



Tom Luce Testimony
Senate Committee on Commerce, Science, and Transportation
Hearing on America Wins When America COMPETES: Building a High-Tech Workforce
Thursday, May 6, 2010

Importance of Science, Technology, Engineering, and Math (STEM)

STEM fields offer the fastest growing and highest paying jobs in our economy. More than 50 percent of the fastest growing jobs in the United States are in STEM fields¹ and the science and engineering workforce has shown sustained growth for over a century. STEM jobs continue to grow much faster than the rest of the U.S. workforce² and workers with science and engineering degrees earn more than comparable workers.³ These statistics illustrate that math and science education is absolutely critical to ensuring the country's economic prosperity. Math and science are creating a pipeline for more competitive workers and providing opportunity for future generations.

Currently, students in the U.S. perform below students from other industrialized countries in math and science. In a report issued by the Organization for Economic Cooperation and Development (OECD), the U.S. was classified as "statistically below OECD average" in both science knowledge and mathematics on the 2006 PISA survey. Just as troubling, according to the Bureau of Labor Statistics, a mere five percent of U.S. college students graduate from college in math and science fields, compared to 42 percent in China.

Making STEM Education Work

To close this gap, we must scale what works. For years, we've been pursuing pilot program after pilot program, but we have yet to make a lasting difference. Scaling effective, proven programs is the only way we will change an education system with over 50 million schoolchildren.

The federal government can play a key role in this improvement of STEM education by identifying what works and providing incentives to scale those interventions at a national level. Congress and the Administration can also take several other steps to facilitate this change.

¹ U.S. Department of Labor, Bureau of Labor Statistics, Occupational Outlook Handbook, 2008-09 Edition.

² National Science Board, Science and Engineering Indicators 2010.

³ National Science Board, Science and Engineering Indicators 2010.

- 1) Congress should continue holding schools accountable for math and science by including accountability provisions in these subjects in any reauthorized version of the law.
- 2) Congress should work with the National Science Foundation (NSF) to more aggressively pursue education reform and provide support for states in implementing STEM strategies. Most importantly, Congress should work to provide an avenue for NSF to scale its most promising investments. This will ensure that the important work funded by NSF will be replicated and expanded to make a lasting difference in STEM education.
- 3) The federal government should provide priority points for STEM in all competitive education programs.
- 4) Congress should fund expansion of programs that work, such as the UTeach Program and the Advanced Placement Training and Incentive Program.

Scaling Works – Specific Examples of Success

The National Math and Science Initiative (NMSI) was launched in 2007 by top leaders in business, education, and science to reverse the troubling decline in American math and science education. NMSI is dedicated to dramatically impacting the U.S. public school system by replicating programs nationally that have documented success in math and science education. Inaugural funding for NMSI was provided by the Exxon Mobil Corporation, the Bill & Melinda Gates Foundation, and the Michael & Susan Dell Foundation.

According to the Business-Higher Education Forum, there will be a shortfall of more than 280,000 highly qualified math and science teachers by 2015. It is clear that talented math and science teachers with strong content knowledge are urgently needed in classrooms across the country to help our students reach their full potential. To address this urgent need, NMSI identified two initial programs to scale nationwide: the UTeach Program and the Advanced Placement Training and Incentive Program.

The UTeach Program transforms the way universities prepare math and science teachers. Developed at The University of Texas at Austin in 1997 to change the way colleges and universities recruit, prepare, and inspire new math and science teachers, this highly effective program recruits math and science undergraduate majors to pursue a teaching career. UTeach graduates enter teaching at much higher rates than regular College of Education teachers and stay in teaching at much higher rates than the national average. In fact, 92 percent of UTeach graduates become teachers, and 82 percent are still in the classroom after five years.

In 2006, The University of Texas Austin had 450 students enrolled in its UTeach Program. In 2007, NMSI partnered with the UTeach Institute and led an aggressive, intentional scaling effort funded by the private sector to expand the UTeach Program to additional universities. By 2009,

UTeach was expanded to 13 campuses and had over 2,600 students enrolled in the program across the country. This year, NMSI and the UTeach Institute were able to add a second cohort, bringing the UTeach Program to a total of 22 campuses this fall. The 22 universities replicating UTeach will prepare over 4,500 math and science teachers by 2015 and 7,000 by 2018. These new STEM teachers will have an impact on more than 20 million students over the course of their teaching careers.

However, more can be done. There is incredible demand and high growth potential for the program. In 2007, NMSI had 52 universities apply to replicate the UTeach Program and was only able to fund 13 sites. We've raised money to expand the program to additional campuses, but demand continues to increase. Currently, over 50 Association of Public and Land Grant Universities have committed to doubling their STEM teacher preparation production. Three state university systems have pledged to bring STEM teacher preparation reform to their state systems: the California University System, California State University System, and the Maryland system. Most of these universities still need the tools to help them meet the goal of bringing programs like UTeach to their campuses.

A program to fund the replication of the successful UTeach Program was authorized under the 2007 America COMPETES legislation, but was not funded. That program, Teachers for a Competitive Tomorrow, needs to be funded. The federal government has the unique opportunity to leverage the investments already made by the private sector to expand access to even more universities. The private sector has responded, the universities have responded, the students are willing – what is urgently needed now is federal funding to make much more progress possible.

The other successful program NMSI has worked to bring to scale is the Advanced Placement Training and Incentive Program (APTIP). This program impacts the existing teacher corps by providing training to AP teachers and provides immediate opportunity for high school students to master college level work. APTIP increases teacher effectiveness and student achievement through a multi-faceted, comprehensive approach that includes: training, teacher and student support, vertical teaming, open enrollment, and incentives. Expanding Advanced Placement courses is a matter of equity, equal access, and equal opportunity for all students. APTIP empowers high-need, underrepresented students to succeed in rigorous math and science courses. This change transforms expectations for students and significantly improves college-readiness.

In 2007, APTIP was only available in Texas. Since 2007, NMSI has scaled it to six additional states: Alabama, Arkansas, Connecticut, Kentucky, Massachusetts, and Virginia. We have impacted more than 30,000 students and trained over 1,000 teachers. In NMSI's first school year (2008-09), NMSI schools had a 52 percent increase in AP exams passed in math, science, and English, which is over 9 times the national average. At the same time, NMSI schools showed a 71.5 percent increase in AP exams passed by African American and Hispanic students in math, science, and English. These results show that expanding this proven program could help reduce the minority achievement gap in our country.

But more can be done. With additional resources to leverage the private investments in the success of these programs, NMSI will be able to bring the benefits to thousands of more students nationwide.

It is this kind of systemic change that will increase the quality and quantity of our STEM graduates and ensure that the U.S. economy will thrive in the 21st century.