



March 2008

How Many Engineers Does It Take to Change a Policy?

Many say there aren't enough engineers to go around. Two researchers disagree.

By Harold Salzman, Ph.D., and Lindsay Lowell, Ph.D.

Opinion makers are sounding the alarm about impending shortages of engineers and scientists. Commissions, summits, and prestigious councils foresee looming blows to America's status as the world's leader in science and engineering innovation. Whether "perfect" or just "gathering" storms are on the horizon, they all see the American ship about to be swamped and the economy dragged under. Among the many challenges, the most serious concern is an assumed dearth of globally competitive science and engineering students.

Yet, in our analysis of education supply and workforce demand, we find evidence of a substantial supply of well-qualified science and engineering graduates and no evidence of widespread science or engineering labor market shortages. Interestingly, critics of our recently released report do not dispute our evidence on the whole but, rather, quibble with a few details and criticize it for deflating the pressure on Congress to legislate increases in engineering's educational pipeline. For the true believers, there appears to be no downside to increasing the supply of engineers and scientists, while the danger of not doing so would be a decline in American innovation, rising unemployment, and a slide in the standard of living.

But are the U.S. and the scientific and engineering professions best served by substantially increasing the supply of scientists and engineers? Is any harm done if jobs do not materialize for batches of newly minted engineers and scientists?

The space race is typically cited as a success story in American technology prowess, but less often discussed is the impact of the workforce buildup on U.S. engineering and science in the years that followed. After a late 1950s and early 1960s spike in numbers of science and engineering college graduates, there came a spectacular bust that led to a precipitous decline in graduates in these fields. Similar boom and bust cycles in engineering, IT, and science continued for the next four decades. All in all, the education supply line tracks market demand fairly well.

Nonetheless, policy groups call for more math and science education in the hope it will increase the number of new science and engineering entrants. Are students discouraged because these fields are too hard or they lack the requisite math and science preparation? Have these occupations, as many policy reports claim, fallen from grace in the minds of students? Will better public relations and outreach campaigns, coupled with more Advanced Placement high school courses, be the solution? What are the prevailing perceptions about the future of U.S. science and engineering?

In interviews we conducted, many engineers said that they had a great ride in their careers but, for the next generation, that ride is over. Outsourcing, offshoring, and

workforce internationalization indicate a future with fewer job opportunities and diminished career paths. True or not, this widely-held perception influences the decisions students are making day in and day out.

Moreover, if the wide open frontier of space defined the promise of science and engineering in the past, today's students may foresee only the confines of the cubicle in a Dilbert-esque world. There are many fields that are seen as exciting, and many students whose love of technology and science still propels them into these careers, but an overall malaise among practitioners dampens the enthusiasm of many current and prospective engineers and scientists.

Should these perceptions and disincentives be countered by policies that attempt to induce students into fields where the labor market apparently fails to do so? Given the long lead time to create new engineers and scientists and the short-term hiring strategies of firms, there is an unavoidable gap between hiring and supply. But when the job market is flooded by new graduates and the jobs do not materialize, after many years and great cost, particularly at the master's and doctorate levels, those experiences reverberate throughout the education supply chain. These bust cycles make it harder to expand the supply when the next boom occurs and may also encourage the most able students to consider other career options.

So why the consternation about supply? It's a mystery to us given the ample supply and reasonable responses to labor market signals when there is a shortage. Moreover, we are puzzled about the disregard for the evidence about supply and of simple labor market economics in these policy reports. While we welcome many of the reports' recommendations, particularly those that stimulate the demand side, we are concerned that they overemphasize supply-side policies and risk creating a bigger pipeline to nonexistent jobs. Rather, the educational mandate should be to improve science and engineering literacy, especially for poor and minority students, while carefully nurturing maximal proficiency for students interested in pursuing careers that use their science and engineering education.

The paradox of the proposed policies to increase science and engineering graduates is that short-term supply expansion is likely to lead to longer-term weakness in U.S. science and engineering capacity. The stormy hyperbolic rhetoric of these policy reports bodes ill. Policy based on fear may motivate action, but without evidence as a guide, will it lead to the right outcomes?

Harold Salzman, Ph.D., is a senior research associate at the Urban Institute and Lindsay Lowell, Ph.D., is director of policy studies for the Institute for the Study of International Migration at Georgetown University. They are coauthors of "Into the Eye of the Storm: Assessing the Evidence on Science and Engineering Education, Quality, and Workforce Demand."

Views expressed are those of the authors and not necessarily those of NSPE.