

The Mismatch Between STEM Degree Holders and STEM Workers: Differences by Gender, Race, and Nativity Status

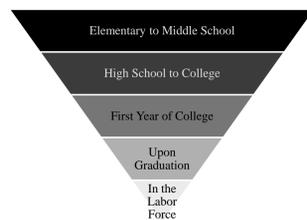
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Introduction

- STEM education and a strong STEM workforce are key to being able to meet our increasing transportation & infrastructure needs, increasing water & energy demand, increasing demand for pharmaceutical expertise, demand for new cell phone “apps” and new technology, and keeping America’s competitive edge.
- Only about 5 percent of the US workforce works in STEM occupations.
- The current status of preparation for the STEM labor force in the US has been characterized by many as a “leaking pipeline” where students “defect” from STEM at various stages:



- There is particular concern about minorities and women leaving STEM.
- To do any type of “intervention” programs successfully, we should know:
 - Where exactly are the gaps? How big are they?
 - Which fields and occupations are most affected?
 - Which demographic groups are most affected?
 - What are the current attitudes (or stereotypes) around going into STEM majors or STEM careers?
 - What are effective strategies for incubating interest in STEM? (Exposure to science? Parent and teacher support? Celebrating role models?)

Data and Methods

Data Source:

- American Community Survey (ACS) has asked occupation since 2000, and started asking field of bachelor’s degree in 2010. These two variables can highlight where the gaps between those who are trained in STEM and those actually working in the STEM labor force are, and any differences between groups.
- For our analysis, we used the 2010 ACS Public Use Microdata Sample (PUMS) to look at adults ages 25-70, their occupations, and their field of degree.
- Double majors in a STEM major and a non-STEM major were counted as STEM degrees.

Definitions:

- The Census Bureau’s definition of STEM degrees includes the following 7 groups of majors:
 - Biology/Agriculture/Environmental Science
 - Computers/Math/Statistics
 - Engineering
 - Physical Sciences
 - Psychology
 - Social Sciences
 - Multidisciplinary STEM (i.e. nutritional science, cognitive science, behavioral science)
- PRB’s definition of the STEM labor force includes the following 7 groups of occupations:
 - Architecture
 - Computer Science / IT
 - Engineering
 - Life Sciences
 - Math
 - Physical Sciences
 - Social Sciences
- We examined gaps by field of degree, age, race, nativity/citizenship status, educational attainment, gender, occupation, and employment status.

For More Information

Related materials — including a downloadable dataset of characteristics of the STEM labor force, articles, reports, and sources — are available on the Population Reference Bureau’s website at: <http://www.prb.org/About/DomesticPrograms/Projects-Programs/SEWorkforce.aspx>.

The Mismatch Between STEM Degree Holders and STEM Workers, 2010

Only **19** percent of 25-70 year olds with a STEM B.A. actually worked in the STEM labor force.

	In STEM Labor Force			In non-STEM Labor Force			Not In Labor Force
	total	employed	unemployed	total	employed	unemployed	
STEM B.A.	18.7	18.0	0.7	65.7	62.2	3.5	15.6
non-STEM B.A.	3.8	3.6	0.2	78.2	74.3	3.9	18.0
no B.A.	1.8	1.6	0.1	68.5	60.8	7.7	29.7

Of workers who have a STEM B.A., only **22** percent worked in the STEM labor force.

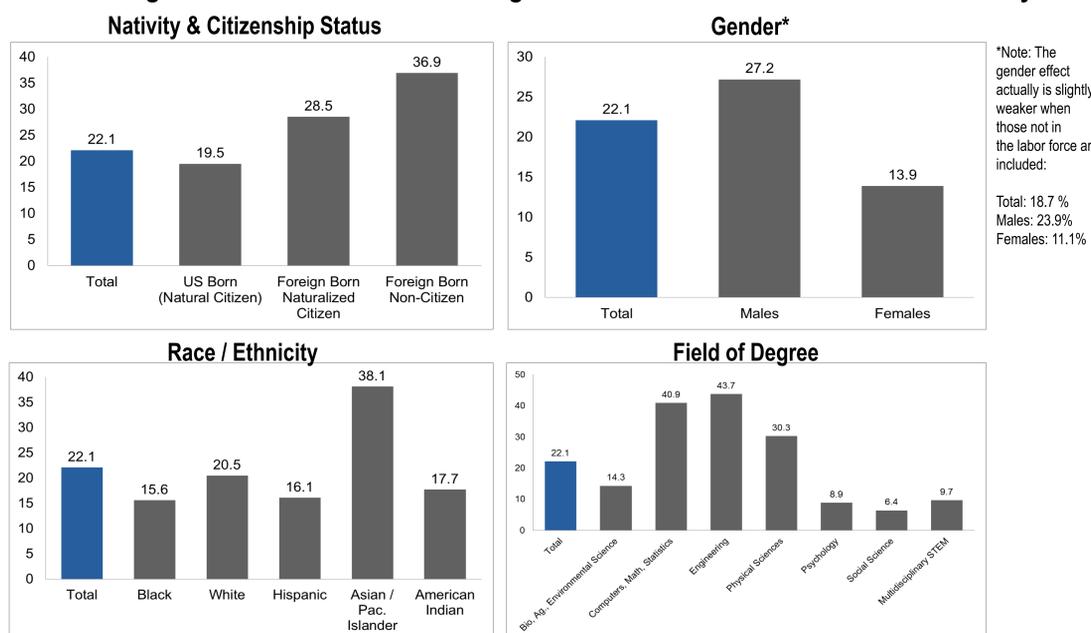
	STEM LF	non-STEM LF	Total
STEM BA	22.1	77.9	100.0
non-STEM BA	4.7	95.3	100.0
no BA	2.5	97.5	100.0

Of workers in the STEM labor force, only **51** percent had a STEM B.A.

	STEM LF	non-STEM LF
STEM BA	50.5	10.1
non-STEM BA	18.1	21.0
no BA	31.4	68.9
total	100.0	100.0

The Mismatch Is Most Apparent Among U.S. Born Workers, Blacks, Hispanics, Women, and Psychology & Social Science Majors

Percentage of Workers with a STEM Degree Who Work in the STEM Labor Force by...



More Findings

- Asians and foreign-born non-citizens with STEM degrees are most likely to work in the STEM labor force. These two groups overlap and there is evidence of a selection effect as many people from Asia come here to pursue a STEM education and career.
- There is a slight age effect: 25 percent of workers with a STEM bachelor’s degree ages 25-34 were in the STEM labor force, whereas only 17 percent of workers with a STEM bachelor’s degree ages 55-64 were. This is consistent with the difference in foreign-born workers by citizenship status: It can take many years to become a citizen, so given that there is an age effect, it makes sense that foreign-born citizens with STEM degrees have lower rates of STEM labor force participation than the rates of non-citizens.
- For those 18.1 percent of workers in the STEM labor force with a non-STEM bachelor’s degree, the most common fields of degree were “science and engineering related” majors (i.e. nursing, architecture, math & science secondary education, “technology” majors) at 7 percent followed by business majors at 5 percent. Arts/Humanities/Other majors and education majors were much less likely to work in the STEM labor force.
- 24 percent of workers with a STEM bachelor’s degree who are employed full-time were in the STEM labor force compared to only 10 percent of those with a STEM bachelor’s degree working part-time and 17 percent of those who were unemployed.
- There is a big educational attainment effect: Of workers with a STEM bachelor’s degree who completed a Ph.D., 32 percent were in the STEM labor force, while the percentages for those who completed only a bachelor’s or a master’s degree were very similar to the total (22 percent). Of workers with a STEM degree who completed a professional degree (i.e. MBA, JD, MD), less than 5 percent were in the STEM labor force. This suggests that career paths in business, law, or medicine are attracting those with STEM degrees.
- While 10 percent of the non-STEM labor force holds a STEM degree, the occupations that have high percentages of STEM degrees are education (19 percent), health care (16 percent), and business/finance (15 percent). This further suggests that non-STEM career paths are successfully attracting those with STEM degrees.

Conclusions

- Many people graduate with STEM degrees, but then do not work in the STEM labor force.
 - **It’s not just a lack of training, talent, or skills!**
 - Particularly true among U.S. born workers, Blacks & Hispanics, women, and psychology & social science majors.
 - Two potential reasons why people, especially people in these 4 groups, are defecting:
 - Not enough jobs available (supply)
 - Jobs that do exist are less attractive than other jobs and career paths (demand)

Implications for Decision Makers

- For those trying to incubate interest in STEM careers:
 - Focus on the college grads with STEM degrees who are not working in the STEM labor force, perhaps conduct some qualitative research to discover why some opt out of the STEM labor force and others opt in.
 - Examine best-practices and evaluate programs and professional organizations that encourage interest in STEM careers among college grads in STEM majors. Conduct secondary research on successful “intervention” programs.
 - Continue to challenge negative stereotypes around minorities’ and women’s lack of interest or ability in STEM, work with teachers and parents to do the same.
 - Raise awareness about possible jobs and career paths in psychology and social sciences.
 - Celebrate female and minority scientists and engineers as role models. They don’t need to be well-known, chose someone in the local community or even a recent alumnus.
- For employers trying to recruit workers with STEM degrees:
 - Conduct best-practices research to see what strategies are effective in recruiting and retaining talent, especially U.S. born, minority, and female talent.
 - Create a welcoming lab/office environment for minorities and women.

Data Limitations & Future Research

- “Foreign-Born” does not distinguish between those who entered the US as children and those who entered the US as adults.
- Examine sub-national geographic differences
- Disentangle nativity/citizenship status effect from race effect and age effect.

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