent will be eligible to retire within the next three years. In the very near future, our companies and our nation's aerospace programs will need tens of thousands of engineers—in addition to those joining the workforce today.

These are already becoming difficult jobs to fill not because there is a labor shortage but because there is a skills shortage. This is especially acute in the U.S. defense industry because many government programs can employ only U.S. citizens. Of the positions open in the aerospace and defense industry in 2009, two-thirds required U.S. citizenship. Yet less than 5 percent of U.S. bachelor's degrees are in engineering, compared with about 20 percent in Asia, for example.

Our pipeline of qualified U.S. STEM workers is too small: Of nearly 4 million children who start pre-school in the United States each year, only about 25 percent of them go on to complete basic Algebra in junior high, only 9 percent declare a STEM major at the undergraduate level, only 4.5 percent actually graduate with a STEM-related degree, and only 1.7 percent graduate with an engineering degree—and not all engineering degrees are applicable to aerospace.

On a positive note, certain institutions of higher education have increased their retention rates of students who enter engineering programs from 50 percent to greater than 80 percent. These successful programs typically feature similar key ingredients: From the time a student steps on campus, he or she is pulled into a group of students, as part of this cohort has direct interaction with a professor who wants to see this team succeed, and performs hands-on work starting as a freshman. Often, costly remedial education is involved.

The underlying problem with the STEM pipeline, though, starts much earlier. Children whose imaginations are sparked by someone who reveals the possibilities of math or science tend to gravitate toward STEM-related interests. When this happens, that person is typically an inspiring teacher. Too often, it doesn't happen at all, because today, many who teach STEM classes lack degrees in the fields they teach: Some 58 percent of middle-school math teachers and 68 percent of middle-school science teachers are neither proficient nor certified in these subjects.

The influence of parents and media is also profound. In the media 10% of characters are scientists or engineers, and of those 70% are negatively portrayed. This negatively influences children, who spend an average of 7 hours and 38 minutes a day engaged in media, according to the Kaiser Family Foundation.

Let me just note here that AIA is in the process of tackling one of the biggest barriers—the perception of the STEM disciplines. AIA and Boeing are collaborating with the Entertainment Industries Council, which has played a critical role in shaping people's perspectives about smoking, seat belts and mental illness, just to name a few. We are now working together to support accurate depictions of how engineers and scientists are portrayed in mainstream media.

The AIA and its members have developed the following recommendations to strengthen undergraduate and graduate education to support our industry:

- First, encourage and expand scholarships and other forms of financial aid as well as retention programs for undergraduate STEM students—so that U.S. institutions of higher education successfully graduate a lot more of those students who initially pursue STEM disciplines.

- Second, encourage and incentivize the preparation of STEM-certified primary and secondary-school teachers—with a goal of ensuring that U.S. colleges and universities produce enough qualified secondary teachers of science and math.
- Third, help motivate our youth to pursue STEM-related careers by enhancing support for two- and four-year institutions that provide students with hands-on experience that is directly transferable to the workplace.
- And fourth, motivate the media, parents, and teachers to provide a positive view of STEM careers.

I want also to emphasize the importance of measuring the impact of our investments in STEM education. Right now the AIA is doing an inventory of our company programs to assess the impact of our investments by the first quarter of 2010. We are also working to coordinate this process with other industries through a STEM Coalition of Coalitions. We encourage the federal government to also considering measuring the impact of its investment in STEM education programs and scaling up those that show positive outcomes. The Business Higher Education Forum has developed a model that can help identify where we can strategically invest to make a difference to improve the STEM pipeline.

Mr. Chairman, Mr. Ehlens and members of the committee, thank you for the opportunity to testify before this important panel.

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