

Common Definition of STEM Jobs Ignores Millions of Skilled Workers, Researcher Says

By Larry Swisher

The most commonly used definition of science, technology, engineering, and mathematics (STEM) occupations ignores three-fourths of all workers whose jobs require a high level of STEM knowledge and skills—about 19.5 million workers—a Brookings Institution economist said July 18.

A recent study published by the Washington, D.C., nonprofit research group, which analyzed skill requirements for more than 700 occupations, found that 26 million jobs in 2011, equaling 20 percent of total U.S. employment, require a high level of knowledge in at least one STEM field, according to Jonathan Rothwell, a Brookings associate fellow and the study's author.

By contrast, under the National Science Foundation's definition, only 6.5 million people, or about 5 percent of the workforce, are employed in STEM jobs, Rothwell told a luncheon meeting of the National Economists Club. NSF's description of the scientific and engineering workforce is the most prominent definition of STEM jobs developed by federal agencies, he said.

“I think we need a new approach” to defining and identifying STEM jobs, he said.

His study, *The Hidden STEM Economy*, which was released in June, presents a “new, more rigorous definition” of STEM occupations, based on analysis of a unique, little known database funded by the Labor Department and compiled from annual surveys of workers in all occupations about their job requirements.

The O*NET program provides a database for researchers and the basis for the Employment and Training Administration's career exploration tools, which can be used by workers and students looking to find or change careers, according to DOL.

Half of STEM Jobs Lack Bachelor's Requirement

Since 1950, the share of U.S. workers employed in STEM jobs has increased to 20 percent from about 15 percent, and that figure is expected to continue to grow, Rothwell said.

Of the 26 million workers employed in STEM occupations in 2011, roughly 13 million were employed in jobs that do not require a bachelor's degree, while the NSF definition identified only about 1.2 million such workers, he estimated.

In addition, NSF's definition leaves out millions of STEM workers whose jobs require a college education, he said.

“I believe there are roughly 11.8 million STEM workers in occupations that do not require a bachelor's degree that are not counted by the NSF and another 7.7 million STEM workers in occupations that do require a bachelor's degree or higher,” Rothwell told BNA.

He said there are “two STEM economies” that both play vital roles in innovation and the overall economy and that complement each other.

One is the well-known professional STEM economy, which is closely linked to graduate school education, maintains close links with research universities, and functions largely in the corporate sector.

The “hidden STEM economy,” on the other hand, draws workers from high schools, workshops, vocational schools, and community colleges, and includes high-skilled jobs in health care, manufacturing, and construction.

The largest single STEM field in terms of employment is architecture and engineering (13.5 million), followed by life, physical, and social sciences (12.0 million), mathematics (7.5 million), and computer-related fields (5.4 million), according to the study. Some of these and other STEM jobs require a high level of knowledge in more than one field.

Possible ‘Class Bias’ Cited

Rothwell said the problem with NSF's definition is that it “seems arbitrary” and is not based on an objective standard for the level of knowledge required in STEM jobs.

For example, medical doctors are not considered STEM workers, although they use scientific knowledge extensively, he said.

Also, he said, in NSF's definition of the scientific and engineering workforce, “there seems to be something of a class bias,” because occupations categorized as STEM jobs under NSF's definition are primarily professional ones.

Omitted are a large number of skilled workers in the health care industry and traditionally “blue-collar” jobs in manufacturing, construction, and installation, maintenance, and repair, Rothwell said.

Many of these workers use high levels of STEM knowledge in their jobs but do not have a bachelor's degree, including chemical technicians, water and wastewater treatment plant and system operators, medical and clinical laboratory technicians, nuclear power reactor operators, and radiation therapists.

Many Jobs Require Less Education, Training

Although half of all STEM workers have less than a college education and earn above-average wages, only 20 percent of the \$4.3 billion spent annually by the federal government on STEM education and training goes to support community colleges and other programs at the sub-bachelor's degree level, Rothwell said.

By contrast, 45 percent of the federal funding supports careers at the bachelor's degree or higher level.

Rothwell recommended that policymakers place more focus on the community college level and on education, training, and retraining programs that require only one or two years of study but that provide the opportunity to place workers in STEM jobs, which pay wages about 10 percent higher than non-STEM jobs with similar educational requirements.

“The optimistic take-away” from his study is that students and trainees can obtain the high level of knowledge needed for good-paying STEM jobs through less than the four years of postsecondary education typically required for a bachelor's degree, he said.

Policymakers have an opportunity “to boost recruitment and retention and [job] placement rates” of students and adults at community colleges and other programs, he said, citing evidence that job vacancies in STEM occupations are taking longer to fill.