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The role of girls and women in STEM

What is the STEM?

STEM is the acronym for science, technology, engineering, and mathematics, four key strands of research and industry that are critical to technological development. Scientific and technological innovation, fostered by the STEM sectors, are key to enhancing a state's competitiveness and productivity, and are also a critical components in sustainable development. Breakthroughs in STEM have far-reaching applications in the fight against poverty, including increasing food production and developing biopharmaceutical medicines to help fight disease. Technology also plays a significant role in providing non-traditional education, where it has transformed the teaching landscape. Non-traditional, contemporary methods of education, such as online and distance-learning, podcasts and mobile device applications, are especially instrumental in providing learning resources to isolated communities and to those who cannot be physically present in educational institutions. In addition to the numerous social and health advantages, the STEM sectors also provide substantial economic benefit in terms of global employment worldwide; 22 million jobs in the European Union alone are within STEM.¹

What is the *status quo* of women in STEM?

- Only 12% of the global engineering workforce is female.
- Only 30% of all science researchers in the world are women.
- Latin America and the Caribbean have the highest proportion of female researchers, who account for 45.2% of all science researchers in the region. On the other hand Asia, the continent with the largest gender gap in science researchers, only have 18.9% participation of women.
- In some countries, there are signs of regression in terms of women in STEM: in the United States, women accounted for 37% of computer science degree holders in 1985 but this figure has since plummeted to 18% in 2013.
- Only 6% of Chief Executive Officers at the top 100 tech companies are women.
- An estimated 90% of future jobs will require skills in Information and Communication Technology.
- In the United States, for every \$1 earned by a man in STEM, a woman earns \$0.86, representing a 14% gender wage gap. Nonetheless, women in STEM jobs earn 33% more than their female peers in other jobs, while the STEM premium for men is 25%.

IN THIS ISSUE

p.1 What is the STEM?

p.3 Why is it important to have more women in STEM?
How does IFUW work with STEM?

p.2 Are women present in STEM?
Why aren't there more women in STEM?

p.4 How can NFAs become involved?

Are women present in *STEM*?

Despite the increasing number of women completing tertiary- and masters-level education, including in countries where female students outnumber their male counterparts,² the statistics still illustrate a glaring gender gap within certain professions, especially in STEM sectors. According to UNESCO, only 30% of all science researchers in the world are female.³ The participation of women in science research varies greatly by country and region. Latin America and the Caribbean has the highest average number of female researchers in science, accounting for 45.2% of all researchers; in fact six countries within the region see women outnumber men in terms of participation.⁴ The region where the gender gap is most prevalent in researchers is Asia, while the country with the lowest participation of women in science research is Saudi Arabia, where they account for only 1.4%.⁵

Science is not the only area where women are distinctly underrepresented professionally; other STEM disciplines have similarly glaring shortfalls of female participation. Gender diversity numbers released by giants of the technology world show the distinct lack of female employees generally and especially within technological (tech) roles. Google, Apple and Twitter each report that women account for 30% of total staff, while Facebook and LinkedIn show a marginal increase at 31% and 39% respectively.⁶ The figures are even more concerning in terms of tech-specific positions: men fill 80% of all technology positions at Apple, while women account for just 20%.⁷ At LinkedIn the disparity is even larger for technology roles; only 17% of women are employed in such positions.⁸ The status quo of the global female workforce in engineering is even more alarming still; only 12% is made up by women.⁹



Why aren't there more women in *STEM*?

Numerous socio-cultural and practical barriers exist that make it difficult or unappealing for women to access and pursue careers within STEM:

GENDER STEREOTYPING

Certain traditions and cultural norms stream girls and boys into different academic fields of learning during primary and secondary school, which carries over into tertiary education and eventual professions. Academic subjects within STEM have historically had an overrepresentation of male students, while social sciences, including home economics, have been predominantly studied by girls and women. The pool of graduates within STEM who continue to professional careers within the industries is therefore distinctly lacking in female candidates.

INHOSPITABLE WORKING CLIMATE

One study examining why women leave careers within science, technology and engineering (though not including mathematics) highlighted issues such as a sense of isolation, biased professional evaluations and a lack of sponsors, role models and mentors as factors contributing to their decision.¹¹ These were core reasons behind why 45%¹² more women than men within the industries were more inclined to leave the professions within the first year. A multitude of other factors including low salaries, long working hours and a conflict in work-life integration were also amongst the causes of the high attrition rate of women in technology.¹³ This behavioural pattern of women falling out of STEM careers is known as the “leaky pipeline” phenomenon.

“leaky pipeline” phenomenon

Gender disparities in STEM are particularly visible when women cross from educational to professional life. The “leaky pipeline” phenomenon describes the situation whereby the further a woman advances in her scientific studies and profession, the higher the likelihood she will drop out. The leaky pipeline is due to a number of conditions: marginalisation, funding gaps, non-family friendly work environments, lack of female peers and mentors, and a lack of professional recognition. The phenomenon seriously hampers innovation, slows socio-economic progress and perpetuates the gender gap across STEM industries. Education sectors and industries must make a concerted effort in the recruitment, retention and promotion of women to the highest levels within STEM, strengthening the transition between education and the labour market.

Why is it important to have *more women in STEM?*

Though women account for 40% of the global workforce,¹⁴ their severe underrepresentation in research within STEM industries is detrimental to achieving substantive gender equality as well as having a direct and damaging impact on the development of national economies. Statistics show that countries will face a large deficit in the labour force in the medium term, which is exacerbated by the low uptake of women in STEM. Europe alone is looking at a deficit of 24 million workers by 2040 if female participation in the workforce does not improve.¹⁵ Similarly, national economies would stand to benefit from higher productivity if more women participated within the labour force, especially in STEM industries where diversity of ideas is key to innovation. The potential for financial growth and technological advancement is severely stunted when women – who account for 50% of the population – are not sufficiently represented in STEM careers. Employers should create a better environment for women at work and provide a balanced working environment that will keep women working and advancing in their chosen professions, and not retreating to less demanding professional careers, part-time work or even non-professional employment.

How does IFUW work with STEM?

Acutely aware of the significant gender gap in STEM and recognising the negative socio-economic consequences thereof, IFUW promotes the role women in STEM through advocacy initiatives, grants and projects. IFUW emphasises throughout its manifestos¹⁶ that access to non-traditional forms of education, particularly within STEM subjects, is critical to increasing innovation, competitiveness, creativity and long-term development. At the international advocacy level, IFUW frequently urges international and national policy makers to promote education and careers for girls and women in STEM. IFUW has also provided financial

support to female postgraduate students conducting doctoral research within STEM subjects.¹⁷

Most recently, IFUW has developed a project specifically aimed at bringing innovation to STEM education, inspiring secondary school girls to pursue engineering and facilitate female STEM students to lead the way to a wealth of opportunities for women in manufacturing innovation. The project – “STEM Talent Innovation Lab” – will inspire future generations to consider a career in a STEM field. IFUW plans to roll out “STEM Talent Innovation Labs” for secondary school girls and women students in 2015. The girls’ workshop will be centered on fun and discovery, while the students will participate in an industry immersion programme, to harness the talents of these two generations. The project supports an ethos to advance each generation with an inclusive environment that embraces new ideas. The labs will be integrated through demonstrations led by the students. The project provides the opportunity to champion STEM across the generations and will take place in partnership with schools, universities, education authorities and other leading institutions. More information will follow soon on the IFUW website.¹⁸

“...[Q]uality education and equal access and participation in science and technology for women of all ages are not only imperative for achieving gender equality and the empowerment of women – they are also an economic necessity, providing women with the knowledge and understanding necessary for lifelong learning, employment, better physical and mental health, as well as full participation in social, economic and political development.”

– MICHELLE BACHELET, FORMER UNDER-SECRETARY-GENERAL AND EXECUTIVE DIRECTOR OF UN WOMEN, AT THE 55TH SESSION OF THE COMMISSION ON THE STATUS OF WOMEN (CSW), MARCH 2011.¹⁹

How can NFAs become *involved*?

NFAs can undertake numerous advocacy activities at the local and national level to promote the critical role of women and girls in STEM. At the public level, members can begin by raising awareness of the persisting gender-stereotyping that continues at schools, where girls are steered into certain disciplines of learning. NFAs and local branches can engage with school boards and ministries of education, encouraging them to incorporate education policies that actively encourage girls to study STEM subjects. This could be achieved by launching national campaigns that showcase strong female role models, leadership and expertise, especially within STEM professions, including by developing mentoring programmes. In terms of addressing the leaky pipeline phenomenon, members could advocate with local and national politicians to formally adopt legislation that prohibits gender discrimination in the workplace, with particular focus on applying the principle of equal pay for work of equal value.

With regard to interaction with the private sector, NFAs can seek to partner with STEM companies to facilitate sponsorship of scholarships and training opportunities for women graduates in non-traditional fields. STEM industries should also be encouraged to make the work environment more appealing to female employees, including by exhibiting greater gender diversity in leadership positions and offering improved employment conditions, including more flexibility with working hours, competitive remuneration and continuing training.

Join the STEM Community!

Social media is another powerful means of communication to advocate for increased female participation in STEM. Follow STEM on Twitter: @Stemettes @4womeninscience @GirlsInStem @Womenintech @WomenWhoCode #womeninstem #womenscientists



RESOURCES

<http://www.uis.unesco.org/FactSheets/Documents/sti-women-in-science-en.pdf>

<http://www.uis.unesco.org/ScienceTechnology/Pages/women-in-science-leaky-pipeline-data-viz.aspx>

http://www.empowerwomen.org/~/_documents/2014/01/26/16/56/girls-in-stem-and-ict-careers-the-path-toward-gender-equality#

<http://science-girl-thing.eu/en/splash>

<http://www.esa.doc.gov/sites/default/files/reports/documents/womeninstemagaptoinnovation8311.pdf>

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2. Including in the United States, Russia, Argentina, Brazil and Venezuela: <http://www.uis.unesco.org/Education/Pages/women-higher-education.aspx>
3. <http://www.uis.unesco.org/ScienceTechnology/Pages/women-in-science-leaky-pipeline-data-viz.aspx>
4. Bolivia, Venezuela, Trinidad & Tobago, Argentina, Paraguay and Uruguay. As of 2010 or last available year of data: <http://www.uis.unesco.org/FactSheets/Documents/sti-women-in-science-en.pdf>.
5. *Ibid*,

6. <http://www.techrepublic.com/article/diversity-stats-10-tech-companies-that-have-come-clean/>
7. *Ibid*.
8. *Ibid*.
9. http://www.sustainlabour.org/IMG/pdf/women_en.pdf
10. 55th Session of the Commission on the Status of Women (CSW), United Nations Headquarters, New York (March 2011) http://www.un.org/womenwatch/daw/csw/csw55/statements/MB_CSW_closing_final.pdf
11. <http://www.fastcompany.com/3037075/strong-female-lead/why-are-women-leaving-science-engineering-tech-jobs>
12. Figure for the US, *ibid*.

13. <http://anitaborg.org/insights-tools/why-women-leave/>
14. <http://www.theguardian.com/global-development/2014/sep/29/women-better-off-far-from-equal-men>
15. <http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTWDRS/EXTWDR2012/0,,contentMDK:22999750~menuPK:8154981~pagePK:64167689~piPK:64167673~theSitePK:7778063,00.html>
16. <http://www.ifuw.org/ifuw-manifestos/>
17. <http://www.ifuw.org/what-we-do/grants-fellowships/fellowships-grants-archive/>
18. <http://www.ifuw.org/what-we-do/projects/>