Diversity, Ethics and Engineering

WELCOME!

Learning Objectives

1. Understand terminology and concepts related to diversity and how biases develop
2. Learn the prevalence and outcomes of discrimination in engineering
3. Learn how to prevent self and others from discriminating

The Importance of Diversity

according to William A Wulf, National Academy of Engineering President, 1996–2007

1. "Many people talk about the need for diversity as an issue of equity, in terms of fairness, and that is a potent argument"
2. "A second argument for diversity has to do with numbers … unless we include more women and underrepresented minorities in the engineering workforce, we are simply not going to have enough engineers"
3. "My argument is essentially that the *quality* of engineering is affected by diversity (or the lack of it). …The argument in a nutshell hinges on the notion that engineering is a profoundly creative profession"

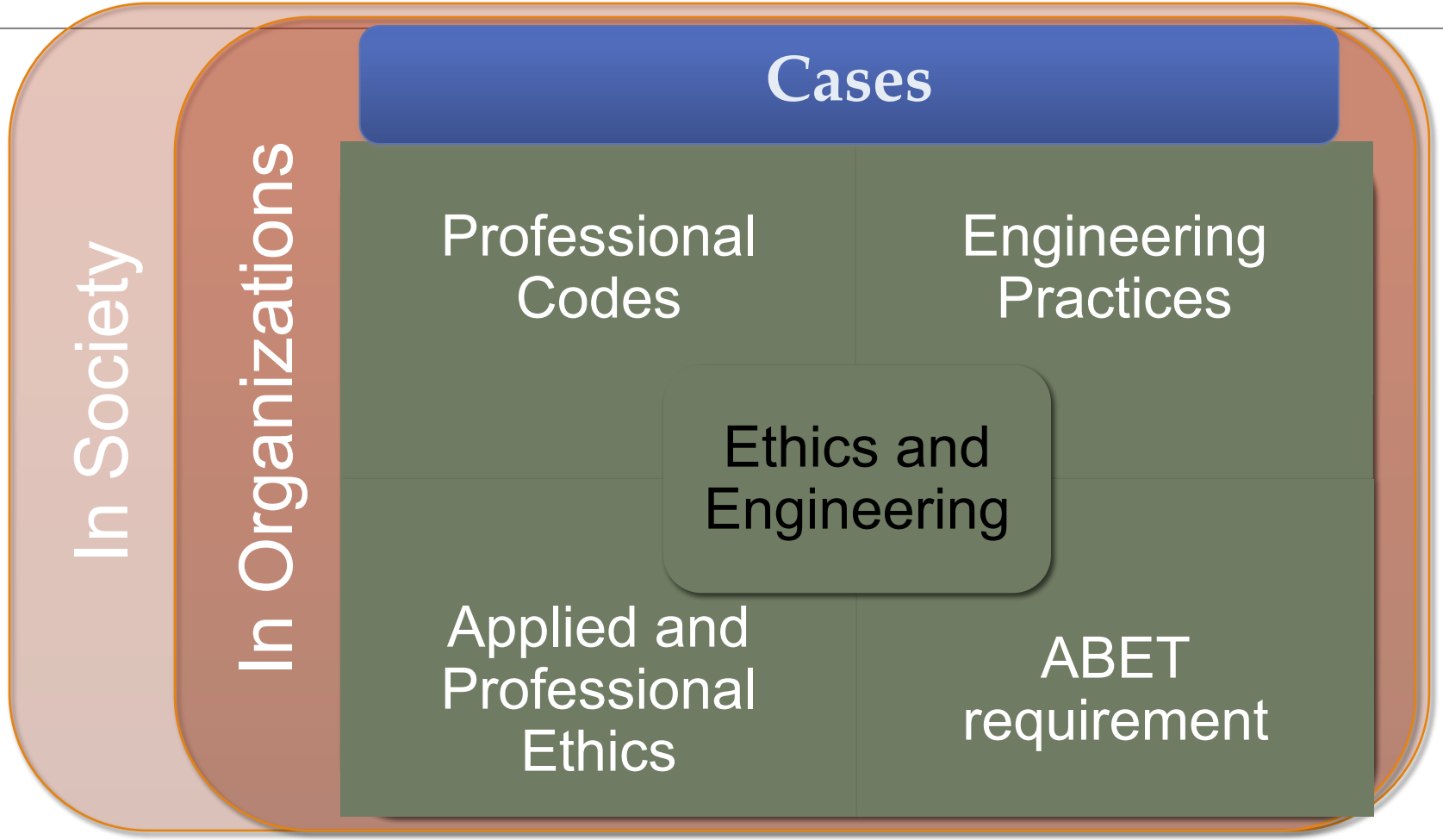
NSPE Code of Ethics

Professional Obligation 1: Engineers shall be guided in all their relations by the highest standards of honesty and integrity.

(f) “Engineers shall treat all persons with dignity, respect, fairness and without discrimination.”

1. Engineering ethics and DEI

Engineering ethics and DEI



ABET Criterion Three

"an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts."

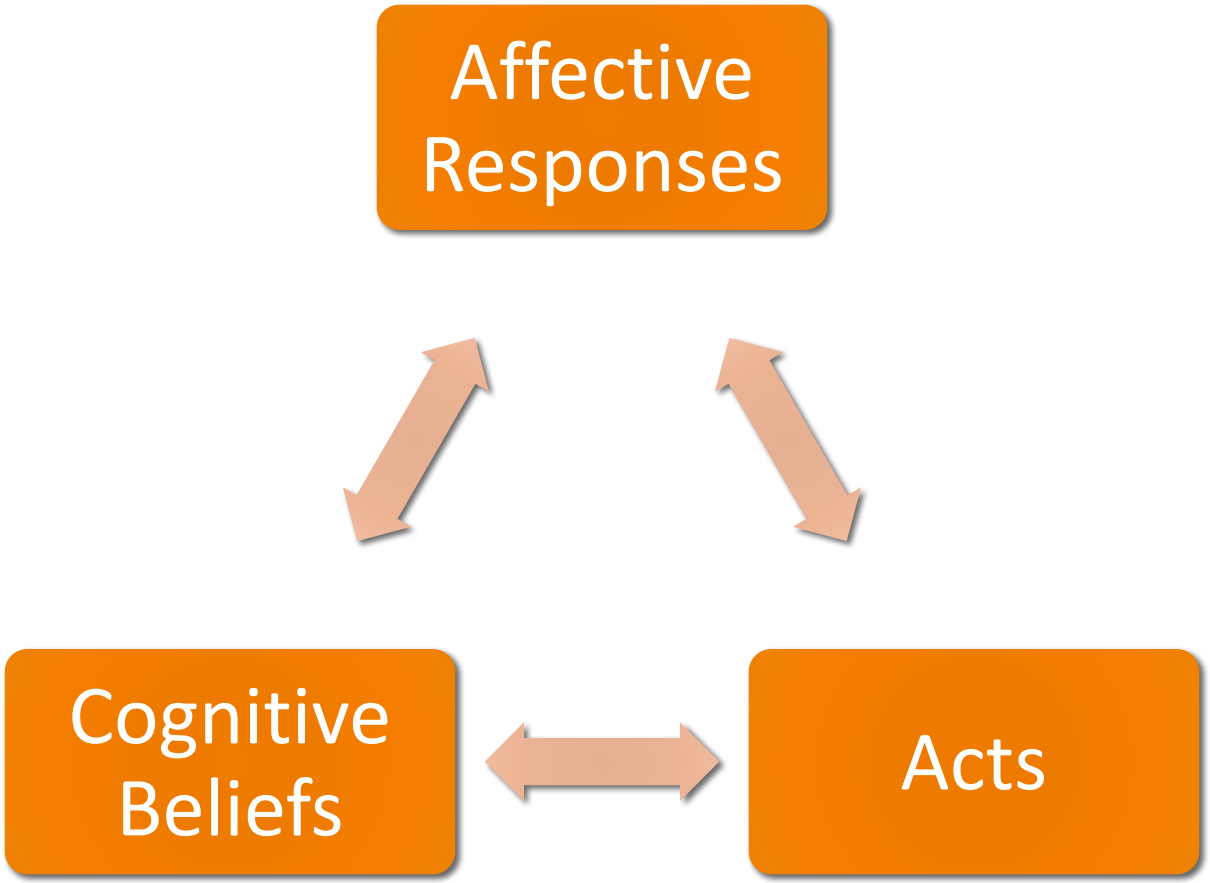
DEI and ethics

Three levels of claims:

1. **Descriptive ethics: a study of what people actually do with respect to DEI: factual**
2. **Normative ethics: a study of what a person should or ought to do with respect to DEI**
3. **Metaethics: a study of the nature of moral claims (not relevant here)**

2. Concepts and Terminology

Thinking, Feeling, Acting



Definitions

Diversity concerns relate to categorizations "that impact potentially harmful or beneficial employment outcomes such as job opportunities, treatment in the workplace, and promotion prospects—irrespective of job-related skills and qualifications." (Mor Barak, 84)

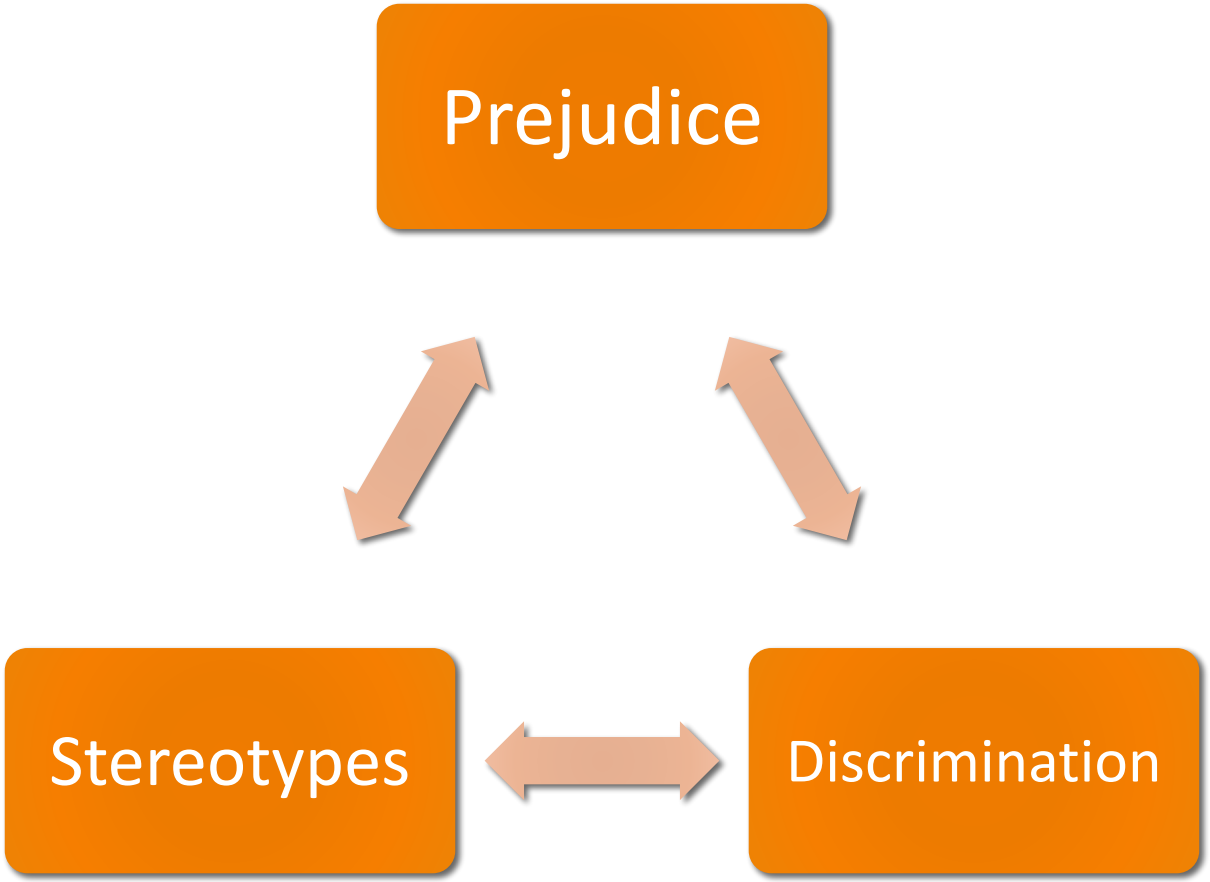
Inclusion "refers to employee perceptions that their unique contribution to the organization is appreciated and their full participation is encouraged." —Mor Barak (85)

In-group: a social group with which an individual identifies as a member (vs. **out-group**)

Historically Stigmatized Characteristics

- Gender
- Race/Ethnicity
- Nationality/Citizenship
- Religion
- Age
- Disability
- Pregnancy
- Parental Status
- Sexual Orientation
- Gender Identity
- Obesity
- Socioeconomic Status

Thinking, Feeling, Acting Distorted



Implicit Bias

https://www.youtube.com/watch?v=1JVN2qWSJF4 (0:15-1:155)

Origins of Implicit Bias

- **Cognitive Factors**
  - Categorization effects
  - Confirmation bias
  - External vs. Internal attributions
  - Out-group homogeneity
- **Affective Factors**
  - In-group favoritism and out-group denigration
  - Preference for homogenous social circles
  - Perceived status threat
  - Desire to maintain status quo

Microaggressions

subtle verbal or behavioral slights and insults

"I'm not racist. I have several Black friends."

"You speak good English."

"I understand. As a woman, I face discrimination also."

"You are a credit to your race."

"Maybe if you work harder you can succeed like your peers."

"Do you think you're ready for college?"

"You're not like the other ones."

"You people always do well in school."

"When I see you, I don't see color."

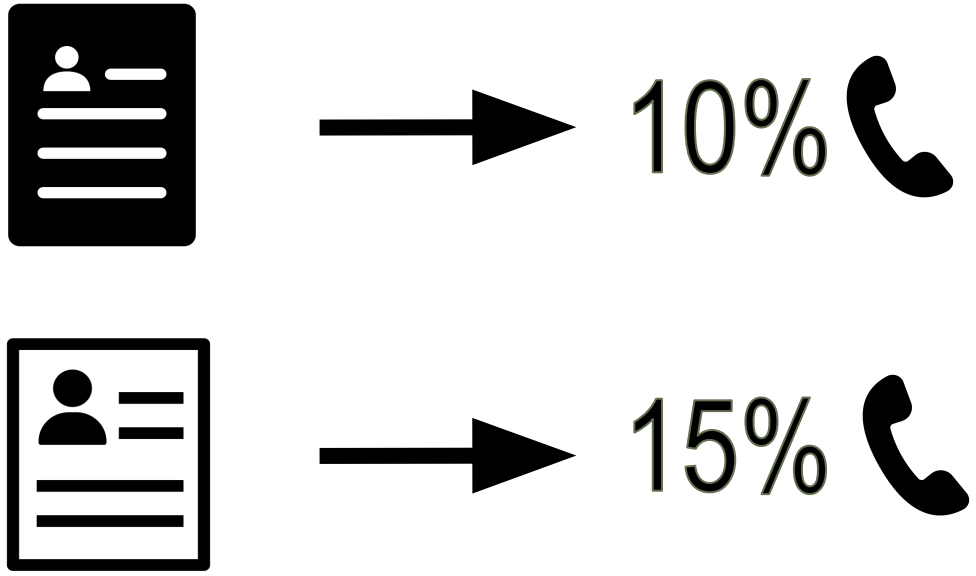
3. Prevalence and Outcomes in STEM

Unconscious Bias at Work

https://www.youtube.com/watch?v=NW5s_-NI3JE

Race

- Resume Studies *(Bertrand & Mullanaithan, 2004)*



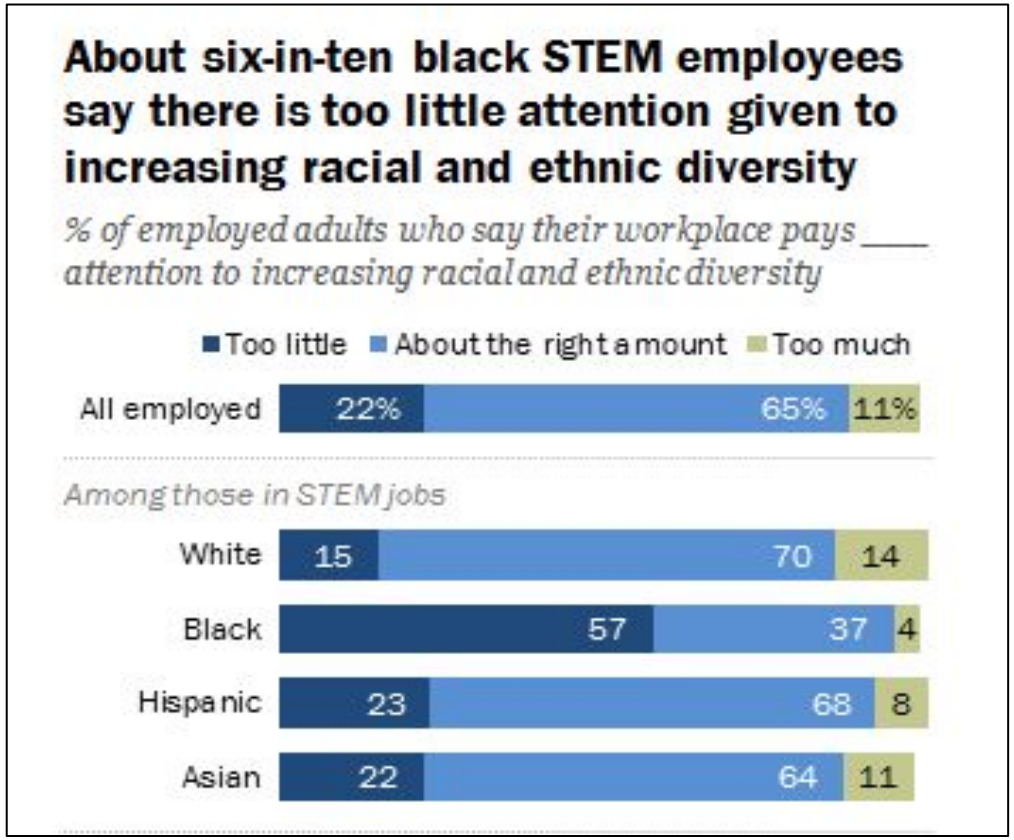
These studies also manipulated experience and education, finding that these provided less of a boost for black names compared to white names.

Black resumes needed the equivalent of 8 years of experience compared to white names.

Race

- **68%** of engineers of color (men as well as women) reported having to **prove themselves repeatedly**, as compared to 35% of white men.

- Engineers of color were **less likely** than white men to report having the same **access to desirable assignments.**



https://www.pewsocialtrends.org/2018/01/09/blacks-in-stem-jobs-are-especially-concerned-about-diversity-and-discrimination-in-the-workplace/

Gender

- Women in engineering earned between 86-95% of what men did (*Society of Women Engineers, 2016*).
- Even more pronounced for racial minorities in STEM; Black women (62%), Hispanic women (61%) (*Pew Research Center, 2016*).
- Women are promoted less and "protected" from challenging "stretch assignments", especially during pregnancy or motherhood (*Brown, 2010, Hoobler et al., 2014*).
- Men with children are rated more positively, while women with children face severe penalties (*Heilman & Okimoto, 2007; Fuegan, Biernat, Haines, & Deaux, 2004*).

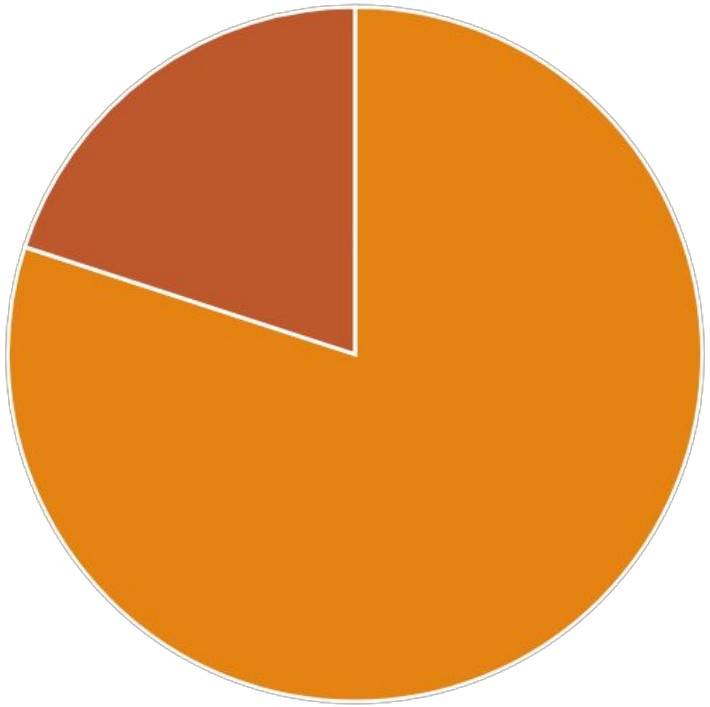
Gender

- Women face greater barriers in achieving top-level positions (i.e., glass ceiling effects). As an example, women currently hold **6.6%** of all CEO positions at Fortune 500 companies (2019).

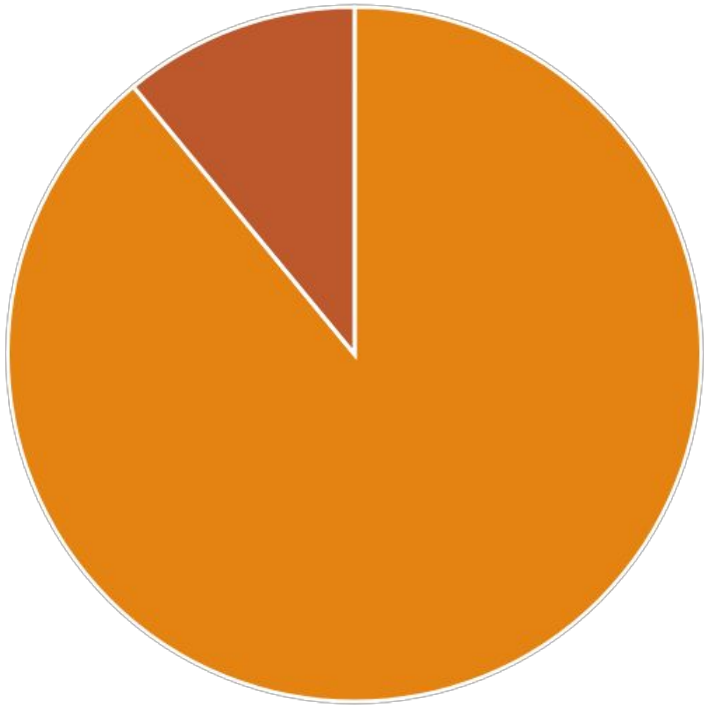
- Women face challenges in obtaining leadership positions, but also in being viewed and respected as leaders.

Gender

WOMEN ARE 20% OF ENGINEERING SCHOOL GRADUATES

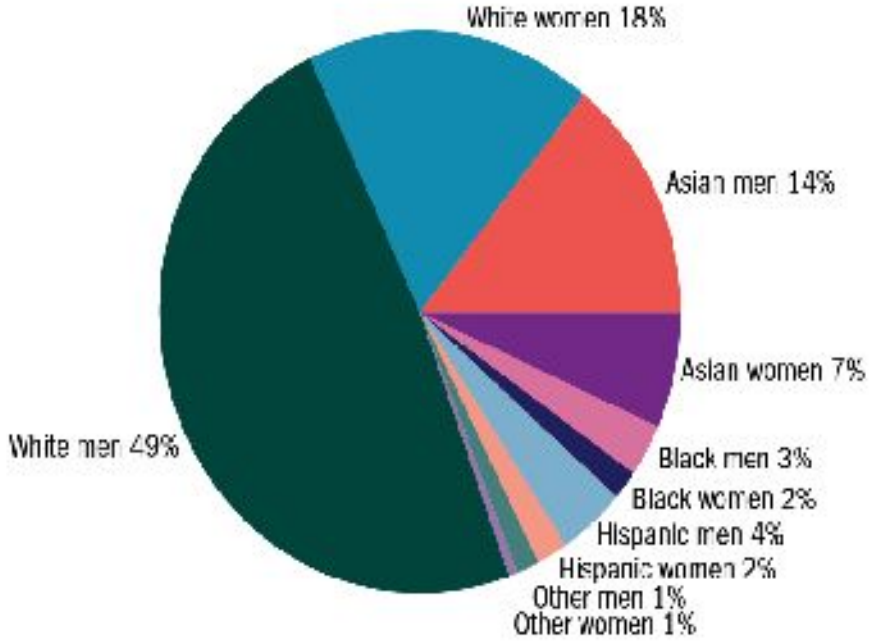


WOMEN ARE ONLY 11% OF PRACTICING ENGINEERS



Demographics of Engineers & Scientists in U.S.

Scientists and engineers working in science and engineering occupations: 2015

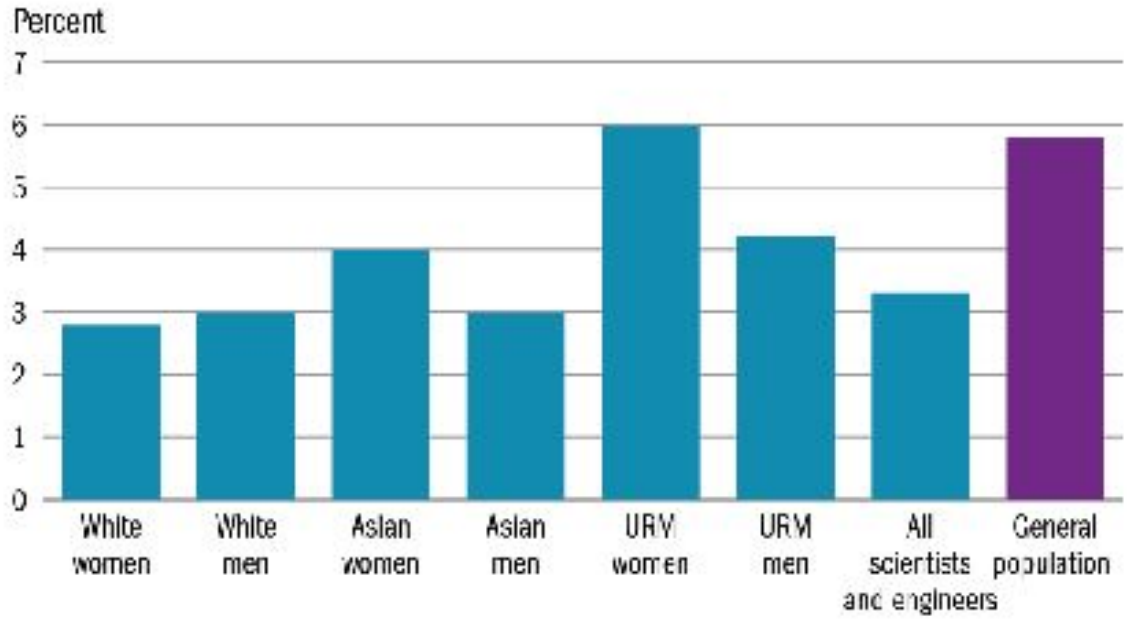


NOTES: Hispanic may be any race. Other includes American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, and multiple race.

Women, Minorities, and Persons with Disabilities in Science and Engineering: 2017

Unemployment Demographics

Unemployment rates among scientists and engineers: 2015



URM = underrepresented minority.

NOTE: The general population consists of the U.S. civilian noninstitutional population 16 years and over.

Women, Minorities, and Persons with Disabilities in Science and Engineering: 2017

Other documented biases

Physical Disabilities

Mental Illnesses

LGBTQ+

Individuals with Disabilities

The ADA (Americans with Disabilities Act of 1990) prohibits employment discrimination against individuals with disabilities, yet in 2018:

- **38%** of individuals with disabilities were employed, compared with **78%** of counterparts without disabilities.
- **median earnings** of full time employed individuals with disabilities was **$5,796 less** than their counterparts without disabilities

Mental Illness and Engineers

- 25% of engineering students meet the criteria for an anxiety or depressive disorder versus 10% of the general population

- Engineers report themselves as the second loneliest profession but only report depression at a rate of 4% a year. This is lower than the average workplace, which reports 6-7% of employees as having a depressive disorders.

How Depression Looks to Co-Workers:

Withdrawal from team, isolates oneself

Indifference

Putting things off, missed deadlines, accidents

Seems “scattered” or absentminded

Procrastination, indecisiveness, slowed productivity

Late to work, afternoon fatigue, accidents

Unsure of abilities, lack of confidence

Low motivation, detached

Inappropriate reactions, strained relationships

Change in appearance

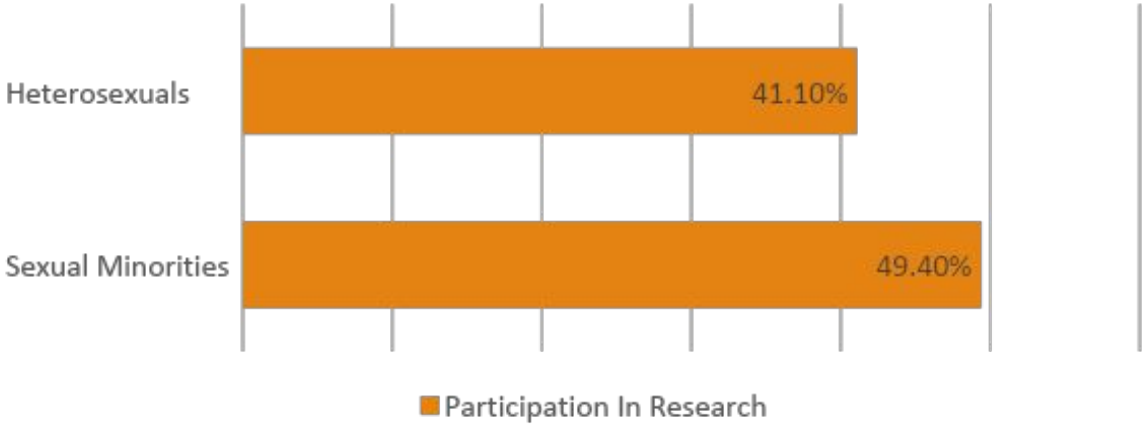
The LGBTQ+ Community

LGBTQ: Abbreviation that stands for Lesbian, Gay, Bisexual, Transgender, and Queer. An umbrella term used to refer to the community as a whole.

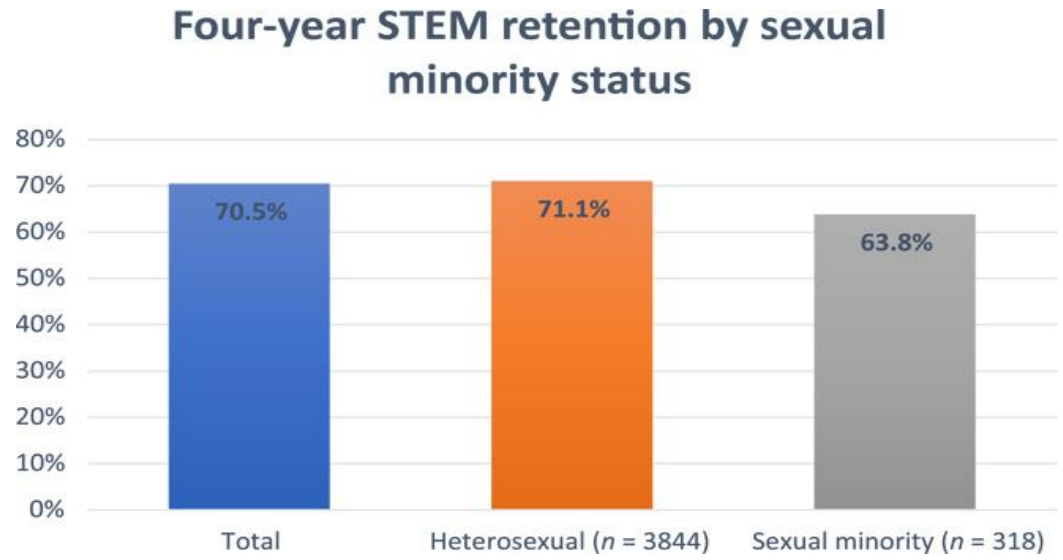
According to Gallup, “about 10 million people, or 4.1% of the U.S. adult population, identified as LGBT in 2016” (Brown, 2017).

LGBTQ Student Retention In STEM

More LGBTQ STEM students participate in undergraduate research—a **significant** contributor to STEM retention—than their heterosexual counterparts (Hughes, 2018).



However, they are "**7%** less likely than heterosexuals to persist in STEM after 4 years versus switching to a non-STEM field" (Hughes, 2018).



4. Practical Steps toward Inclusion

Inclusion and Organizations

Inclusion means developing a culture and processes that encourage **belongingness** + **uniqueness**.

[**belongingness**]

- involvement in formal processes (meetings, emails, zooms, slack, etc.)
- and informal processes ("water cooler talk")

especially for processes that affect these individuals!

[**uniqueness**]

but without forgoing one's characteristics that vary from the dominant culture!

(Bor Marak, 85)

How Can I Be More Inclusive?

- Be aware of your outgroup
- Actively seek out counterexamples to your prejudices
- Imagine the perspectives of others
- Individuation: how well do I know the people around me?

"The unexamined life is not worth living for a human being."

— Socrates

Strategies to Support Others

Supportive behaviors

- Communicating with and supporting those not in the “ingroup”
- Attending events that expand your circle of colleagues
- Receiving disclosures of invisible stigmas with acceptance and positivity

Advocacy behaviors

- Confronting instances of prejudice
- Call for better organizational laws, policies, and practices

Organizational Strategies to Support Inclusion

- Adopt a written policy admonishing all forms of discrimination
- Evaluate culture and processes
- Use predefined rubrics that tie decisions to job qualifications
- Get to know your co-workers

Breakout session

- What is one of the most inclusive acts or decisions that you have seen an organization with whom you have worked or collaborated make?

Recommended Reading

“Diversity in Engineering -- **Managing the Workforce of the Future”**

National Academy Press, Washington, D.C., 2002.

The Importance of Diversity in Engineering, pp 8-14.

https://www.nap.edu/read/10377/chapter/4

References

Hays-Thomas, R. (2016). *Managing workplace diversity and inclusion: A psychological perspective*. Taylor & Francis.

Mor Barak, M. E. “Inclusion is the Key to Diversity Management, but What *Is* Inclusion?” *Human Service Organizations: Management, Leadership & Governance, 39*, 83–88.

National, Academies of Sciences, Engineering, and Medicine, et al. *Sexual Harassment of Women : Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine*, edited by Frazier F. Benya, et al., National Academies Press, 2018.

National Research Council. (2002). *Diversity in engineering: Managing the workforce of the future.* National Academy Press, Washington D.C.

Perez, P. (2019) “Diversity, Inclusion, Belonging…Not Just PC BS.” In *The Drama-Free Workplace: How You Can Prevent Unconscious Bias, Sexual Harassment, Ethical Lapses, and Inspire a Healthy Culture*. Hoboken, NJ: John Wiley & Sons.

Vinkenburg, C. J. (2017) “Engaging Gatekeepers, Optimizing Decision Making, and Mitigating Bias: Design Specifications for Systemic Diversity Interventions.” *The Journal of Applied Behavioral Science* 53:2, 212–234.

Heilman, Madeline & Caleo, Suzette. (2018). Combatting gender discrimination: A lack of fit framework. *Group Processes & Intergroup Relations. 21*. 725-744. 10.1177/1368430218761587.