Are STEM Degrees Valuable In Other Fields?

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There is a current emphasis on the importance of STEM (science, technology, engineering, and math) education in the US, but historically where did that emphasis and the acronym come from? Additionally, why has STEM education been emphasized, what is the value of a STEM degree, and is a STEM degree valuable not only for STEM occupations but broader fields? For example, what happens to STEM graduates who pursue other fields?

These are a handful of the questions that sociologists John D. Skrentny and Kevin Lewis of the University of California San Diego tackled in their new paper published in *Minerva* titled “Beyond the ‘STEM pipeline’: Expertise, careers, and lifelong learning.” What follows is an interview with the lead author who explains the history behind STEM education, how he thinks we might reconceptualize our thinking about the STEM pipeline, and also how their results expand conceptions of STEM education and careers.

**What did you find in your study?**
John Skrentny: First, please let me provide a bit of background for why we did this study. Since at least the Cold War, policymakers and educators have been greatly interested in the number of scientists and engineers that the American educational system was producing. They were initially concerned with competition with the Soviet Union on issues of national security, and saw counting graduates in these fields as a way of keeping score.

By the 1980s, policymakers’ interest in these fields became even stronger, but their purpose shifted to economic competition—first with Japan, and more recently, China and the rest of the world.

Academic researchers followed this concern, with great interest seemingly catalyzed by Judith Ramaley, the director of the National Science Foundation’s Education and Human Resources Division, which focuses on workforce development. It was Ramaley who started to call these fields “science, technology, engineering, and math” or “STEM.” Suddenly, this subject had a pithy acronym, and “STEM” became ubiquitous in education and workforce research, and appears regularly in new legislation, regulations, and government programs. Federal, state, and local governments now spend billions of dollars trying to understand the “STEM pipeline,” and how to make sure people—especially women and minorities—do not “leak” from it.
What my co-author Kevin Lewis and I saw, however, was that these researchers focused very intensively on STEM education in primary, secondary, or college education. They seemed to assume that once a STEM degree was obtained, the STEM pipeline was done. But what about STEM work—which is the point of STEM education? We know much less about what happens after graduation.

Kevin and I know that technology and thus jobs change all the time—did STEM graduates have to keep learning job skills just to keep up? We framed this question as focusing on the “length” of the STEM pipeline.

We also wondered about what jobs, exactly, are included in the STEM pipeline. Since technology and jobs change all the time—think about digital animators, “quants” on Wall Street, and data scientists working in marketing and advertising—can we really rely on old job titles like “mechanical engineer” to capture who was and who was not working in STEM? What happens if we look at STEM jobs as any that require college-level expertise in a STEM subject? Are managers of STEM workers still using their STEM skills? This is crucial to understanding persistence or leaking from the STEM pipeline. We framed this question as focusing on the “contents” of the STEM pipeline.

Finally, we took a step back and questioned the point of STEM education—is it only to produce STEM workers? Or is it valuable for any career? This is crucial for understanding whether “leaking” from the pipeline is a
problem or not. We are the first we know of who have actually looked what happens to STEM graduates who leave STEM jobs.

Our findings are very suggestive to everyone who is interested in this important part of the workforce.

First, on the length of the STEM pipeline, we found that about half of all STEM workers report taking skills-related training related to their current job in the last twelve months—and this continues with little change even up to 30 years after earning the STEM degree. It seems that the STEM pipeline, understood as learning and job preparation, continues through careers up until retirement. It’s a lifelong commitment to learning.

Second, on the contents of the pipeline, we found that if we define STEM jobs as those with traditional STEM occupational titles, a stunning 60 percent have leaked from the pipeline. But if we use a broader, more realistic measure of STEM—those using college-level STEM skills on the job—that number is cut in half, and only about 30 percent have left. That’s a lot better, but still quite high. And though the persistence gap between Whites and Latinos mostly disappears, it is still very great for women and African Americans.

Finally, regarding the purpose of the STEM pipeline, we looked at how STEM graduates who are not using STEM expertise on their jobs are doing. The picture here is a bit mixed, though troubling. STEM graduates in non-STEM jobs are less likely than non-STEM graduates to do skills-related training for those jobs. We think this may mean that their STEM educations prepare them for any minor technical aspects of these mostly non-STEM jobs that non-STEM graduates may need. However, these STEM graduates do not have any salary advantage, and they are consistently less likely to be satisfied with their non-STEM jobs, and especially the intellectual challenge of these jobs. In short, they seem to be
bored doing non-STEM work.

**How does your research contribute to an understanding of STEM education and careers?**

We hope that we are part of a trend to more attention to the experiences of STEM workers, and for those interested only in STEM education, we hope that they see these work lives as a continuation of education. After all, very large percentages are still learning, education continues—it’s just not necessarily in school anymore.

Policymakers who want to grow the STEM workforce need to pay attention to this learning, as we suspect that keeping up with technology changes is part of the reason that even with our more expansive understanding of STEM jobs, there are still about 30 percent of people who spent all of this time and money getting STEM degrees who are not even using those skills. Training to keep up may become too difficult over time, especially with family pressures that are common later in careers.

We also show that policymakers and scholars will be wise to pay more attention to what constitutes the STEM workforce. It seems simple until we look more closely. A lot of the jobs that show up on our list of jobs that workers say require STEM expertise but do not appear in National Science Foundation or many other lists of STEM occupations are in management, medical/health fields, science teaching and accounting. We need to be very clear about what we want to maximize when we encourage more and more students to study STEM subjects, and what we want to count as a STEM worker. If we care about innovation, for example, we should understand that STEM-capable managers will help that effort, STEM teachers educate the next generation of innovators, and that physicians can easily lend their expertise to drug development.
We also contribute by shining a light on these STEM graduates who have totally left STEM, and no longer use STEM expertise on the job. Anyone interested in American economic competitiveness should be interested why these people left the jobs in science and engineering for which they were trained, and given their tendency to boredom at work, how we can better use their skill sets.

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