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STEM education

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Increased student interest and proficiency in STEM topics needed



Nicola Soares

STEM education has been a huge focus in conversations about education. There is a continuing need to address the U.S.'s falling rankings in STEM subject areas on a global basis and schools need to do a better job of getting students engaged in the STEM topics. Kelly Services, a leader in providing workforce solutions, compiled information from studies by the U.S. Department of Labor, the National Science Foundation and the Bureau of Labor Statistics to take a look at some recent trends in STEM and some forecasting for the future of STEM, as it relates to career prospects, student proficiency and interest in STEM education in our schools.

Trends in K-12 and higher education science and math preparation, along with demographic and labor supply trends, highlight a serious challenge: the U.S. needs to increase the supply and quality of workers who have specialized skills that will enable them to work productively within the STEM industries and occupations.

According to the U.S. Department of Labor: "We must build a STEM-proficient workforce. The U.S. economy needs a large and increasing supply of workers who can routinely use scientific, technological,

engineering and mathematical knowledge and skills in their jobs; this knowledge fuels innovation and entrepreneurship. The nation's ability to solve problems and propel economic growth will therefore depend on cultivating a future workforce that is STEM-proficient."

So what are the current trends?

STEM Career Trends

The top STEM occupations in May 2011 were related to information technology — seven of the top 10 occupations, with the top three being computer support specialists, software developers, and computer systems analysts. Civil engineers and mechanical engineers rounded out the top 10.

The Science, Technology, Engineering and Math related fields are many and diverse. All STEM related occupations are anticipated to increase from 2008 to 2018. In fact, the total change in STEM careers over the 10 year span is 16.8 percent, compared with a 10.1 percent increase in U.S. employment in general over that time. The biggest increase will be seen in the category of computer specialist occupations, which are forecasted to jump 22.4 percent.

The demand for biomedical engineers is projected to grow by 72 percent through 2018 — by far the fastest growth rate for a single STEM occupation.

STEM Student Trends

In 2008, nearly 35 percent of college freshman expressed an interest in a STEM major — a fairly consistent stat since 1993, however over this period the percentage of freshman interested in computer sciences dropped from a peak of 5.2 percent in 2000, down to only 1.5 percent in 2008.

The number of STEM bachelor's degrees rose steadily from 366,000 in 1993 to 485,000 in 2007. Bachelor degrees in STEM subjects have consistently remained at roughly one-third of all bachelor degrees during this period.

Many students never make it into the STEM pipeline because of inadequate preparation in math and science or poor teacher quality in their K-12 systems. Of the 2005 high school graduates who took the ACT test, for example, only 41 percent achieved the College Readiness Benchmark in mathematics and 26 percent achieved that benchmark in science (ACT 2006). We, from the business community and



Increased student interest and proficiency in STEM topics needed *continued*



education community, need to have better alignment between school curriculum and workforce planning to create a system that reflects the real world need of employers and students.

Clearly, the most likely pool of candidates to pursue STEM majors in college and STEM careers down the road are those who are both proficient in mathematics and interested in STEM. Of total students, only 17.3 percent fall into that category. By far the largest category of students — 42.1 percent — fall into the non-math proficient, non-STEM-interested category. Obviously these students are the least likely to pursue STEM majors and careers.

Many of the students who are qualified academically for postsecondary STEM studies, do not pursue STEM topics beyond high school. Why is that? They might be dissuaded by disappointing postsecondary experiences, high tuition or demanding coursework.

In 2009, about 40 percent of men with STEM related college degrees worked in STEM jobs; only 26 percent of women do. Female STEM majors are twice as likely as men to work in education or in healthcare — one in five STEM college-educated women will pursue those careers.

STEM Teachers Trends

There are approximately 1.7 million elementary school teachers, very few of whom are specialists in STEM subjects, and about 1.3 million middle and high school teachers. Out of those, only 477,000 are estimated to have a main teaching assignment within mathematics or science in K-12 public schools; 426,000 of those teach in middle or high schools.

Each school year, there is considerable turnover in the STEM teaching force. If recent trends continue, about 25,000 math and science teachers can be expected to leave the profession annually. Nearly two-thirds cite job dissatisfaction as their reason for leaving — many due to a lack of professional support.

The overall supply of mathematics and science teachers nationally has been rising to meet total demand, but unfortunately, there are regular imbalances on the local level. Schools in low income, urban areas, in particular, often do not have access to specialized teachers. In part, this is due to the fact that STEM teachers migrate to better paying jobs at schools with better funding. However, organizations like the National Academy Foundation (NAF) work to change this by engaging employees from companies across the country to support their Academies of Engineering and IT in urban areas by volunteering in classrooms, acting as mentors, connecting NAF students with paid internships and serving on local Advisory Boards.

Through a four year partnership with NAF's Academies of Engineering and IT, Kelly Services has been able to expand outreach efforts to encourage career interest in these critical disciplines by offering internships that enable students to connect real world applications back to the classroom. Kelly has also been able to offer IT scholarships to graduating Academy of IT students to pursue higher education in IT, as well as engineering grants to Academies of Engineering for special school engineering projects.

However, the issue is not just the quantity of STEM teachers, but the crucial issue of quality. Many existing STEM teachers today lack the necessary attributes associated with great STEM teachers: 1) deep content knowledge, and 2) strong pedagogical training specific to STEM.

Conclusion

Government, industry and education have begun to respond to the needs in STEM with strategies in place to increase the number of qualified STEM teachers and also to generate interest in STEM subjects in early education students.

The Federal Government spends about \$1 billion on K-12 STEM education through agencies such as the National Institutes of

Health (NIH), National Science Foundation (NSF), and the Department of Education. Industry associations, individual firms, foundations and other organizations have been identified in an effort to fill in the gaps. Much work remains to be done, both within government and across diverse sectors, to ensure that the U.S. education system and the workforce rise to the STEM challenge. ■

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References:

"Science, technology, engineering and mathematics (STEM) occupations: a visual essay." BLS Monthly Labor Review, May 2011

"The STEM Workforce Challenge." US Department of Labor, 04/2007

"Prepare and Inspire: K-12 education in science, technology, engineering and math (STEM) for America's future." President's Council of Advisors on Science and Technology, September 2010

"Women in STEM: A Gender Gap to Innovation." US Department of Commerce, Economics and Statistics Administration, 08/2011

Bureau of Labor Statistics

"Science & Engineering Indicators: 2010." National Science Foundation.



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