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# AI IN EDUCATION: Creating Inclusive STEM Environments for Girls

In today's swiftly advancing global landscape, the fields of science, technology, engineering, and mathematics (STEM) shape nearly every facet of society. Across developments in health care, education, agriculture, entertainment and media, environmental protection, and national security, innovations in STEM have become the backbone of modern progress.

According to the Girl Scout Research Institute, STEM jobs have increased by 70 percent over the last 30 years and are expected to keep growing (The Impact of Girl Scout STEM Programming, 2022). Individuals in STEM careers hold the power to shape global infrastructure now and into the future. Yet, despite Beyoncé's declaration that girls run the world, a gender disparity persists, with women making up only 35 percent of the global STEM workforce (Women in tech stats 2024, 2024). Closing this gap and increasing women's representation in STEM careers not only fuels global innovation and economic growth, but also advances equity.

Research shows that girls' interest in STEM often sparks in childhood, and educators play a crucial role in igniting this curiosity (Master et al, 2017). Equipping the

female voices of tomorrow with the skills and confidence necessary to pursue STEM careers enables them to not just "run the world," but shape and co-create the future of humanity.

Educators play a crucial role in establishing gender balance in a future STEM workforce. Studies show that a stronger STEM curriculum leads to higher rates of girls intending to major in STEM-related fields in college (Master et al, 2017). However, even with robust STEM programming, educators must first address the cultural and gender stereotypes that prevent girls in the U.S. from exploring STEM subjects.

Additionally, studies indicate girls receive less exposure to technology-related activities early in development (Barker & Aspray, 2006). These barriers can act as "gate keepers," deterring girls from pursuing STEM interests and careers (Cheryan, Master, & Meltzoff, 2015). Educators have the power to overcome these obstacles by introducing a variety of purposeful STEM activities and opportunities that spark and sustain girls' interest in STEM throughout their education.

## Role Models

Role models are guiding lights that shape our interests, behaviors, and dreams, igniting confidence and focus. For children, role models significantly influence development and offer a roadmap of what's possible. Sixty percent of women working in STEM careers report being there because they were inspired by role models. For women working in tech, role models are even more important as 64 percent report being inspired by a role model to pursue their career compared to only 47 percent of men (Buchholz, 2022).

“As a female founder of a tech start-up, I’m passionate about encouraging more women into STEM subjects and careers,” said Tash Grossman, co-founder and CEO of Slip. “The best way to promote more women in tech is within the education system and to provide students with female role models. The current education systems allow women to feel that tech is an inaccessible industry for them to thrive in—we need to change this narrative and encourage female empowerment in this space” (Buchholz, 2022).

Educators can introduce girls to STEM role models through a variety of impactful ways. Jackie Smalls, a teacher and writer with Edutopia says, “Surround your students with images of successful STEM professionals, and they’ll grow up knowing they can become one” (Smalls, 2022). Teachers and program managers can display pictures of influential women in STEM around the room and incorporate them into lessons. For example, they can read a STEM-themed book with female protagonists like “Rosie Revere Engineer” and “Ada Twist Scientist” by Andrea Beaty or assign essays on prominent women in the field.

Digital platforms like the “If/Then Collection” offer free resources like photos, videos, posters, and activities that feature diverse women in STEM. Additionally, the A Mighty Girl website—dedicated to inspiring smart and confident girls—curates an excellent collection of books related to science and technology. Educators can invite local women in STEM to speak about their experiences and help organize mentorship programs for older students to connect with successful women in STEM careers.

## Early Exposure to STEM

Research indicates that girls as young as six believe they are less capable than boys in STEM subjects. Although young girls display confidence in their math and science abilities, they still internalize stereotypes that boys are better at robotics and technology. This early self doubt is concerning, but the data also shows that educators can intervene to shift these perceptions (Master et al, 2017). By providing early, age-appropriate exposure to STEM, educators can challenge gender-biased narratives before they take root, empowering girls to feel confident and excited about a wide range of STEM subjects.

When introducing children of any age to STEM, experts agree that lessons should engage them in active exploration and participation in the process of scientific discovery. Hands-on experiences that allow children to develop and test theories encourage curiosity, enthusiasm, and innovation. Most experts advocate for a play-based curriculum as the most effective approach for early learning. Lessons can be built around activities like playing with blocks, Lego kits, or even washing hands, and seamlessly integrated into daily school activities.

“Embedding STEM-related opportunities allows learning to occur both out of context [and in context], such as a science experiment led by the teacher and daily classroom situations such as caring for the class pet,” says Jennifer Buchter, visiting lecturer at the University of Nevada College of Educational and Clinical Studies (Hand, 2017).

Cultivating a love for STEM learning and fostering a continually curious mindset lays the foundation for deeper engagement with science, technology, engineering, and math as girls grow, mature, and eventually choose whether they would like to enter STEM careers.

## Professional Development

Children and youth are not the only ones impacted by gender-biased stereotypes; educators can also hold negative self-assessments shaped by societal beliefs about gender. These internalized beliefs can influence how educators interact with students, both consciously and subconsciously (Feierabend et al, 2024). Through targeted professional development, educators can gain insight into the societal narratives affecting girls and women, enabling them to design more inclusive STEM programs (Chiangpradit, 2024).

Training can also help educators identify and address any subconscious biases they may possess, helping to reduce gender-biased microaggressions in STEM programs. Additionally, professional development can enhance educators’ understanding of the challenges faced by women with STEM degrees, fostering greater awareness of the obstacles young girls may encounter later in the workforce.

Trainings can focus upon teachers learning to become “conscious of their words, actions, expectations, and stereotypes for all expressions of gender identity ...and be prepared to take actions to learn from their mistakes” as well as how to cultivate culturally relevant instructional practices and be cognizant of gender in STEM (NSTA Board of Directors, 2019).

Research has shown that many women employed in STEM settings today have experienced sexual harassment and gender discrimination in the workplace. “For women working in science, technology, engineering, or math (STEM) jobs, the workplace is a different, sometimes more hostile environment than the one their male coworkers experience. Discrimination and sexual

harassment are seen as more frequent, and gender is perceived as more of an impediment than an advantage to career success” (Pew Research Center, 2018).

Educators play a crucial role in empowering young girls and addressing gender bias in education and future workplaces. To achieve this, it is essential that educators first recognize and address their own potential gender biases. By doing so, they can more effectively instill confidence in young people and provide them with the tools to advocate for themselves. This approach ensures that gender-based aggression in the workforce is not seen as the norm but rather as an unacceptable occurrence.

Educators should actively educate all students about gender bias, its manifestations, and its impacts. For example, they can introduce concepts like the “Matilda Effect,” which describes the bias that denies recognition of women’s work. By raising awareness of such biases, educators can help students identify and challenge these prejudices in their future academic and professional lives.

Research has shown that enterprises tend to hire men, rate them better in their applications, and pay them higher salaries, reviewers tend to give positive comments on scientific papers in which men are the first author, and there is also a disproportionate number of citations to studies written by female scientists and fewer award nominations and collaboration opportunities for women. (Guevara-Ramírez et al., 2022).

While educators cannot eliminate workplace discrimination, they can create opportunities for girls to be recognized for their STEM activities, fostering a sense of success and building confidence. By familiarizing all students with equitable environments, they will be more likely to speak up against gender discrimination when it occurs, paving the way for the next generation of female STEM professionals.

## The Future is Female

Research reveals that girls begin believing they are less capable than boys in STEM subjects at a young age, and that this stereotype follows them through to adulthood (Funk & Parker, 2018). However, educators can begin to combat this cultural narrative by connecting girls with STEM role models, encouraging early exposure to STEM, and gaining training in creating inclusive STEM environments for girls.

While the issue of gender bias in STEM is deeply systemic, educators can have a meaningful impact on future generations by implementing these strategies in their work with youth. As the workforce increasingly shifts toward STEM fields, the daily efforts of educators to create inclusive environments for girls in STEM not only can ignite girls’ passion for these subjects, but they also lay the foundation for women in STEM to play an equal role in shaping the course of humanity.

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