Women’s Leadership in STEM Fields

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Women in STEM in the U.S.

Women make up over 50% of the U.S. population, but are represented in STEM careers at much lower percentages.

– Google: 17% of technical workforce is female
– Facebook: 15% of technical workforce is female
– Apple: 20% of technical workforce is female


STEM = Science, Technology, Engineering, Mathematics
Degrees Earned by Women in U.S. in 2012


- **All Fields**: Humanities, Soc., Bio., & Physical Sci.s, Edu., Health, Engineering

**Biological Sciences**: Agriculture and Biology

**Physical Sciences**: Physics, Earth Science, Chemistry

**Engineering**: Chemical, Mechanical, Biological, Civil, Computer Science, Etc.
Leaky Pipeline: Women’s representation decreases with each increase in professional rank.

- Consequently, women are missing out on the higher paying higher status positions in STEM.
In the U.S., there is also a serious lack of racial/ethnic diversity in the STEM fields.

Scientists and engineers working in science and engineering occupations: 2013

- White men: 51%
- White women: 20%
- Asian men: 12%
- Asian women: 5%
- Black men: 3%
- Black women: 2%
- Hispanic men: 4%
- Hispanic women: 2%
- Other men: 1%
- Other women: 1%

NOTE: Hispanic may be any race. Other includes American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, and multiple race.
Pipeline also leaks for other minority groups
Status of Women in STEM in Africa
(Unesco 2015; Education for All 2015)

Across the Continent
• ~10% of all engineering students are female.

But there is tremendous variation by country.
Some Data on Women in STEM in Your Countries
(UNESCO 2015; Education for All 2015)

Female Researchers as Percentage of Total Researchers

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Business</th>
<th>Government</th>
<th>Higher Ed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Côte d'Ivoire (2005)</td>
<td>12%</td>
<td>14%</td>
<td>22%</td>
</tr>
<tr>
<td>Mali (2010)</td>
<td>31%</td>
<td>34%</td>
<td>29%</td>
</tr>
<tr>
<td>Sudan, Pre-Scession (2005)</td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>Zambia (2008)</td>
<td>42%</td>
<td>16%</td>
<td>NA</td>
</tr>
</tbody>
</table>
Why does diversity matter?

What are the benefits of increasing women’s participation in STEM – or the participation of other under-represented groups?
Diversity in Science...

...refers to cultivating talent, and promoting the full inclusion of excellence across the social spectrum.

- Ethnicity
- Gender
- Nationality
- Race
- Religion
- Socioeconomic Status
Diversity in Science: Why it Matters

1. Diversity is critical to excellence.
   -- Science is a collaborative enterprise.
   -- Research shows that groups of diverse problem solvers outperform less diverse groups.

   “The ability to see the problem differently, not simply ‘being smart,’ often is the key to a scientific breakthrough.”

Sources:
• AAUW (2015), *Solving the Equation*
Diversity in Science: Why it Matters

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2. Lack of diversity represents a loss of talent.

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Diversity in Science: Why it Matters

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2. Lack of diversity represents a loss of talent.
3. Enhancing diversity is key to long-term economic growth and global competitiveness.

When it comes to solving the world’s problems – such as climate change, drought, famine, renewable energy, disaster relief -- no country can afford to lose a large proportion of their available talent.
• Most children born in the U.S. today are non-white and half of all children born are female.
• These groups collectively make up ~75% of the U.S. population of children.

*If U.S. wants a large pool of talented scientists and engineers in the future, it is necessary to increase the participation of under-represented groups*
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4. Diversity promotes equity.
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– Smaller Pay Gap, especially in engineering and computer science.
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- Economic benefits for women and their families.
- Smaller Pay Gap
- Higher quality of life: Flexible hours, work independence, creativity, etc.
Why So Few?

What are some of the reasons women are underrepresented in STEM?
Why So Few?

- Gender Stereotypes
- Lack of Role Models
- Negative Messaging

*Girls and women need to see STEM careers as realistic options.*
2005: Harvard president Larry Summers tells attendees at a science diversity conference that innate differences between men’s and women’s math abilities contributes to women’s underrepresentation as professional scientists and engineers.
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2014 Grace Hopper Celebration of Women in Computing

Microsoft CEO Satya Nadella: women shouldn’t ask for raises – if they work hard enough “karma” will reward them.

(Microsoft: 17% female technical workforce)
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Celebration of Women in Computing

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"Surely he didn't just sit around and wait to be promoted to CEO of Microsoft.”

- Rose Simmons, UT Austin CS student
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- Lack of Information and Networking Opportunities
- Climate:
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- Climate:
  - Bias... Both Implicit and Explicit
Evaluation Bias

One study of postdoctoral applicants found that women had to publish 3 more papers in prestigious journals, or 20 more in less-known publications, to be judged as productive as male applicants. (Wenneras and Wold 1999)
127 science professors evaluate applications for an undergrad lab manager.

Moss-Racusin C A et al. PNAS 2012;109:16474-16479
Faculty gender did not affect the outcomes. Female faculty showed the same biases as male faculty.
What are some solutions?
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Educate leaders and other about the problems.

-- Data

-- Evaluation Bias

-- Causes of Underrepresentation
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   Ex.: Ensure that institutional practices don’t reinforce stereotypes.
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Active Recruitment
Active Mentoring
Active Networking

Biological Sciences: Agriculture and Biology

Physical Sciences: Physics, Earth Science, Chemistry

Engineering: Chemical, Mechanical, Biological, Civil, Etc.