GEORGETOWN UNIVERSITY
Center on Education and the Workforce

EXECUTIVE SUMMARY

STEM

SCIENCE
TECHNOLOGY
ENGINEERING
MATHEMATICS

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Executive Summary

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Science, Technology, Engineering, and Mathematics (STEM) occupations are critical to our continued economic competitiveness because of their direct ties to innovation, economic growth, and productivity, even though they will only be 5 percent of all jobs in the U.S. economy by 2018.[1] The disproportionate influence of STEM raises a persistent concern that we are not producing enough STEM workers to compete successfully in the global economy. We find that this concern is warranted—but not for the reasons traditionally claimed.

High and rising wage premiums are being paid to STEM workers in spite of the increasing global supply. This suggests that the demand for these workers is not being met.[2] Indeed, with the exception of some PhD-level researchers in academia, the demand for workers in STEM occupations is increasing at every education level. The STEM supply problem goes beyond the need for more professional scientists, engineers, and mathematicians. We also need more qualified technicians and skilled STEM workers in Advanced Manufacturing, Utilities and Transportation, Mining, and other technology-driven industries.

Innovation and technology change have led to demand for STEM competencies beyond traditional STEM occupations.[3] Previously, STEM work had been concentrated among an elite few workers. Today, competencies necessary for innovation are scattered across a wider swath of the economy. STEM competencies are needed in a broader reach of occupations, and their use is growing outside of STEM. What's more, people within these occupations that use STEM competencies most intensely are earning significantly more than those who are not.

The concern for STEM shortages tends to focus on the possibility of an insufficient supply of STEM workers, but the deeper problem is a broader scarcity of workers with basic STEM competencies across the entire economy. Demand for the core competencies is far greater than the 5 percent traditional STEM employment share suggests, and stretches across the entire U.S. job market, touching virtually every industry. Since 1980, the number of workers with high levels of core STEM competencies has increased by almost 60 percent. Further, in all but two occupational clusters, the rate of growth in demand for these core STEM competencies has increased at far greater rates than the growth in employment.[4]

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[1] STEM includes Computer occupations (computer technicians, computer programmers, and computer scientists), Mathematical Science occupations, Engineers and Engineering Technicians, Life and Physical Science occupations, and Architects, Surveyors, and Technicians. We do not include social scientists and we do include sub-baccalaureate technical workers as STEM workers.

[2] When discussing supply and demand for STEM workers, we use "supply" and "demand" as shorthand for relative supply and relative demand.

[3] We define STEM competencies as the set of cognitive knowledge, skills, and abilities that are associated with STEM occupations. We also include and analyze noncognitive work interests and work values associated with motivation and high performance in STEM occupations.

[4] Sales and Office Support and Community and Arts are the exceptions. The U.S. labor force grew by 44 percent, while high-level core STEM employment in Managerial and Professional, STEM, and Healthcare Professionals increased by 73 percent, 175 percent, and 79 percent respectively between 1980 and 2008.

Growth of demand for STEM competencies is especially strong in occupations in fast-growing industries like Professional and Business Services and Healthcare Services. At the same time, technology change in industries like Manufacturing, Mining, and Utilities and Transportation is reducing overall employment but increasing demand for STEM competencies among the more highly skilled workers who remain.

As a result, we find that the demand for traditional STEM workers will only grow. In our projections, STEM is second only to Healthcare as the fastest-growing occupational category in the economy.[5] But we also find that the occupations competing for STEM workers are growing rapidly, too. In fact, the occupations that poach top STEM talent are also among the fastest-growing and highest-paid in the economy. The intensifying demand for STEM competencies contributes to a process that we call diversion. We define diversion as a process through which both students and workers steer away from STEM degrees and STEM careers for numerous reasons. Diversion is both voluntary and involuntary and students and workers divert at various points throughout K-12 and postsecondary education as well as in the workforce.

The diversion of native-born STEM talent into non-STEM educational and career pathways will continue and likely accelerate in the future. This diversion of native-born STEM talent may contribute to an increasing reliance on foreign-born STEM talent among American employers.[6]

THE GROWING DEMAND FOR STEM TALENT ALLOWS AND ENCOURAGES THE DIVERSION OF STUDENTS AND WORKERS WITH STEM COMPETENCIES.

- Some of the voluntary diversion we describe occurs in the K-12 education system. Our K-12 education system produces enough talent in math and science to fill our need for traditional STEM workers, but more than 75 percent of these students do not enter STEM majors in college.[7]
- Students also fall out of the STEM pipeline while in college (38% of those students who start with a STEM major do not graduate with one).[8, 9]
- Immediately after graduation, 43 percent of STEM graduates do not work in STEM occupations.[10]

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[5] There is some discrepancy in how we rank the fastest-growing occupations, and this is related to how we rank Healthcare. We can split Healthcare into two separate occupational categories: Healthcare Support occupations and Healthcare Professional occupations. If we keep Healthcare as one broad group, STEM is the second-fastest growing occupational cluster. However, if we list Healthcare Support and Healthcare Professional occupations separately, then STEM is the third-fastest growing cluster.

[6] Without sufficient reform of the rules regarding the selection of prevailing wages for H-1B visas, the likelihood of added downward pressure on wages within these occupations remains high.

[7] The ability of U.S. students to transition outside of their initial field of study, and later at several points in their career, is a mark of the immense flexibility of opportunities in the U.S. labor market. In Europe, for example, the connection between education and training is far more rigid, as many of their apprenticeship programs link education and career training with occupations at a much earlier age, and are more difficult to transition out of.

[8] Compared with other fields of study, STEM majors are "middle-of-the-road" in terms of attrition of its graduates into other fields (if we remove the sub-baccalaureate STEM workers). For example, the comparable rate for teachers is substantially higher at the beginning of their career, while those in the computing fields have the highest retention rates later in their career (defined as 10 years into the workforce).

[9] Many students drop out of the STEM pipeline between high school and college, or in college. These students either do not enroll in college or do not complete a degree—any degree. Thirty percent of students who score in the top quartile on a math skills test in high school, clearly demonstrating abilities in STEM, do not have any college degree eight years after graduating high school. This represents an enormous pool of talent from which we could potentially draw to get more workers with STEM competencies. Almost half of students in the second quartile on the same test do not have a college degree eight years after graduating high school.

[10] These numbers only include students with Bachelor's degrees. Our diversion analysis details only Bachelor's degrees.

- STEM attrition continues 10 years into the workforce, as 46 percent of workers with a Bachelor's degree in STEM have left the field, oftentimes for higher paying managerial roles.[11]

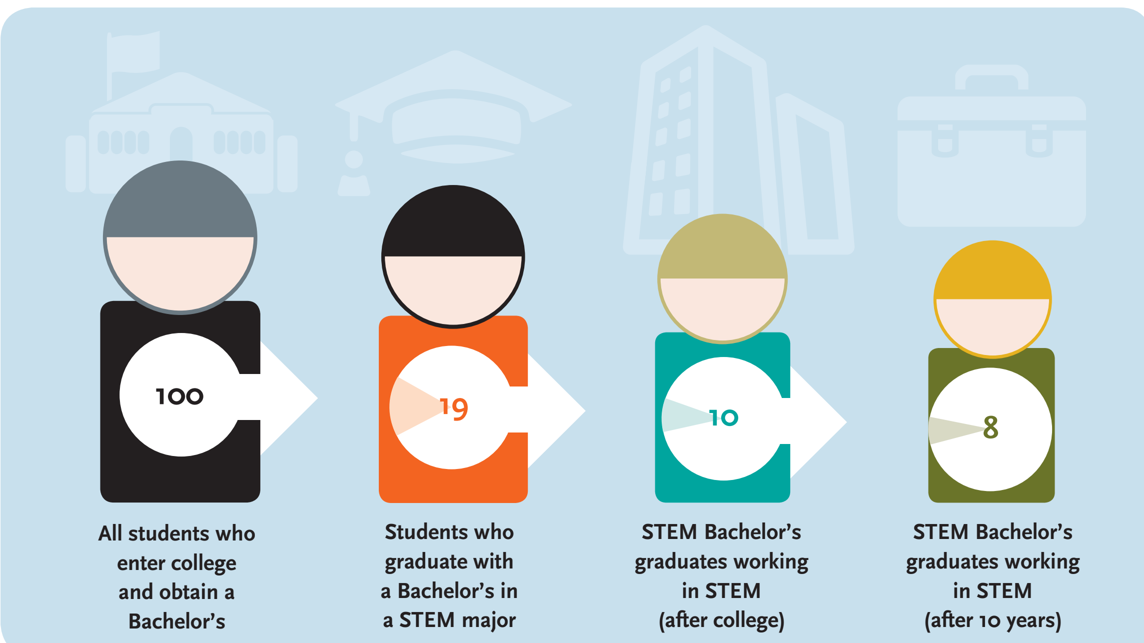
Diversion of domestic STEM talent away from STEM occupations is driven by three interconnected factors:

1. There is a set of core cognitive competencies (knowledge, skills, and abilities) associated with STEM.[12] These core cognitive STEM competencies exist in an increasing share of highly-paid and prestigious non-STEM occupations.[13]

2. Many potential STEM workers never work in STEM occupations, or leave them, because they have *work interests* and *work values* that are more compatible with other careers.[14]

The core work interests associated with STEM occupations are Realistic and Investigative interests. People with these work interests enjoy practical, hands-on problem-solving (Realistic) and working with ideas and solving problems (Investigative), but there are other work interests that compete for STEM talent, including Artistic interests (focused on self-expression); Social interests (focused on the well-being of others); Enterprising interests (associated with selling and leading); and Conventional interests (associated with highly ordered work environments).

Similarly, the work values associated with STEM are Achievement, Independence, and Recognition, but there are other work values that compete for STEM talent such as Relationships (valuing friendly, noncompetitive work environments),



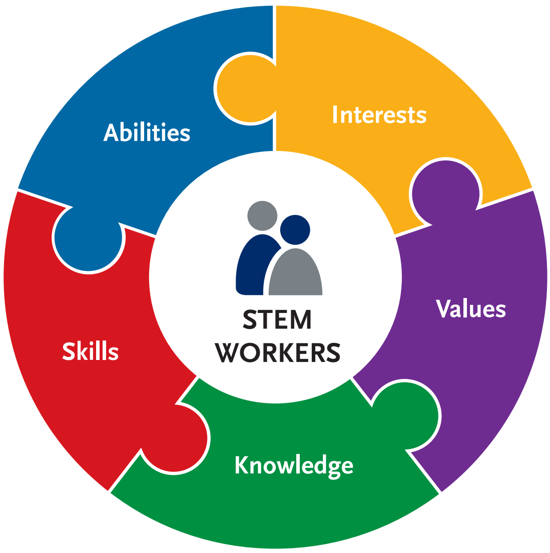
[11] Oftentimes, managers are still working in field, but these workers are counted as managerial workers. However, in most cases, an individual would not have had an opportunity to perform this job without previous STEM training.

[12] Our analysis of STEM competencies relies on the Occupational Information Network (O*NET) administered and updated by the Department of Labor/Employment and Training Administration, Version 14.0.

[13] This is not to suggest, of course, that all STEM competencies are transferable across the economy. Indeed, we are at this point referring to the subset of knowledge, skills, and abilities (defined later) traditionally associated with STEM occupations that are increasingly demanded by many other types of employers outside of STEM occupations.

[14] We identify STEM work values and STEM work interests as noncognitive competencies required for success in the occupation. This is a point of contention with many of our reviewers. While interests and values are usually characteristics of an individual, we extend this notion as a personal characteristic required for an individual to be successful in an occupation.

Support (valuing supportive management), and Working Conditions (valuing job security and good working conditions).



3. While STEM earnings are high relative to most other occupations, students and workers with STEM cognitive competencies have access to superior earnings and career choices, especially in Managerial and Professional and Healthcare Professional occupations.

OUR ANALYSIS SHOWS THAT TRADITIONAL STEM JOBS HAVE GROWN FASTER THAN JOB GROWTH OVERALL FOR DECADES, AND THE FUTURE PROMISES MORE OF THE SAME.

Through 2018, the share of STEM occupations in the economy will grow to 5 percent, up from 4.4 percent in 2005—a growth in the number of STEM jobs from 6.8 million in 2008 to 8 million by 2018.[15] STEM occupations will grow far more quickly than the economy as a whole (17% versus 10%), and will be the second-fastest growing occupational cluster, after Healthcare occupations.[16]

We find that over the same period, there will be 2.4 million job openings in STEM: 1.1 million net new STEM jobs and 1.3 million STEM job openings to replace STEM workers who permanently leave the workforce.[17]

STEM workers are employed in highest concentrations in the Professional and Business Services industry, while the bulk of Engineers and Engineering Technicians are in Manufacturing.

THE VAST MAJORITY OF STEM JOBS REQUIRE SOME FORM OF POSTSECONDARY EDUCATION OR TRAINING.

- By 2018, 92 percent of traditional STEM jobs will be for those with at least some postsecondary education and training, the third-highest educational concentration among all the occupational clusters after Education and Healthcare Professionals.
- Close to two-thirds of STEM job openings will be for those with Bachelor's degrees and above (65%).
- By 2018, roughly 35 percent of the STEM workforce will be comprised of those with sub-baccalaureate training,[18] including:
  - 1 million Associate's degrees,
  - 745,000 certificates, and
  - 760,000 industry-based certifications.

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[15] It is difficult to pinpoint exactly how many STEM workers are ideal for increasing innovation economy-wide. In theory, we should continue to add STEM workers and STEM jobs as long as each additional worker produces added value. We limit our measure of STEM demand to the more prosaic standard of projected job growth in industries and occupations that employ traditional STEM workers.

[16] Please see footnote 5.

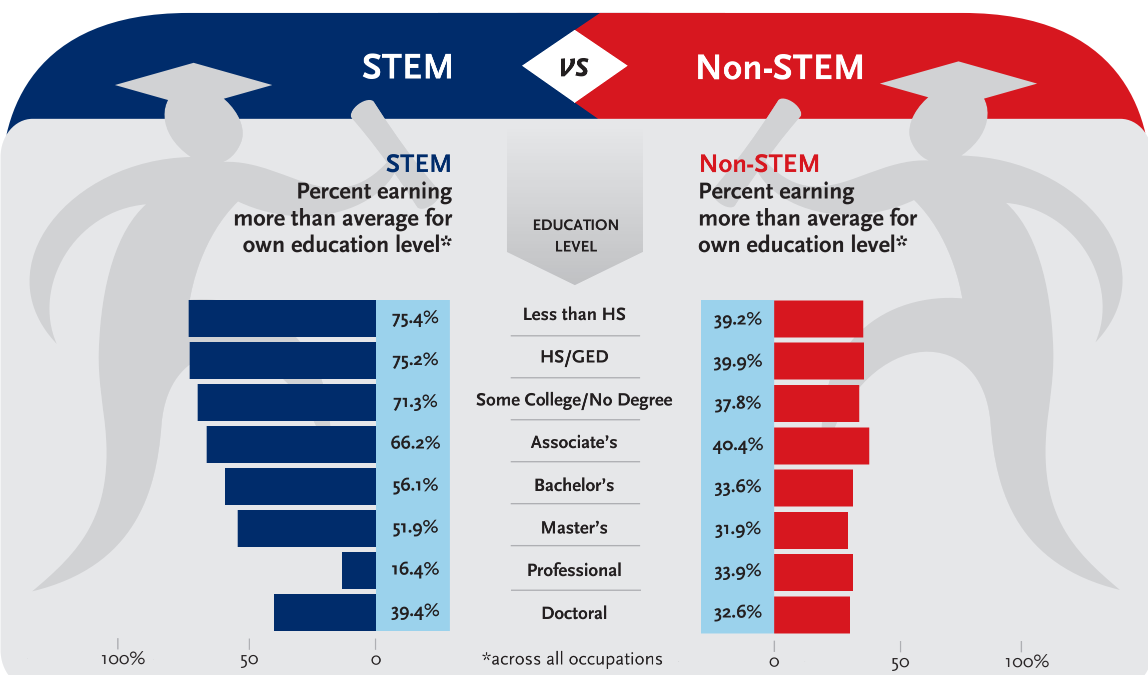
[17] In the Georgetown University Center on Education and the Workforce's 2010 report, *Help Wanted: Projections of Jobs and Education Requirements Through 2018,* we project 2.8 million STEM jobs by 2018. The *Help Wanted* report includes social science workers in STEM, while this STEM report excludes social scientists from our definition of STEM.

[18] Including those with a high school diploma and high school dropouts.

- Many STEM occupations also require industry-based certifications, especially Computer and Engineering and Engineering Technician occupations.
- Undergraduate STEM majors, especially Life and Physical Science majors, have extremely high rates of graduate degree attainment. Fifty-four percent of Biology and Life Science majors go on to graduate school, as do 48 percent of Physical Sciences majors.[19]

WE FIND THAT STEM WAGES ARE HIGH AND HAVE KEPT UP WITH WAGES AS A WHOLE OVER THE LAST 30 YEARS.

- Although some STEM jobs, such as PhD jobs in academia, face oversupply, rising relative wage advantages of STEM sub-baccalaureate, STEM Bachelor's, and STEM graduate degrees suggest increases in the relative demand for STEM competencies.
- STEM workers have earnings advantages at nearly every level of educational attainment. In fact:
    - Over 75 percent of STEM workers with less than a high school education make more than the average for workers with less than a high school education;
    - Over 75 percent of STEM workers with a high school diploma make more than the average for workers with a high school diploma;
    - Over 71 percent of STEM workers with some college but no degree make more than the average for workers with some college but no degree;
    - Two-thirds (66%) of STEM workers with an Associate's degree make more than the average for workers an Associate's degree;
    - Over 56 percent of STEM workers with a Bachelor's degree make more than the average for workers a Bachelor's degree;
    - Over half (52%) of STEM workers with a Master's degree make more than the average for workers with a Master's degree.
- People with an undergraduate major in STEM make substantially more over their lifetimes than non-STEM majors, by about $500,000 ($1.7 million versus $2.2 million).



[19] For those with a terminal Bachelor's degree working full-time, full-year.

- Wages for Engineers and Engineering Technicians have grown at 18 percent since the early 1980s. This wage growth is slow relative to that of all other workers, yet the average salary for Engineers and Engineering Technicians ($78,000) is higher than all other STEM occupations.

BUT AT THE SAME TIME, WAGES IN HEALTHCARE PROFESSIONAL AND MANAGERIAL AND PROFESSIONAL OCCUPATIONS HAVE GROWN FASTER THAN STEM WAGES, ESPECIALLY AT THE GRADUATE LEVEL.

- STEM majors can earn more over their lifetimes in some non-STEM occupations than in STEM occupations.
- At the Bachelor's and graduate degree level, while STEM workers start out with high wages after college, midcareer earnings for many Managerial and Professional occupations surpass those for STEM. By age 35, STEM workers with a graduate degree make about $50,000 less than Healthcare Professional workers with a graduate degree. For Bachelor's degree-holders, Managerial and Professional workers make about $10,000 more than STEM workers by midcareer (but STEM workers at the Bachelor's degree level still do better than Healthcare Professionals at the Bachelor's degree level).

IN SPITE OF THE GLOBALIZATION OF THE STEM ENTERPRISE, OUR STEM WORKFORCE STILL OVERWHELMINGLY DRAWS FROM WHITES AND MALES, ESPECIALLY AT THE MOST SENIOR LEVELS.

Women and minorities continue to be underrepresented in STEM occupations relative to their position in the labor market as a whole. Only 23 percent of workers in STEM are women, compared with 48 percent of workers in all occupations. African-Americans and Latinos are underrepresented relative to their share of workers in all occupations, while Asians are a larger share of STEM workers than they are in the labor force in general.[20]

Women and minorities are also paid less than their White male counterparts in STEM, even when they work the same number of hours. However, the earnings gaps are smaller in STEM than in other occupations, and compared with other occupations, women and minorities are better compensated in STEM.

Racial/ethnic and gender diversity in STEM is still lacking, although Asians are a notable exception. In fact, Asians outearn their White male counterparts in all STEM occupations.

Recently, women have become the majority in certain STEM majors, including Biology and Statistics and Decision Science (they are also a large portion of all Mathematics majors). However, they have yet to translate their gains in school into good-paying jobs. Women are strong in majors

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[20] See George, Yolanda S., et al. "In Pursuit of a Diverse Science, Technology, Engineering, and Mathematics Workforce: Recommended Research Priorities to Enhance Participation by Underrepresented Minorities." *American Association for the Advancement of Science, and National Science Foundation* (2001). Web.; and Malcom, Shirley M., Yolanda S. George, and Virginia V. Van Horne, Eds. *The Effect of the Changing Policy Climate On Science, Mathematics, and Engineering Diversity*. Washington, DC: American Association for the Advancement of Science, 1996. Print. Mason, Mary Anne. "Better Educating Our New Breadwinners: Creating Opportunities for All Women to Succeed in the Workforce." The Shriver Report: A Woman's Nation Changes Everything. Ed. Heather Boushey and Ann O'Leary. Washington, DC: Center for American Progress, October 2009. 160-194. http://www.americanprogress.org/issues/2009/10/pdf/awn/a_womans_nation.pdf (accessed August 2, 2011).

that lead to careers in Healthcare occupations but are less-represented in the occupations of Engineering and Physical Sciences.

Powerful demographic shifts in American society will have a significant impact on STEM employment going forward. The continued underrepresentation of women and minorities in STEM poses a serious challenge to both economic efficiency and democratic and social equity.

WE HAVE BEEN USING A STRATEGY OF RELYING ON FOREIGN-BORN WORKERS TO PLUG THE LEAKS IN OUR STEM PIPELINE.

Foreign-born workers account for 17 percent of all STEM workers, compared with 12 percent in labor force as a whole.[21] In some STEM occupations, foreign-born workers make up even more of the STEM labor force—for example, 25 percent of all Physical Scientists are foreign-born. Foreign-born workers often start as foreign-born students, who then stay in the United States to work.

- 44 percent of students on F-1 student visas were here to study STEM in 2008.
- 63 percent of foreign-born students in STEM fields are in graduate programs.
- 59 percent of PhD recipients in engineering fields in 2009 were foreign-born.
- The share of the foreign-born workforce in STEM has more than doubled in the last 60 years, from 7 percent in 1950 to 16 percent in 2000 to 17 percent in 2008.
- Increasingly, foreign-born STEM workers are from Asia. Fifty-nine percent of foreign-born workers in STEM occupations were from Asia in 2000.
- Foreign-born STEM workers are more likely than other foreign-born workers to become naturalized citizens.

We are relying heavily on the foreign-born workforce to fill our STEM jobs. Whether we can continue to employ this strategy as wages become more competitive in other countries remains an open question. It is unlikely that we will continue to be able to successfully compete for the top international talent.

GOING FORWARD, WE WILL NEED MORE WORKERS WITH STEM COMPETENCIES—BUT NOT NECESSARILY TRADITIONAL STEM WORKERS IN TRADITIONAL STEM JOBS.

As the nature of innovation changes, the cognitive competencies traditionally associated with STEM are intensifying in a host of non-STEM occupations. The dispersion of cognitive competencies outside of STEM has resulted in an artificial shortage—not of workers, but of workers with STEM competencies. In school and in the labor market, the pull of wages, personal interests, work interests and work values has allowed STEM talent to divert away from STEM occupations and into other occupations, such as Healthcare Professional and Managerial and Professional, which demand similar cognitive competencies. This diversion has put a significant strain on the STEM workforce at the most elite levels.

Concern for the supply of the highest-performing STEM workers tends to point toward strategies targeted at relatively small portions of American students among our top science and math performers. However, these elite workers are not the

[21] Although it would be ideal to compare domestic STEM workers with guest workers, foreign-born students on work visas, and foreign-born workers, it is almost impossible for independent researchers to determine the exact number of guest or student workers on various types of F-1, H-1B visas, and other visas that permit work. Throughout the report we use data on foreign-born workers. We believe that there is a positive correlation between foreign-born workers and guest-workers who eventually go through the legal permanent resident (green card) and citizenship process.

entirety of the STEM workforce. The growing demand for STEM competencies outside traditional STEM occupations requires a more broad-reaching strategy in the American K-16 education system. The dialogue on the adequacy of our STEM workforce ultimately leads to the more comprehensive conversation about American education.

While many remain focused on a small cadre of elite STEM workers, more than a third of all jobs in STEM through 2018 will be for those with less than a Bachelor's degree. There is increasing demand for STEM talent at the sub-baccalaureate level and our education system has, thus far, not adequately produced these workers. Going forward, our Career and Technical Education system will need a stronger STEM curriculum at the high school and sub-baccalaureate level that is more tightly linked with competencies necessary for STEM jobs.

The STEM workforce will remain central to our economic vitality well into the future, contributing to innovation, technological growth, and economic development. Capable STEM students, from K-12 all the way through the postgraduate level, will be needed in the pipeline for careers that utilize STEM competencies and increase our innovative capacities.

We cannot win the future without recognizing the growing need for STEM competencies across the economy. We need more STEM talent—but not only for traditional STEM workers in traditional STEM occupations.

Our STEM analysis also includes state-by-state data. By state, we find that Washington, D.C., has the highest proportion of STEM jobs nationwide, while California has the highest number of STEM jobs. The states with the fastest rates of STEM growth are Virginia, Nevada, and Utah.

**For more information,
please see the STEM State-Level Analysis
available at cew.georgetown.edu/STEM.**

STEM COMPETENCIES

KNOWLEDGE CLASSIFICATIONS are content domains familiar to educators. Examples include mathematics, chemistry, biology, engineering and technology, English language, economics and accounting, clerical and food production.

SKILLS are competencies that allow continued learning in a knowledge domain. They are divided into content, processing, and problem-solving skills. *Content skills* are fundamental skills needed to acquire more specific skills in an occupation. These include reading comprehension, active listening, speaking, writing, mathematics, and science. *Processing skills* are procedures that contribute to the more-rapid acquisition of knowledge and skills. These include critical thinking, active learning, learning strategies, and monitoring self-awareness. *Problem-solving skills* involve the identification of complex problems and related information required to develop and evaluate options and implement solutions.

ABILITIES are defined as enduring and developed personal attributes that influence performance at work. In the parlance of education psychology, these closely approximate "aptitudes." O*NET divides abilities broadly into categories such as creativity, innovation, mathematical reasoning, and oral and written expression. Each of these broad abilities is subdivided into component elements. For example, innovative abilities include fluency of ideas, problem sensitivity, deductive reasoning, and inductive reasoning. Other abilities include oral expression, spatial orientation, and arm-hand steadiness.

WORK VALUES are individual preferences for work outcomes. Important outcomes for individuals include recognition, achievement, working conditions, security, advancement, authority, social status, responsibility, and compensation.

WORK INTEREST is defined as individual preferences for work environment. Interests are classified as realistic, artistic, investigative, social, enterprising, and conventional. Individuals who have particular interests—artistic interest, for example—are more likely to find satisfaction in occupations that fit with those interests. Of course, an incumbent can have an artistic interest and not be in an occupation where s/he is able to exercise that interest (for example, accounting is an occupation that is not the best outlet for artistic interest). However, O*NET allows us to identify which interests can be fulfilled in which occupations—for example, that an incumbent with artistic interest might like a job as a designer.

KNOWLEDGE ASSOCIATED WITH STEM OCCUPATIONS

Production and Processing: Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.

Computers and Electronics: Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.

Engineering and Technology: Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.

Design: Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.

Building and Construction: Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.

Mechanical: Knowledge of machines and tools, including their designs, uses, repair, and maintenance.

STEM COMPETENCIES *(continued)*

Mathematics: Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
Physics: Knowledge and prediction of physical principles, laws, their interrelationships, and applications to understanding fluid, material, and atmospheric dynamics, and mechanical, electrical, atomic and sub-atomic structures and processes.
Chemistry: Knowledge of the chemical composition, structure, and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and their interactions, danger signs, production techniques, and disposal methods.
Biology: Knowledge of plant and animal organisms and their tissues, cells, functions, interdependencies, and interactions with each other and the environment.

SKILLS ASSOCIATED WITH STEM OCCUPATIONS

Mathematics: Using mathematics to solve problems.
Science: Using scientific rules and methods to solve problems.
Critical Thinking: Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems.
Active Learning: Understanding the implications of new information for both current and future problem-solving and decision-making.
Complex Problem Solving: Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
Operations Analysis: Analyzing needs and product requirements to create a design.
Technology Design: Generating or adapting equipment and technology to serve user needs.
Equipment Selection: Determining the kind of tools and equipment needed to do a job.
Programming: Writing computer programs for various purposes.
Quality Control Analysis: Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
Operations Monitoring: Watching gauges, dials, or other indicators to make sure a machine is working properly.
Operation and Control: Controlling operations of equipment or systems.
Equipment Maintenance: Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.
Troubleshooting: Determining causes of operating errors and deciding what to do about it.
Repairing: Repairing machines or systems using the needed tools.
Systems Analysis: Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.
Systems Evaluation: Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.

ABILITIES ASSOCIATED WITH STEM OCCUPATIONS

Problem Sensitivity: The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing that there is a problem.
Deductive Reasoning: The ability to apply general rules to specific problems.
Inductive Reasoning: The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
Mathematical Reasoning: The ability to choose the right mathematical methods or formulas to solve a problem.

STEM COMPETENCIES *(continued)*

Number Facility: The ability to add, subtract, multiply, or divide quickly and correctly.
Perceptual Speed: The ability to quickly and accurately compare similarities and differences among sets of letters, numbers, objects, pictures, or patterns. The things to be compared may be presented at the same time or one after the other. This ability also includes comparing a presented object with a remembered object.
Control Precision: The ability to quickly and repeatedly adjust the controls of a machine or a vehicle to exact positions.

WORK INTERESTS AND WORK VALUES ASSOCIATED WITH STEM OCCUPATIONS

Work Values

Achievement: These jobs let you use your best abilities, see the results of your efforts and get the feeling of accomplishment.
Independence: These jobs allow you to do things on your own initiative, and make decisions on your own.
Recognition: These jobs offer good possibilities for advancement, and offer prestige or with potential for leadership.

Work Interests

Realistic: Realistic occupations frequently involve work activities that include practical, hands-on problems and solutions. They often deal with plants, animals, and real-world materials like wood, tools, and machinery. Many of the occupations require working outside, and do not involve a lot of paperwork or working closely with others.
Investigative: Investigative occupations frequently involve working with ideas, and require an extensive amount of thinking. These occupations can involve searching for facts and figuring out problems mentally.

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is comprised of a full report, a state report and an executive summary. All can be accessed at cew.georgetown.edu/STEM

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