

Women in the Workplace

Key Barriers to and Recommendations for Increasing
Female Participation in Male-Dominated Fields

NATIONAL GIRLS COLLABORATIVE PROJECT

2018

Introduction

To successfully address society's greatest challenges, women must be actively engaged as equals in creating and implementing solutions. However, women have been and continue to be underrepresented in specific career types and fields of academic study, limiting their participation in important conversations in technology and other industries. Women are especially absent in science and engineering roles, with the greatest disparities occurring in engineering, computer science, and the physical sciences.¹ This is particularly true for women who are Latina, Black, and Native American.

In order to effectively address issues of gender equity in the workforce, it is critical to examine the factors that contribute to the underrepresentation of women in various industries. We must study girls' experiences and update our practices so that girls and young women feel empowered to pursue roles in fields currently dominated by men. Increased access to high quality programs, greater visibility of female role models, and a focus on equitable classroom and workplace practices will help turn the tide.

Girls start off strong in math and science, participating and achieving at similar rates as boys, but lose interest and confidence in their skills as they grow older. Although equally capable, girls' interest and confidence in science, technology, engineering and mathematics (STEM) begin to decrease in middle school when they are developing their identities and starting to figure out who they are.^{2 3} Unfortunately, even when a girl is interested in STEM, curiosity and confidence are not always enough to motivate a girl to pursue STEM courses and, ultimately, STEM careers.⁴ It is imperative to provide better support and access to opportunities to reverse this trend and prepare our girls for the jobs of the future.

Significant gender disparities in enrollment in science and engineering courses begin to emerge at the undergraduate level, with these disparities continuing into the workforce.⁵ Women earn 57% of bachelor's degrees in all fields and 50% of science and engineering bachelor's degrees, but their participation significantly differs by field. The gender disparity is even more acute for women from racial and ethnic groups historically underrepresented in STEM (Latina, Black and Native American), who collectively earn only 11.9% of bachelor's degrees in science and engineering, including 3.1% of bachelor's degrees in engineering, 4.4% of bachelor's degrees in computer sciences, and 6.2% of bachelor's degrees in physical sciences.²

Women comprise half of the total U.S. college-educated workforce, but only 28.4% of the science and engineering workforce. Following the emerging trends at the undergraduate level, female scientists and engineers are concentrated in different occupations than men with relatively high shares of women in the social sciences (60%) and life sciences (48%) and relatively low shares in computer and mathematical sciences (26%) and engineering (15%).¹

Although women's participation in these fields is gradually increasing by females of all racial and ethnic groups, women of color remain dramatically underrepresented, comprising fewer than 5% employed scientists and engineers.²

Over the past 10 – 15 years, there has been a substantial surge in educational programming and research focused on increasing the participation of girls and women in STEM careers. Research and practice have identified key barriers to their participation in these fields, including girls and women's perceptions of their abilities as well as persistent stereotypes. This paper summarizes these challenges and suggests strategies to address them in order to engage and retain more girls and women in courses and careers traditionally dominated by men, including STEM.

Key Challenges

Lack of Self-Efficacy. Self-efficacy refers to the extent or strength of one's belief in his or her ability to complete tasks and reach goals. Believing in one's ability to succeed in STEM is important because it is linked to girls' engagement and persistence in these subjects.^{6 7} Research has found that girls express less confidence in their ability, rating themselves lower in mathematics and science knowledge than boys, even when actual achievement levels are similar, which adversely impacts their motivation to pursue mathematics and science-related fields.^{8 9}

Strong self-efficacy is also linked to the development of a STEM identity: when girls believe they are good at STEM subjects, they are more likely to pursue STEM-related opportunities and are better positioned to overcome feelings of inadequacy.^{10 11} This is especially true for girls of color.¹² Strong self-efficacy is also linked to young women enrolling in higher level mathematics and science courses in high school and choosing to pursue a STEM career path.¹³

Stereotypes. Stereotypes about male-dominated professions and the profile of individuals who succeed in those professions persist, putting women and underrepresented minorities at a significant disadvantage. Stereotypes about STEM proficiency, such as the idea that boys are better at math and science than girls, often deter young women from exploring STEM subjects.¹⁴ Research has also shown that stereotypes can negatively impact girls' assessments of their abilities¹⁵ and that female perception of stereotypical barriers to male-dominated fields discourage women from pursuing jobs in these fields. Such barriers include the perceptions that it is harder for women to get STEM jobs and that women are less likely than their male counterparts to be successful in STEM fields.¹⁶

Stereotypes about the nature and societal value of STEM professions can also decrease female interest in working in these subjects. Studies show that girls and women tend to prefer careers with communal benefit characteristics, such as helping others, creating a positive societal impact, and/or collaborating with others.¹⁷ These aspects of STEM careers, although present, are not well-publicized and often not part of the image that comes to mind when one envisions a typical person working in these roles.¹⁸ In addition, fields in which women are underrepresented are commonly perceived as masculine and competitive^{19 20} which often does not align with girls' interests and identities.²¹

Strategies and Recommendations

Raise the visibility of female role models. Research shows that increased visibility of female role models in fields currently dominated by men can have a positive impact on girls and young women, including increasing interest, positive attitudes, and self-efficacy.^{22 23 24} Presenting girls with female role models who come from diverse backgrounds, have experienced varying career pathways, and demonstrate a track record of success can help break down the stereotype of who works in and who can succeed in fields where women are traditionally underrepresented.²⁵ Role models can be especially powerful for Black, Latina and Native American girls, who are less likely to see people who look like them in STEM careers. Increasing visibility of or access to women in STEM who help others, work collaboratively, and successfully integrate family and careers can go a long way to change a girl's perception of life as a STEM professional.^{26 27}

Cultivate a growth mindset. Another method of improving girls' confidence and performance is to encourage a growth mindset – the belief that one's intelligence can expand with effort and practice.^{28 29} ³⁰ Having a growth mindset has been shown to alleviate stereotype threat, which is especially important for girls and women exploring fields in which they are underrepresented, given persistent stereotypes that boys and men are innately better at these subjects.³¹ Encouraging a growth mindset includes

providing constructive feedback to girls about their work and emphasizing that being challenged and struggling is a normal part of the learning process.

Counter stereotypes. Explicitly countering stereotypes can motivate girls and women to pursue careers in which they have been and continue to be underrepresented.^{32 33} It is powerful for organizations, companies, educational institutions and individuals to send the message that girls and women can succeed in fields traditionally dominated by men and that these professions are worth pursuing. This messaging can take many forms, including displaying non-stereotypical images, using curriculum that combats stereotypes, and providing support and opportunities to girls and young women throughout their educational trajectory.^{34 35} Messaging related to male-dominated professions, including STEM, is also impactful, as many girls and women have limited knowledge or inaccurate perceptions of what many of these professionals do. For example, females often value communal career characteristics such as being able to have work/life balance and engaging in work that helps others. Being explicit about how these characteristics can be congruent with STEM professions can increase girls and women's interest and ability to see themselves in these fields.

Create a collaborative environment. Providing a collaborative and supportive environment is a powerful strategy for encouraging girls to explore subjects of interest. Many fields in which women are underrepresented value independent work and achievement above collaboration, which reinforces stereotypes that careers in these fields are isolating and non-collaborative.³⁶ However, girls and women often prefer and benefit from opportunities to work collaboratively.³⁷ Being a part of a community and having a strong sense of belonging have been shown to help young women see themselves in STEM fields, increasing their confidence and persistence in the subjects.^{38 39} Support from others is also important for girls pursuing STEM subjects, especially from teachers and peers.^{40 41}

Make STEM relevant. Making STEM relevant to girls' lives can also increase their self-efficacy and sense of belonging in these fields.^{42 43} This includes making connections between girls' societal and cultural backgrounds and STEM disciplines as well as engaging girls in STEM activities that draw on their interests, knowledge, and lived experiences.^{44 45} This can be especially true for girls of color and girls from underserved communities who may identify less with STEM to begin with. Showing how technology can solve problems in one's own community is one way to make these subjects relevant and, as a result, more appealing, to young women.

Increase access to high-quality afterschool programs. Although increasing girls' participation in STEM programs has received its share of public attention recently, significant gaps remain in quality and accessibility of programming. High quality afterschool programs are more prevalent than ever, but can be cost prohibitive, with schools in more affluent areas offering more advanced STEM programs. Research focused on afterschool education demonstrates that what happens outside of school is just as important as what happens inside of school for activating interest and confidence in STEM.⁴⁶ Some promising practices to increase equitable access include partnering with nonprofit organizations currently working with underserved youth to add STEM program components, working with foundations to increase the capacity of STEM organizations to under-resourced areas, and connecting with community leaders to increase awareness of opportunities for underserved youth and families.

Conclusion and Next Steps

Engaging and retaining girls and women in fields in which they are currently underrepresented, including STEM, necessitates a multi-layered approach, from shifts in curriculum and teaching methods to an increase in visibility of role models to strengthening of support structures. At the foundation, high-quality programming needs to be available and accessible to all girls, especially those in underserved communities and girls of color. It is also critical to implement effective strategies, such as those discussed in this paper, that have been shown to increase girls' beliefs in their abilities and to break down negative stereotypes about careers in fields in which women continue to be underrepresented.

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