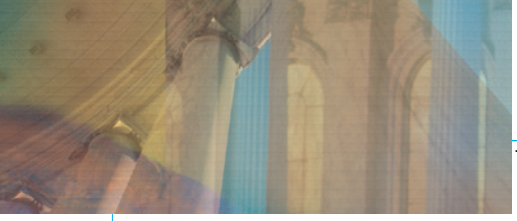


Closing the Gap: Addressing STEM Workforce Challenges

Few people know better than higher education professionals about the power of technological innovation to reinvent the ways in which we learn and work. With advances in mobile technology, online learning platforms, and open-course content, colleges and universities can now bring education to students' fingertips, literally. Moreover, IT-skills-heavy jobs are some of the fastest-growing and best-paying jobs available, and technological know-how is becoming increasingly important for performance in *any* job. In order to harness the promise of technology to deliver improved educational outcomes and sustained economic growth, however, the United States must face a critical workforce-development challenge: in the country today, there are simply not enough people with the high-tech skills needed to fill open positions in tech-dependent fields. Innovative recruiting and training strategies are not enough to address these workforce challenges. Innovative policies are needed too.

Let's consider computing professions. By the end of the decade, the U.S. economy will annually create 120,000 new jobs requiring a bachelor's degree in computer science,[1] yet the country's higher education system is currently producing only 51,000 such degrees per year.[2] Unemployment rates also point to an overheated marketplace for high-tech workers. The unemployment rate in computer-related occupations is 3.4 percent, markedly below the national unemployment rate (8.1%) and lower than the unemployment rate among bachelor's degree holders (4.1%).[3]

Higher education institutions' IT departments are not immune to these workforce shortages. Indeed, they may feel these challenges more acutely. In addition to competing with the private sector for very few applicants, colleges and universities offer relatively lower compensation. Unless the country changes course, its education system simply will not produce enough people for the high-tech positions that colleges, universities, and companies like Microsoft depend on to make their organizations successful and competitive in a globalized marketplace.

New Coalition, Smart Policy

In light of these challenges, over 40 business and education organizations recently formed the coalition inSPIRE STEM USA (http://www.inspireSTEMusa.org) to promote policies linking immediate high-skilled immigration reform with long-term investments in science, technology, engineering, and math ("STEM") education. This two-pronged approach, which involves increasing fees on industry for employment-based visas to fund new investments in STEM education, offers a comprehensive solution to addressing the IT workforce-development challenges that affect colleges and universities as well as the private tech sector.

The coalition believes that multiple policy approaches are needed to meet long-term IT workforce challenges: improve K–12 STEM education, as well as support more students to complete postsecondary degrees in STEM fields. To fill the jobs that the increasingly technology-dependent U.S. economy demands, we must broaden access to STEM education, especially in high schools. Even though computing occupations are projected to represent 51 percent of all STEM jobs by 2018,[4] only nine states recognize computer science for core high school graduation credit. Furthermore, only 24,782 students in the United States took the Advanced Placement (AP) computer science exam in 2012, representing less than 0.7 percent of all AP exams taken, down from 1.6 percent in 2000.[5]

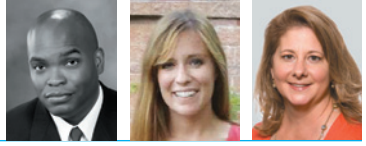
These deficits in the STEM education pipeline spill over into higher education. Compounding these challenges, budget deficits in many states have hampered public universities' ability to expand access to STEM degrees. At the University of Washington, for example, more than two-thirds of qualified applicants for the Department of Computer Science and Engineering were turned away in 2011 due to capacity constraints.[6]

Currently, private and public employers alike rely on temporary work visas for foreign nationals to plug workforce gaps. Yet even these resources have failed to keep up with demand. The annual allotment of 65,000 H-1B visas has been exhausted every year since 2004; in 2013, the available H-1Bs were gone in five days. Moreover, though foreign nationals represent a significant portion of graduate students in STEM fields, including 49 percent of all students enrolled in graduate computer science programs,[7] restrictive high-skilled immigration policies often force U.S.-educated foreign STEM students to leave the United States after graduation.

For both private and public employers, IT workforce challenges are twofold. First, the education system is not producing enough graduates with technology degrees to keep up with economic demand, a problem that begins at the K–12 level and spills over into higher education. Second, even with stop-gap immigration programs in place, these too are insufficient to keep pace with the demand for high-tech talent. This is why it makes sense to employ a two-tiered approach to our nation's workforce-development challenges in STEM.

Prospects for Congressional Action

The U.S. Congress appears poised to act on the pressing need for a serious re-thinking of high-skilled workforce-development strategies. Co-sponsored by a bipartisan group of over two dozen senators, the Immigration Innovation (or "I-Squared") Act of



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2013[8] boldly attempts to tackle the urgent high-skills gap crisis by providing a needed link between short-term immigration-based reforms and long-term investments in the domestic STEM education pipeline. Of particular interest to the education community, the I-Squared bill would create a new, dedicated source of funding for state-level investments in STEM education by asking private employers to chip in a bit more for employment-based visas.

How would the I-Squared reforms work? The bill would increase the number of H-1B visas and green cards available each year, and it would increase employers' H-1B training fee (from which higher education institutions are already exempt), generating as much as $500 million annually to fund STEM education initiatives at the K–12 and higher education levels. These fees would be deposited in a "Promoting American Ingenuity Account" to fund a variety of state-led initiatives aimed at improving STEM education attainment.

The Promoting American Ingenuity Account offers a tremendous opportunity for the K–12 and higher education communities to address pipeline issues in STEM. Funds would be distributed to all states based on the poverty-based Title I formula in the Elementary and Secondary Education Act. Depending on states' plans, funds generated by additional fees on employment-based visas could provide a boost for colleges and universities looking to tackle some of the biggest obstacles to STEM degree attainment. Innovative schools could direct awarded funds toward targeted STEM investments, including recruiting additional STEM faculty, establishing or expanding programs to increase STEM enrollment among women and underrepresented minorities, increasing support services to improve degree completion, and bringing additional technological tools into the classroom. As an outcomes-based funding program, the Promoting American Ingenuity Account would allow leaders in higher education to devise and execute bottom-up strategies to expand STEM education enrollment, a project in which CIOs and other IT leaders would undoubtedly play an important role.

What does the future hold for high-skilled immigration and new STEM education investments? The fate of I-Squared will likely follow the fate of comprehensive immigration reform. Encouragingly, the Senate's "Gang of Eight" included much of the spirit of the I-Squared bill in the omnibus immigration reform legislation released in April. The Gang of Eight bill, however, allocated only $50 million toward STEM education investments, one-tenth of what the I-Squared bill proposed. As Microsoft General Counsel Brad Smith stated in his testimony before the Senate Judiciary Committee: "While I'm pleased to see a STEM fund included in [the Gang of Eight] bill, a more robust national education fund would go further in growing the pipeline of qualified workers and keeping these high skilled, high wage jobs in the U.S. There is a real opportunity before us to address the threats to employment and economic competitiveness our country faces at its source, and we need to ensure the level of our investments in STEM are sufficient to make a long-term difference."[9]

The future of high-skilled immigration reform and STEM education funding is far from certain. We invite technology and education stakeholders to join inSPIRE STEM USA to press lawmakers to keep industry-funded investments in STEM education as a key part of ongoing immigration reform discussions.

Conclusion

Insufficient capacity in the nation's STEM education pipeline poses workforce challenges for higher education and companies alike, but more fundamentally, it jeopardizes the nation's future economic competitiveness and threatens to leave a generation of young Americans behind. STEM jobs rank among the best-paying and fastest-growing jobs in the 21st-century economy, but we must expand the STEM education pipeline and equip more students with the skills to seize these opportunities. We must pass new legislation in order to expand this pipeline. inSPIRE STEM USA supports the Immigration Innovation Act of 2013 as a promising step toward needed workforce-development strategy reforms, linking targeted, short-term immigration reforms with long-term, broad-based investments for STEM education. The nation's IT employers—from Silicon Valley to colleges and universities, big and small—should pay close attention to the immigration reforms unfolding in Congress in order to ensure that investments in STEM education remain a critical element of reform. A high-skilled, high-tech workforce depends on it. ■

Notes

1. This estimate is based on the U.S. Bureau of Labor Statistics' occupational employment and job openings data, projected for 2010–2020 (available at http://www.bls.gov/emp/).
2. Integrated Postsecondary Education Data System from the U.S. Department of Education's National Center for Education Statistics (available at https://webcaspar.nsf.gov).
3. U.S. Bureau of Labor Statistics, Labor Force Statistics from the Current Population Survey (available at http://www.bls.gov/web/empsit/cpseea30.htm).
4. Anthony P. Carnevale, Nicole Smith, and Michelle Melton, *STEM: Science, Technology, Engineering, Mathematics* (Washington, D.C.: Georgetown Center on Education and the Workforce, 2011), p. 18, http://www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/stem-complete.pdf.
5. The College Board, AP Program Summary Report 2012, http://www.collegeboard.com/student/testing/ap/exgrd_sum/2012.html.
6. Stuart Glascock, "The Cost of Engineering's Capacity Problem," *The Trend in Engineering* (Spring 2012), http://www.engr.washington.edu/news/trend/spr12_capacity.html.
7. National Science Foundation, *Science and Engineering Indicators 2012*, Chapter 2: "Higher Education in Science and Engineering," http://www.nsf.gov/statistics/seind12/c2/c2h.htm.
8. I-Squared Act of 2013, S. 169, 113th Cong. (2013).
9. Brad Smith, "The Border Security, Economic Opportunity, and Immigration Modernization Act, S.744," testimony before the U.S. Senate, Committee on the Judiciary, April 22, 2013, http://www.judiciary.senate.gov/pdf/04-22-13BradSmithTestimony.pdf.

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