The last decade has seen considerable concern regarding a shortage of science, technology, engineering, and mathematics (STEM) workers to meet the demands of the labor market. At the same time, many experts have presented evidence of a STEM worker surplus. A comprehensive literature review, in conjunction with employment statistics, newspaper articles, and our own interviews with company recruiters, reveals a significant heterogeneity in the STEM labor market: the academic sector is generally oversupplied, while the government sector and private industry have shortages in specific areas.

Introduction

Economic projections point to a need for approximately 1 million more STEM professionals than the U.S. will produce at the current rate over the next decade if the country is to retain its historical preeminence in science and technology.—President’s Council of Advisors on Science and Technology

Unemployment rates within STEM fields...are often higher than they’ve been in years—a sign that there is a shortage of jobs, not workers.—Michael Anft

Over the past decade, there has been substantial concern regarding the adequacy of the science, technology, engineering, and math (STEM) workforce. Opposing sides paint a polarizing picture: Is there a “STEM crisis” or a “STEM surplus”? Our answer is that there are both.

STEM covers a diverse array of occupations, from mathematicians to biomedical researchers, and at degree levels from bachelor to Ph.D. Some occupations have a shortage of qualified talent, such as nuclear and electrical engineering Ph.D.’s who are U.S. citizens; in other areas, such as biology Ph.D.’s aiming to become professors, there is a surplus. Although many studies have examined the science and engineering workforce in
the aggregate, little analysis has been aimed at identifying specific areas of STEM worker shortage or surplus. Using a “taxicab queuing model” as a framing metaphor, this article examines the heterogeneous nature of STEM occupations by studying distinct STEM disciplines and employment sectors on the basis of current literature and statistical data, as well as anecdotal evidence from newspapers. To augment our findings, we interviewed company recruiters from a wide range of industries in order to gauge the ability of employers to fill open positions. We evaluate these interviews by means of labor market data and scholarly work so as to understand better, from a recruiter’s perspective, the hiring needs of employers and the hiring difficulties encountered by STEM workers.

The ongoing STEM debate. Depending on the definition, the size of the STEM workforce can range from 5 percent to 20 percent of all U.S. workers. Although fields such as computer programming and mechanical engineering are generally considered STEM fields, there is less consensus on areas such as medicine, architecture, science education, social sciences, and blue-collar manufacturing work. In this article, “STEM” refers to the science, engineering, mathematics, and information technology domain detailed by the Standard Occupation Classification Policy Committee, but excluding managerial and sales occupations. Under this definition, postsecondary teachers in STEM fields and lab technicians are considered STEM workers, but workers in skilled trades, such as machinists, are not. Our analysis focuses on graduates with postsecondary education within this STEM domain.

Numerous reports detail the growing concern of policymakers and industry leaders regarding a shortage in the STEM workforce believed necessary to sustain the U.S. innovation enterprise, global competitiveness, and national security. Most notable is the National Academies’ report Rising Above the Gathering Storm, which called for improvements in kindergarten through 12th-grade science and mathematics education and increasing the attractiveness of higher education, among other recommendations. The report highlighted troubling issues in a number of areas: low STEM retention rates, a relative decline in the number of U.S. citizens enrolled in science and engineering graduate school, and lower percentages of STEM graduates than those of other developed countries. These sentiments were echoed in a 2012 report by the U.S. Congress Joint Economic Committee which stated that the current STEM workforce was falling short of demand in both STEM and non-STEM occupations. According to the President's Council of Advisors on Science and Technology, the United States would need to increase its yearly production of undergraduate STEM degrees by 34 percent over current rates to match the demand forecast for STEM professionals.