Committee: Educational, Scientific and Cultural Organization

Issue: Providing Equal Opportunity for Women in STEM

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Introduction

In today's world, scientific innovation is advancing at an unprecedented rate. Mankind has a greater understanding of the natural world than ever before, and individuals have used technology to improve their lives in many ways. However, shockingly, women still make up less than a third of scientific researchers globally. In the U.S., less than 25 per cent of STEM jobs are occupied by women, and only 22 per cent of all tech jobs across Europe are occupied by women.

It is crucial for the governments of each nation to provide equal opportunity in education and job search regardless of their jobs, and STEM fields are no exception. As Sustainable Development Goal (SDG) 4 – to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all – and SDG 5 – to achieve gender equality and empower all women and girls – suggest, nations must devise a way to solve the problem of unequal opportunity for women in STEM.

It is a must to resolve this problem. According to McKinsey & Company, if all countries closed the gender gap in STEM, the global GDP could increase by $12 trillion by 2025. Furthermore, according to the European Commission, if the number of women in the tech workforce in Europe increased to 40%, the European GDP could increase by €160 billion to €280 billion by 2025.

Definition of Key Terms

STEM Education

According to the Cambridge Dictionary, STEM is "an abbreviation for Science, Technology, Engineering, and Mathematics (as subjects of study)." According to the Federation of American Scientists (FAS), the term STEM education refers to "teaching and learning in the fields of science, technology, engineering, and mathematics."

STEM jobs

The Economics and Statistics Administration (ESA) defines STEM jobs to include professional and technical support occupations in the fields of computer science and mathematics, engineering, and life and physical sciences while omitting STEM education professionals and social scientists.

Deep technology

Deep technology, or deep tech, refers to "organisations with the expressed objective of providing technology solutions based on substantial scientific or engineering challenges." This means that the heart of the solutions that these organisations provide is strongly based on developing novel and appropriate technology to solve the problems rather than improving user experience through aesthetic design or attractive texts. Deep technology includes organisations that develop new chemical substances, improved medicines, advanced computer algorithms or robots, etc.

History

Women have been playing significant roles in advancing science and technology. However, their crucial and unwavering contributions are not fully recognised.

Among the greatest minds of all time, a number of them were working women in the field of STEM, which includes an astronomer, Maria Mitchell, and a mathematician, Mary Somerville. While the first women's rights convention was held in New York and urged for equal educational opportunities for women in all fields, the education gap between males and females in STEM still exists. In 1876, Elizabeth Bragg received a bachelor's degree in engineering from the University of California, Berkeley, becoming the first woman in the world to receive a degree in STEM fields. In 1889, the Association for the Advancement of Women (AAUW) was founded.

Brilliant scientists and engineers such as Marie Curie, who received the Nobel Prize in physics in 1903 and in chemistry in 1911, and Grace Hopper, who developed a commonly used programming language named COBOL, made substantial contributions to the advancement of science and technology.

In 1972, Title IX of the Education Amendments Act was passed, which prohibits sexual discrimination in education programs that receive federal financial assistance. In 1986, Sally Ride became the first American woman in space.

Key Issues

Addressing the gender gap in STEM education: problematic factors and solutions

Sociocultural norms make it harder for girls and women to pursue STEM careers. The norms are often reinforced by a woman's family, media, schools, workplaces, and culture. As some parents do not want their daughters to pursue male-dominated STEM careers, and some of them also believe that women are innately not suitable to work in STEM fields, many girls are pressured to pursue non-STEM careers, regardless of their talent or interest.
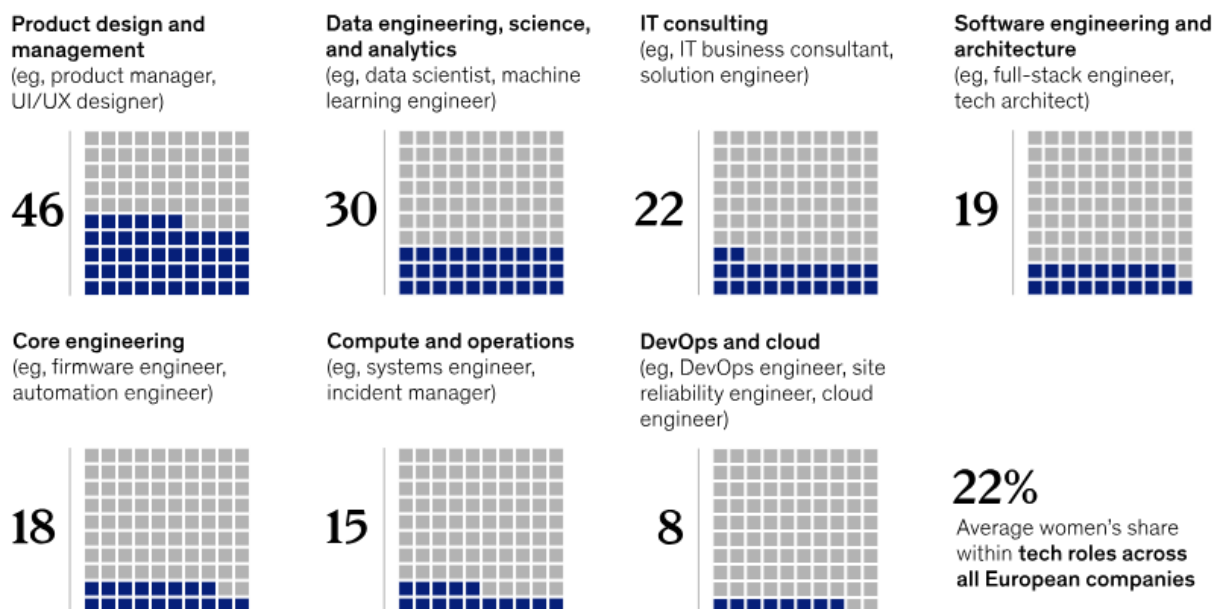
Schools sometimes provide biased curricula for women in STEM, and teachers often believe that STEM fields are only for males, not acknowledging that there are a number of programs and activities

that help, especially girls and women, build the skills and knowledge they need to pursue STEM careers. When teachers and parents hold negative stereotypes about girls' abilities in STEM, it can cause girls to have lower expectations of themselves and lower self-confidence in STEM fields, discouraging them from pursuing careers in the fields. As girls who grow up in cultures that value STEM are more likely to pursue careers in the fields, it is educational institutions' important role to create a more supportive environment for girls to learn and succeed in the fields and to prove more positive female role models in the fields.

Addressing the gender gap in careers in STEM

According to the U.S. Census Bureau, women only represented 27% of STEM workers in 2019. Although almost half of STEM graduates are women, they only make up one-fourth of tech workers. This significant drop-off is caused by the fact that women are underrepresented in STEM jobs in high-paying and growing fields. The distribution of women in tech roles is also uneven, as women are more likely to work in more interdisciplinary and less deep-tech-related areas. Women are more likely to work in product design and management and in data engineering, science, and analytics. However, they are underrepresented in DevOps and cloud roles and in computing and operations roles.

Figure #1: Average women's share in tech roles (McKinsey & Company)

Unconscious bias

Women are often mispredicted to have less interest and talent in math and science. Also, they are thought to be less capable of succeeding in technical and scientific fields. According to the report by McKinsey & Company, girls in secondary school are less likely to be supported by their teachers, parents, and peers to pursue STEM careers than boys. Additionally, the research suggests that girls are often discouraged from pursuing STEM careers as some teachers intentionally call on boys more than girls in STEM classes.

Lack of role models

One of the biggest challenges facing women in STEM is the lack of role models. There are still relatively few women in senior positions in STEM fields, which can make it difficult for young women to see themselves succeeding in these careers. As expectancy-value theory suggests, achievement-related choices can be predicted by a person's expectations of succeeding, as well as subjective task values. Therefore, the lack of role models is likely to discourage female students and professionals from pursuing STEM careers. This is also proven through scientific research that was conducted with 304 girls from 12 years old to 16 years old, suggesting that providing female role models to female students significantly increases the positive impact of expectations of success on STEM choices. However, according to CWJobs, the UK's leading IT job board, the workers in STEM are having difficulty naming female role models in their industry, which may depress female students and workers to pursue STEM careers.

Gender pay gap

According to the report from McKinsey & Company, women in STEM earn, on average, 20% less than men in similar roles. This is due to a number of factors, including unconscious bias and the fact that women are more likely to take on caregiving responsibilities.

Major Parties Involved and Their Views

Specialised agencies and organisations under the United Nations

United Nations entity for gender equality and the empowerment of women (UN Women)

The United Nations Entity for Gender Equality (UN Women) was established in July 2010, following the merger of four United Nations offices that focused on women's empowerment. UN Women works to promote gender equality and the empowerment of women in all areas of life, including economic empowerment, political participation, and ending violence against women.

UN Women conducts research on the status of women in STEM worldwide and holds the International Day of Women and Girls in Science (IDWGIS), holding various events and

conferences, including the UN Ocean Conference and UN Water Conference, to provide more opportunities for women in STEM to discuss and share their achievements.

As UN Women is a UN-affiliated organisation that is established to empower women in various nations and fields and to promote gender equality, it actively engages in resolving the problems among women in STEM, especially through international collaboration.

The commission on the status of women (CSW)

The Commission on the Status of Women (CSW) is a functional commission of the United Nations Economic and Social Council (ECOSOC). It is the principal global intergovernmental body dedicated to the promotion of gender equality and the empowerment of women. The CSW was established in 1946 to provide a forum for governments to review progress on the advancement of women and to make recommendations for further action.

The CSW has played a key role in the development of international norms and standards on women's rights, including the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW).

International Labour Organization (ILO)

The International Labour Organization (ILO) is a specialised agency of the United Nations (UN) that works towards promoting social justice and decent work for all. It was founded in 1919 and is headquartered in Geneva, Switzerland. The ILO has 187 member states, and its tripartite structure brings together governments, employers, and workers to shape policies and programs.

The ILO Women in STEM Workforce Readiness and Development Programme is a global initiative that aims to increase the participation of women in STEM fields. ILO collaborates with a few ICT, biology, and electronics companies in order to help upgrade technical and employability skills for female university graduates through the program.

Non-governmental organisations (NGOs)

Association for women in science (AWIS)

The Association for Women in Science (AWIS) is a non-profit organisation that was founded in 1971 to promote the advancement of women in science, engineering, and medicine. AWIS has over 10,000 members and provides a variety of programs and services to support women in STEM fields. These include networking opportunities, mentorship programs, and

scholarships. AWIS is a leading voice for women in STEM, committed to creating a more inclusive and equitable STEM workforce.

Society of Women Engineers (SWE)

The Society of Women Engineers (SWE) is a non-profit organisation that was founded in 1950 to support women engineers and engineering students. SWE has over 40,000 members in over 110 countries. The organisation's mission is to empower women engineers to achieve their full potential in careers as technical leaders and innovators. SWE is a valuable resource for women engineers. The organisation provides various programs and services that can help women advance their careers, develop their skills, and build relationships.

IEEE Women in Engineering (IEEE WIE)

The Institute of Electrical and Electronics Engineers Women in Engineering (IEEE WIE) is a global organisation founded in 1994, dedicated to promoting women engineers and scientists and inspiring girls around the world to follow their academic interests to a career in engineering. The organisation has more than 40,000 members in over 125 countries. It works to increase the number of women in engineering, especially those in academia, and promotes gender equality in engineering societies, inspiring the next generation of women engineers.

Girls Who Code (GWC)

Girls Who Code is a non-profit organisation founded in 2012 that works to close the gender gap in technology by helping girls pursue careers in STEM. The organisation has grown to reach over 500,000 girls in 14 countries.

GWC offers a variety of programs and initiatives, including after-school clubs, summer camps, and college scholarships. The organisation's goal is to create a world where girls are equally represented in the technology industry. A study by the organisation found that its alumni are more likely to major in computer science and engineering than their peers and are also more likely to work in the technology industry and start their own businesses.

Educational institutions and associations

University Research Association (URA)

Universities Research Association (URA) is a non-profit organisation that manages and operates major scientific user facilities in the United States. URA is a consortium of over 100 universities and research institutions in the United States, Canada, Japan, and Italy. URA's mission

is to advance science and technology through the management of major scientific user facilities. URA does this by providing leadership, management, and technical expertise to these facilities. URA also provides support for research and education programs at these facilities.

URA funds the URA-Fermilab Undergraduate Women in STEM internship program, which engages women STEM undergraduate students from under-represented groups to conduct research at the Fermi National Accelerator Laboratory. The research conducted in the laboratory is deeply rooted in natural science and mathematics, in which female researchers have been traditionally underrepresented. The research includes the following: particle physics, accelerators & detectors, applied physics & superconducting technology, computational science & artificial intelligence, and other emerging technologies.

College Board

The College Board is a non-profit organisation that develops and administers standardised tests and assessments in the United States. The organisation was founded in 1900 to create a more uniform system of college admissions. Today, the College Board serves more than 7 million students each year. The organisation is best known for its SAT and Advanced Placement (AP) programs.

In order to close the gender gap in STEM education, the College Board is running the AP Computer Science Female Diversity Award, honouring schools that have reached 50% or higher female examinee representation in one or both AP computer science courses.

Timeline of Relevant Resolutions, Treaties and Events

Date	Description of event
July 19, 1848	The first women's rights convention was held in Seneca Falls, New York. The convention includes a resolution calling for equal educational opportunities for women, including in STEM fields.
December 10, 1903	Marie Curie, a Polish and naturalised French physicist and chemist, became the first woman to win a Nobel Prize. She shared the 1903 Nobel Prize in Physics with her husband, Pierre Curie, and Henri Becquerel.
December 10, 1948	The Universal Declaration of Human Rights, adopted by the United Nations, states that "everyone, without any discrimination, shall have equal access to public service in his country."

June 23, 1972	Title IX of the Education Amendments Act, passed by the U.S. Congress, prohibits discrimination on the basis of sex in education programs and activities receiving federal financial assistance.
January 1, 1976	The United Nations Decade for Women was launched with the goal of promoting equality for women in all areas of life, including education and employment.
October 17, 1980	In 1981, Margaret Burbidge was elected President of the American Association for the Advancement of Science (AAAS), serving her one-year term from February 1982 to February 1983. She was the first female leader of the AAAS.
July 15, 1985	The Fourth World Conference on Women is held in Nairobi, Kenya. The conference adopts the Nairobi Forward-Looking Strategies, which call for increased access for women to education and training in science and technology.
September 4, 1995	The Beijing Declaration and Platform for Action was adopted at the Fourth World Conference on Women in Beijing, China. The document calls for the elimination of all forms of discrimination against women in education and employment, including in STEM fields.
January 1, 2000	The Millennium Development Goals are adopted by the United Nations. Goal 3 calls for gender equality and the empowerment of women.
January 1, 2015	The Sustainable Development Goals are adopted by the United Nations. Goal 5 calls for gender equality and the empowerment of all women and girls.

Evaluation of Previous Attempts to Resolve the Issue

In 1948, the United Nations declared that all public services must be accessible to everyone without any discrimination through the Universal Declaration of Human Rights. In 1972, the U.S. prohibited discrimination on the basis of sex in education programs that receive federal financial assistance through Title IX of the Education Amendments of 1972.

In 1985, the World Conference on Women in Nairobi called for increased access for women to education and training in science and technology. In 1995, the World Conference on Women in Beijing called for the elimination of all forms of discrimination against women in education and employment, including in STEM fields.

In 2000, Goal 3 of the Millennium Development Goals called for gender equality and the empowerment of women. In 2015, Goal 5 of the Sustainable Development Goals called for gender equality and the empowerment of all women and girls.

Despite these efforts, a significant gender gap in STEM fields still exists. According to the Global Gender Gap Report 2022 by the World Economic Forum, women make up only 26% of the global STEM workforce. This gap is even wider in some specific fields, such as engineering and computer science.

There are a number of reasons for this gap. One reason is the existence of sociocultural barriers that prevent women from pursuing careers in STEM. Another reason is that major companies in STEM fields are not doing enough to promote gender equality.

To address the gender gap in STEM fields, nations need to challenge cultural stereotypes about women in STEM. Also, they need to support women in these fields more by increasing funding for programs that support women in STEM and encouraging major companies in the fields to do more to promote gender equality.

Possible Solutions

To address the gender gap in STEM, nations can provide research funding and startup investment for women in the science and technology industry. Although the British Council, the UK's international organisation for cultural relations and educational opportunities, and other organisations are currently running their funds to support female researchers, the lack of financial incentives for female STEM researchers still exists.

Furthermore, nations can establish global organisations that especially support female scientists and engineers. Even though there are some global organisations for women's rights, such as UN Women, there are no UN-affiliated intergovernmental organisations that specifically focus on narrowing the gender gap in STEM. The organisation can offer international scholarships for women in STEM, mentorship and internship programs for female STEM students, scientists, and engineers, and a global networking program for female STEM professionals.

It is also important to develop education programs both for students and teachers. Education programs for students may include summer camps for K12 students, programming or engineering education programs for professionals, various STEM events for both female students and professionals in STEM, including research competitions, hackathons, and etc. As the gender gap in STEM is mainly caused by a sociocultural atmosphere that prevents women from learning science and working in STEM fields, education programs to help teachers properly guide female students to pursue STEM careers must be developed. Regulations to close the gender gap in STEM must also be implemented, especially in the field of education, as prospective STEM professionals might be deprecated to pursue careers in STEM fields if their teachers hold negative stereotypes about girls' abilities in STEM.

Bibliography

1. Gonzalez, Heather B., and Jeffrey J. Kuenzi. "Science, technology, engineering, and mathematics (STEM) education: A primer." Washington, DC: Congressional Research Service, Library of Congress, 2012.

2. "The Untold History of Women in Science and Technology ." *Obama White House Archives*, n.d., https://obamawhitehouse.archives.gov/women-in-stem. accessed 08 Aug 2023.

3. "Here's why we need more women and girls in STEM." *McKinsey & Company*, n.d., https://www.mckinsey.com/featured-insights/themes/heres-why-we-need-more-women-and-girls-in-stem. accessed 08 Aug 2023.

4. "Women in tech: The best bet to solve organisationent shortage ." *McKinsey & Company*, n.d.,https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/women-in-tech-the-best-bet-to-solve-europes-talent-shortage. accessed 08 Aug 2023.

5. UNESCO Office Bangkok and Regional Bureau for Education in Asia and the Pacific. *STEM education for girls and women: breaking barriers and exploring gender inequality in Asia*. UNESCO. 2020. Report num.: TH/C3-4873/IQE/20/054-Rev..

6. Beede, David et al. Women in STEM: *A Gender Gap to Innovation Executive Summary*. U.S. Department of Commerce Economics and Statistics Administration. 2011. Report num.: 04-11.

7. "The Gender Gap in STEM: Still Gaping in 2023 ." *MIT Professional Education*, n.d., https://professionalprograms.mit.edu/blog/leadership/the-gender-gap-in-stem/. accessed 08 Aug 2023.

8. "Eleanor Margaret Burbidge (1919–2020)." *Science*, n.d., https://www.science.org/doi/10.1126/science.abc6555. accessed 08 Aug 2023.

9. "Become an AWIS member." *Association for Women in Science*, n.d., https://awis.org/join/. accessed 08 Aug 2023.

10. "About SWE." *Society of Women Engineers*, n.d., https://swe.org/about-swe/. accessed 08 Aug 2023.

11. "About IEEE Women In Engineering." *IEEE WIE*, n.d., https://wie.ieee.org/about/. accessed 08 Aug 2023.

12. "About Us." *Girls Who Code*, n.d., https://girlswhocode.com/about-us. accessed 08 Aug 2023.

13. "About Us." *Universities Research Aswsociation*, n.d., https://ura-hq.org/about-ura/. accessed 08 Aug 2023.

14. "AP Computer Science Female Diversity Award." *College Board*, n.d., https://apcentral.collegeboard.org/exam-administration-ordering-scores/scores/awards/ap-computer-science-female-diversity-award. accessed 08 Aug 2023.

15. "About Us." *UN Women*, n.d., https://www.unwomen.org/en/about-us. accessed 08 Aug 2023.

16. "Commission on the Status of Women." *UN Women*, n.d., https://www.unwomen.org/en/csw. accessed 08 Aug 2023.

17. "About the ILO." *International Labour Organization*, n.d., https://www.ilo.org/global/about-the-ilo/lang--en/index.htm. accessed 08 Aug 2023.

18. "International Day of Women and Girls in Science ." *UNESCO*, n.d., https://www.unesco.org/en/days/women-girls-science. accessed 08 Aug 2023.

19. "International Day of Women and Girls in Science, 11 February ." *UNESCO*, n.d., https://www.un.org/en/observances/women-and-girls-in-science-day. accessed 08 Aug 2023.

20. "Global Gender Gap Report 2022 ." *The World Economic Forum*, n.d., https://www.weforum.org/reports/global-gender-gap-report-2022/. accessed 08 Aug 2023.

21. "The Gender Pay Gap in STE." *STEM Women*, n.d., https://www.stemwomen.com/the-gender-pay-gap-in-stem. accessed 08 Aug 2023.

22. "World Conferences on Women." *UN Women*, n.d., https://www.unwomen.org/en/how-we-work/intergovernmental-support/world-conferences-on-women. accessed 08 Aug 2023.

23. "Transforming our world: the 2030 Agenda for Sustainable Development ." U*nited Nations Department of Economic and Social Affairs Sustainable Development*, n.d., https://sdgs.un.org/2030agenda. accessed 08 Aug 2023.

24. Granovskiy, Boris. "Science, Technology, Engineering, and Mathematics (STEM) Education: An Overview. CRS Report R45223, Version 4. Updated." *Congressional Research Service* (2018).

25. "What is Deep Tech?" *TechWorks*, n.d., https://www.techworks.org.uk/about/what-is-deep-tech. accessed 08 Aug 2023.

26. González-Pérez, Susana, Ruth Mateos de Cabo, and Milagros Sáinz. "Girls in STEM: Is it a female role-model thing?." *Frontiers in psychology 11* (2020): 2204.