

Do I Belong in STEM?

by

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Introduction

Working in a STEM field (science, technology, engineering, or math) presents you with opportunities to understand the world in exhilarating ways. How many other professions provide the chance to plumb the ocean depths, search Mars for water, navigate into a human heart, or construct new ways to generate electricity from the sun; and this is just a tiny sampling of the experiences you can have. A job in a STEM field is also more likely to result in higher pay than a non-STEM job (Fund & Parker, 2018). Many students who enter the STEM field will find themselves challenged at some point, however, and start to doubt whether they belong.

Many students who are excited by the possibilities of STEM may also be worried by questions: *Will I be able to make it in a STEM field? Will it be too difficult for me? Do I belong in STEM?*

Take this opportunity to write down some of your fears and anxieties about choosing a STEM major. When you meet in class you will talk about these fears with your classmates.



The STEM field is sometimes more challenging for students who are not in the majority. In this case study we are going to spend some time looking at the field of STEM through a lens that will help us understand these challenges, and how we can overcome them. Our goals are the following:

- To learn about diversity.
 - What is diversity?
 - Why is diversity important in the context of STEM?
- To increase your sociopolitical and cultural competence.
- To be prepare you to succeed in STEM.

Part I – What Is Diversity and Does STEM Have Enough?

Diversity can be represented in many ways, and often the focus is on race/ethnicity or gender. However, diversity can also be represented by ability status, socioeconomic status, sexual orientation, national origin, and religious affiliation. One of the difficulties that the STEM (science, technology, engineering and math) fields face is that they lack the level of diversity seen in other fields. Don't believe it? Check out the data, and then answer the questions below based on Figure 1.

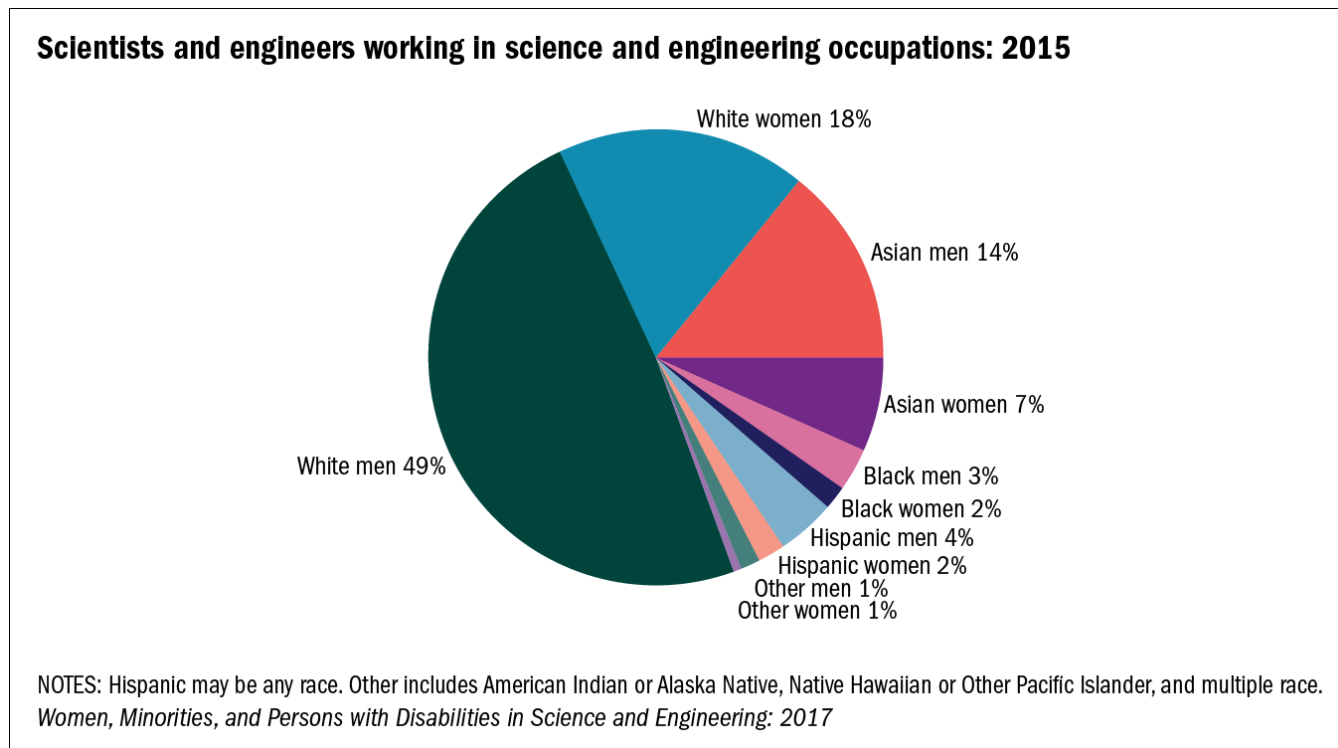


Figure 1. Proportion of workers in STEM fields by race and gender for 2015. *Source:* National Science Foundation, 2017.

Questions

1. What group holds the greatest proportion of STEM jobs?
2. What proportion of women hold STEM jobs? What about men? Show your math!
3. According to 2016 United States census data, women represent 50.8 % of the population. Thus, do the percent of women in the STEM field accurately represent the percent of women in the population? By how much do they differ? Show your math!
4. Which ethnic groups exhibits the least representation (do not use the “other” category)? As of 2016 Black people represent 13.3 % of the population while Hispanic (Latinx) people represent 17.8 % (2016 census data). Thus, does the representation of these groups accurately represent their proportions in the population?

Part II – Does Diversity Matter in STEM?

Answer the questions below after you watch the following 15-minute TedX video by Dr. Nicole Cabrera Salazar:

- *The Future of STEM Depends on Diversity*, <<https://youtu.be/-v8aDo4dV3Q>>

Questions

1. In your own words, define diversity.
2. Explain in your own words why diversity helps promote excellence in science.
3. What are some examples of bias that were revealed in the video?
4. Dr. Cabreza introduced two problems that can make it more difficult for members of underrepresented groups to succeed in STEM: socialization and institutional bias. In your own words, define both terms. Explain why both socialization and institutional bias can serve as hurdles to individuals from underrepresented groups who may be interested in a STEM career.

Socialization:

Hurdle:

Institutional Bias:

Hurdle:

Part III – So How Do We Fix the Problem?

Answer the questions below after you watch the following 15-minute video by Olympia LePoint, an aerospace engineer, author, and CEO. She helped launch 28 NASA space shuttle missions. Despite her overwhelming success, she did not begin her career brilliantly, but instead had to overcome obstacles to achieve success in STEM.

- *Reprogramming Your Brain to Overcome Fear*, <https://youtu.be/1PV7Hy_8fhA>

Questions

1. What obstacles did you identify in the video that made it difficult for Ms LePoint to succeed? Are any of those obstacles specific for sex, race, gender or another identity?
2. Ms. LePoint described three steps to achieving success. Describe those steps.
3. Explain the term mathaphobia, then explain how that term might apply to you as a STEM student. Also, does it only apply to math?
4. In the video, Ms. LePoint described how she transitioned from a failing student to one who eventually became a rocket scientist. Why was her mindset so important to her success? How did her mindset change?

Part IV – How Is STEM Changing?

Women are still underrepresented in many STEM fields including engineering, physics and economics. However, significant gains have occurred in psychology, biosciences and social sciences. A study by Cornell psychologists found that women are now preferred over men in hiring for tenure-track jobs (Boscia, 2015). Minorities are also increasing their representation in STEM. Take a look at the data below.

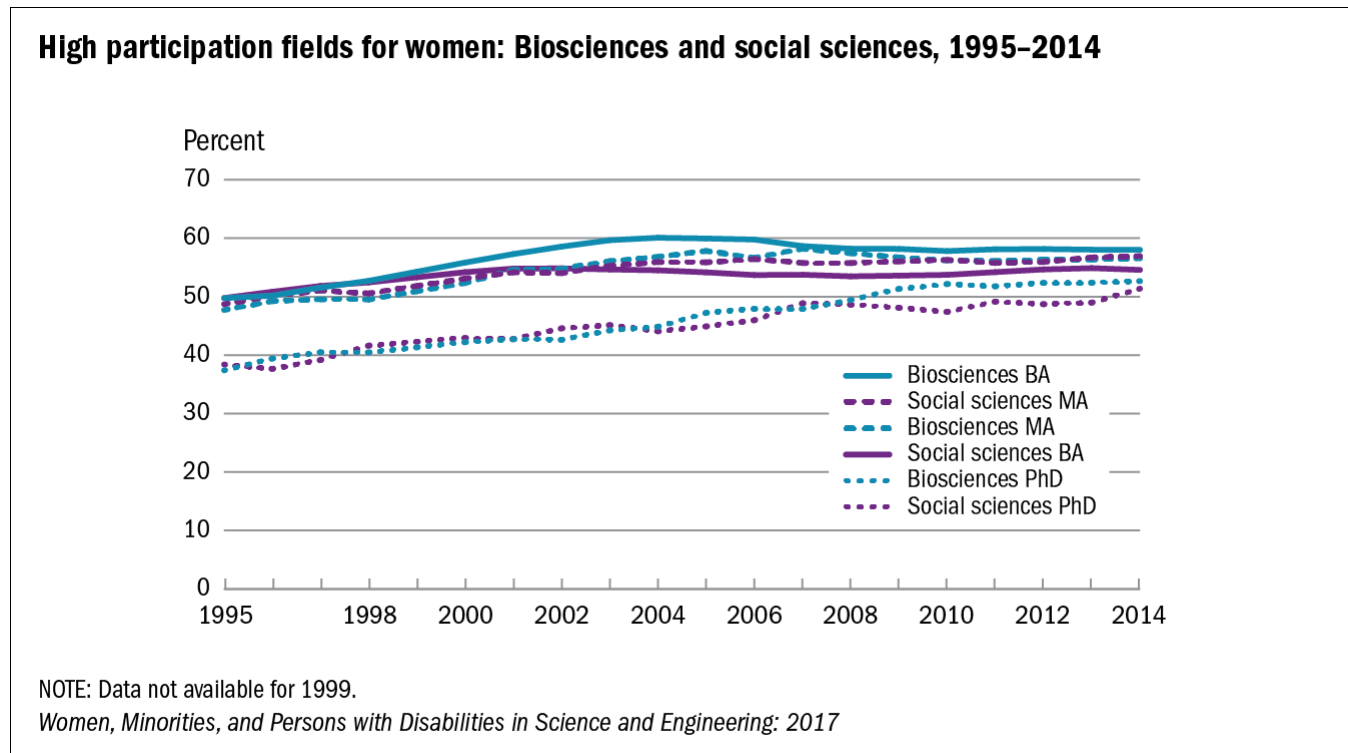


Figure 2. Women in social and biosciences. Source: National Science Foundation, 2017.

Questions

- As of 2014, what percentage of the population did women represent in the social and biosciences? Do you think these fields, as opposed to other STEM fields, did something specific to address underrepresentation, or is it the nature of the field, content knowledge, and potential careers that are responsible for this shift, or might it be both?
- Why do you think other STEM fields are still so male-dominated?

3. Examine Figure 3, below. What is the general trend in terms of degrees earned among minority groups? Given that minorities represent more than 30% of the population, should faculty members and industry leaders in the STEM field be satisfied with this trend?

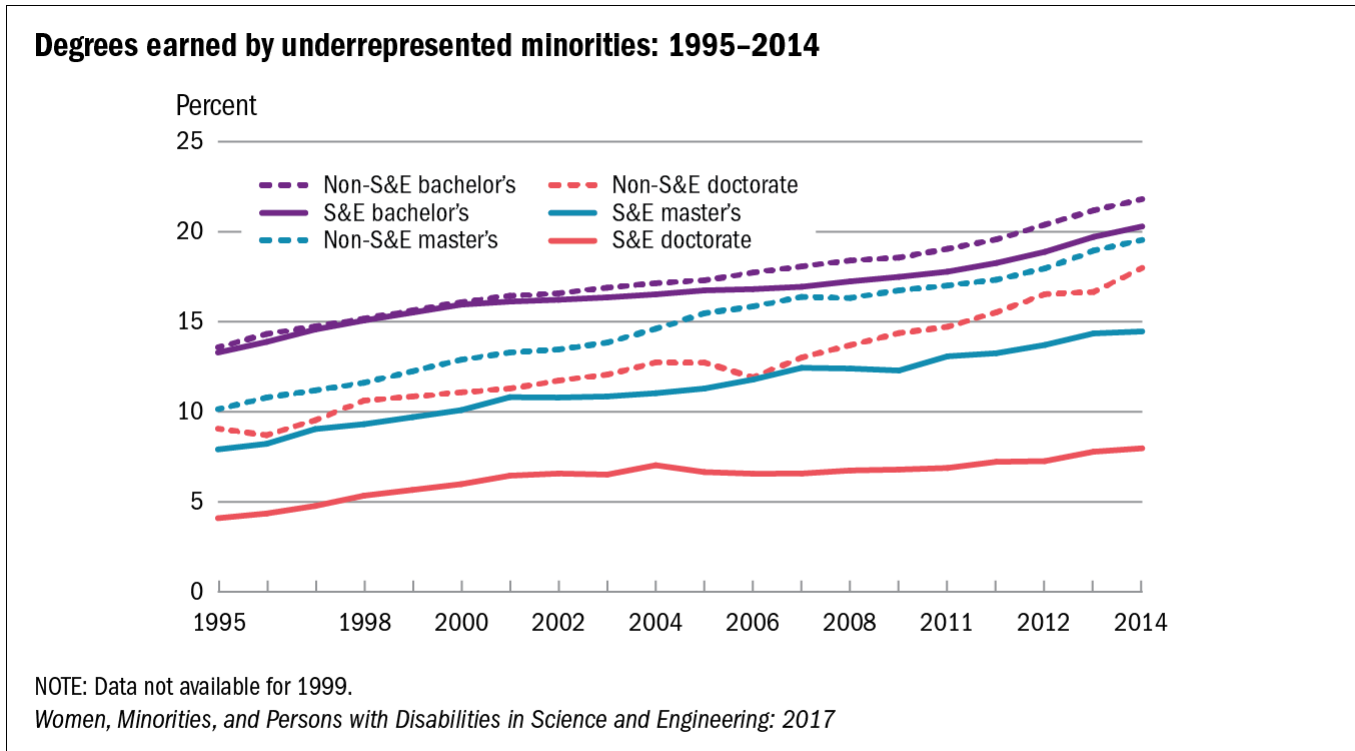


Figure 3. Bachelors, Masters and PhD's earned by underrepresented minorities. Source: National Science Foundation, 2017.

Conclusion

Succeeding in STEM takes perseverance but the potential rewards are immense. Read the reflections of two minority women who have rewarding STEM careers:

I would encourage other women to go into STEM. It's a wonderful and a very satisfying feeling to be able to contribute towards the progress of mankind with creative and innovative solutions. You know you will be at some point touching many other lives other than your own family. This general feeling of hope and content is very satisfying.

—Dr. Papia Chakraborty, Senior Scientist and Head of Immuno-oncology at MedGenome

Once I got into space, I was feeling very comfortable with the universe. I felt like I had a right to be anywhere in this universe, that I belonged here as much as any speck of stardust, any comet, any planet.

—Dr. Mae Jemison, first African-America astronaut, biologist, chemist and medical doctor.

Question

1. Upon completion of this case, do you feel any differently about your identity or ability to persevere in STEM?

References

- Anon. 2005. Then and now: Dr. Mae Jemison [webpage]. *CNN*, Sunday, June 19, 2005. June 19, 2005. <<http://edition.cnn.com/2005/US/01/07/cnn25.tan.jemison/>>.
- Bell, M.K. 2016. Teaching at the intersections: honor and teach about your students multiple identities. *Teaching Tolerance* 53. <<https://www.tolerance.org/magazine/summer-2016/teaching-at-the-intersections>>.
- Boscia, T. 2015. Women preferred 2:1 over men for STEM faculty positions. *Cornell Chronicle*. <<http://news.cornell.edu/stories/2015/04/women-preferred-21-over-men-stem-faculty-positions>>.
- Funk, C. and K. Parker. 2018. Women and men in STEM often at odds over workplace equity. Pew Research Center. Social and Demographic Trends. <<http://www.pewsocialtrends.org/2018/01/09/women-and-men-in-stem-often-at-odds-over-workplace-equity/>>.
- Hill, C., C. Corbett, and A. St. Rose. 2010. Why so few? Women in science, technology, engineering and mathematics. AAUW, Washington, D.C. <<https://www.aauw.org/app/uploads/2020/03/why-so-few-research.pdf>>.
- Holley, R. 12 Women on what it's like being a woman in STEM. Scholarship Points. 4/20/18/ <<https://www.scholarshippoints.com/campuslife/what-its-like-being-a-woman-in-stem/>>.
- Ladson-Billings, G. 2014. Culturally relevant pedagogy 2.0. *Harvard Education Review*. 84(1): 74–84. <http://piggottclass.weebly.com/uploads/2/3/1/7/23179512/ladson-billings_culturally_relevant_pedagogy.pdf>.
- Landivar, L.C. 2013. Disparities in STEM employment by sex, race and Hispanic origin. Report Number ACS-24. U.S. Census Bureau. <<https://www.census.gov/library/publications/2013/acs/acs-24.html>>.
- National Science Foundation, National Center for Science and Engineering Statistics. 2017. *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2017. Special Report NSF 17-310*. Arlington, VA. <<https://www.nsf.gov/statistics/2017/nsf17310/downloads.cfm>>.
- Puritty, C., Strickland, L.R., Alia, E., Blonder, B., Klein, E., Kohl, M.T., McGee, E., Quintana, M., Ridley, R.E., Tellman, B. and Gerber, L.R. 2017. Without inclusion, diversity initiatives may not be enough. *Science* 357: 1101–2.
- QuickFacts United States Census Bureau. Revised 2016. <<https://www.census.gov/quickfacts/fact/table/US/PST045216>>.

Internet references accessible as of September 1, 2020.