Towards an equal future: Reimagining girls' education through STEM

Summary

1. How is the learning crisis affecting girls?

We are facing a learning crisis, which is leading to a skills crisis. Millions of children and young people are not developing the skills they need to survive and thrive. For girls and women, this crisis includes unequal access to quality learning opportunities in Science, Technology, Engineering, and Mathematics (STEM) – subjects traditionally ascribed to and dominated by boys and men. **Girls are missing out on the skills that STEM learning cultivates** that are applicable throughout life; thinking laterally, problem solving and innovating. The intensive use of digital resources during the COVID-19 pandemic have many students, governments and service providers considering the future of education. **This is a moment of change**; a moment to advocate for gender equality in educational opportunities and to identify key actions that could lead to gender equality in education and the workforce. Failure to invest in girls' STEM education and empower them to join the digital revolution will forfeit the economic potential of half the population. **Efforts to prepare girls and young women to equally participate in the workforce, including in STEM fields, need to be accelerated.**

Gender-responsive STEM education

is an approach to teaching and learning with the transformative potential to deliver on the promise of the girls' education and empowerment agenda in the 21st century.

AGENCY & VOICE

Strengthen their agency

CRITICAL UNDERSTANDING

Enable them to understand and seek solutions to issues in the world

LEARNING OUTCOMES

Motivate them to learn and achieve at the highest levels

TRANSITION TO EMPLOYMENT

Facilitate their transitions to employment and livelihoods

EMPOWERMENT

Empower them to be innovators, entrepreneurs, and changemakers

This approach challenges traditional views of men and women about what girls are able to do and what they can aspire to.

unicef for every child

EQUALS GLOBAL PARTNERSHIP

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2. Why is STEM learning so important for girls?

- We cannot afford to live in a world where scientific and technological solutions are desperately needed – and exclude half of the world's talent. We need girls and women.
- **STEM learning encourages girls to think as innovators** and solve problems like scientists and engineers, equipping them with the knowledge and creativity to address challenges in their communities, such as treating diseases or maintaining supplies of clean water.[1]
- **STEM learning can develop girls' literacy and numeracy**, by applying their skills in critical use of complex information and writing arguments[2] and by engaging students in identifying patterns, measuring, and creating models to solve real-world problems.[3]
- **STEM education grows transferrable skills,** including creativity, critical thinking,[4] collaboration, and self-management skills[5] to help meet the evolving demands of the labour market and entrepreneurship.[6]
- **STEM education provides a foundation for children to apply digital literacy** to design technological devices and solutions, search for and manage information, communicate, collaborate, create and share content,[7] and be cyber-safe.
- **STEM learning provides job-specific skills** – in engineering, computer programming, cloud technology, robotics, health sciences and technologies – equipping girls to equally and actively participate in changing economies and evolving labour markets.
- **STEM education disrupts unequal gender norms,** exposing girls to positive STEM messages, role models and activities from a young age, influencing gender socialization.

The cost of inaction

Without STEM for girls inequality will be perpetuated. At the current pace, it will take 99.5 years to achieve gender parity world-wide.[8] The world will continue to be designed by and for men, with the potential of girls and women remain untapped.

Return on investment

Increasing women's participation in STEM careers has the power to close the gender pay gap and boost women's cumulative earnings by $299 billion over the next ten years, expediting global economic development.[9]

STEM education as an accelerator of the 2030 Agenda for Sustainable Development

Girls' and women's equal access and participation in STEM is key to the 2030 Agenda for Sustainable Development and its pledge to leave no one behind in terms of equality, peace and human progress.

SDG 3 – Good Health and Well-being

STEM knowledge and skills can empower girls to make informed decisions about their maternal health and well-being and that of their children (SDG3).

STEM for girls brings together and expands the transformative potential of **SDG4** and **SDG5** by contributing to girls' and women's empowerment and the achievement of other sustainable development goals:

SDG 4 – Quality Education

Access to STEM education contributes to girls' opportunities to develop transferable, technical and vocational skills, for employment, decent jobs and entrepreneurship (SDG 4.4), has the potential to accelerate elimination of gender disparities in access to digital technologies and digital learning (SDG 4.5) and positions girls and women as capable players in the promotion of sustainable development and gender equality in all spheres of life (SDG 4.7).

SDG 5 – Gender Equality

STEM for girls can enhance their access and decision-making in relation to their sexual and reproductive health and reproductive rights (SDG5.6), and can strengthen their use of enabling technology, in particular information and communications technology (SDG5.b) in ways that can potentially enlarge their lives and work-related opportunities.

SDG 6 – Clean Water and Sanitation
SDG 13 – Climate Action
SDG 14 – Life Below Water
SDG 15 – Life On Land

A STEM education also improves girls' awareness and capacity to participate in actions that protect the environment and that can position them as leaders in their communities, actively engaged in building greener and more sustainable societies (SDG 6 and SDGs 13–15).

SDG 1 – No Poverty
SDG 8 – Decent Work and Economic Growth

STEM knowledge and skills can equip girls with the tools to transition from education to employment so that young women improve their livelihoods and contribute to poverty reduction and economic growth (SDG 1 and 8).

SDG 9 – Industry, Innovation and Infrastructure

Girls who develop STEM skills are better prepared to contribute to scientific research and to technological development initiatives leading to innovative solutions in industrial sectors (SDG 9).

3. What are the gender disparities in STEM education?

What are the gender disparities in STEM education?

Girls are consistently underrepresented among top performers in STEM subjects

Girls were represented similarly to boys among top math performers in grade 6 in only

12 of **42** countries

in Sub-Saharan Africa and Latin America and the Caribbean.[10]

Girls in developing economies are particularly disadvantaged in digital skills

In Ghana

16 % of boys

possess digital skills, compared to only

7 % of girls

Women are underrepresented in STEM labour market transitions

Only

30 %

of tech industry professionals are women.[11]

Female mentorship is low in STEM fields

14 %

of STEM entrepreneurs in Latin America are women, as opposed to

38 %

of entrepreneurs in non-STEM fields.[12]

Discrimination and policy gaps

Discrimination in hiring and promotion, harassment, pay gaps, unfair treatment by co-workers, difficulties balancing work and life, and a lack of corporate policies supporting career development.[13]

Stereotypes about STEM as being masculine subjects

Stereotypes about STEM and social norms about what girls can and should do shape girls' beliefs and attitudes towards STEM.

Girls' career expectations reflect gender stereotyping

Only

18 % of women

who are students in tertiary institutions throughout the world pursue STEM fields compared to

35 % of men

4. Why are girls under-represented in STEM?

- **Gender norms and gender stereotypes** limit girls' motivation and engagement with STEM. Caregivers and teachers often reinforce the notion that boys are better in science and mathematics than girls.
- Amongst top performers in mathematics, girls of higher **socio-economic status** are over-represented (19 per cent) relative to girls with lower socio-economic status (3 per cent).
- Women and girls who face **ethnic, racial and linguistic discrimination** often have no role models that look like them, talk like them and share their lived experiences.
- **Girls and women with disabilities** face stigma, underestimation of their skills, and education and labour market systems that are not inclusive.[14]
- **Women with immigration or refugee status**, despite having STEM skills, may not have the permission to work in STEM-related fields in host countries.
- Girls have **limited exposure to female role models in STEM**. Girls' interest and confidence in their abilities increase when they are exposed to positive STEM role models.[15]
- **Marginalized girls face significant barriers in their transition to the STEM workforce** due to caregiving responsibilities and domestic chores.
- **Gender-responsive pedagogies have not made their way into STEM education yet**. Girls are more interested in STEM when it is taught from a hands-on perspective.[16]
- Existing **STEM initiatives have limited reach**, and are more available in cities because of better schooling infrastructure or more readily available private sector initiatives.

5. How can we transform opportunities for girls through gender-responsive STEM education?

To adequately respond to the gender divide and meet the needs of girls, **we need realize the transformative potential of STEM education**. A **gender-responsive and integrative approach** to teaching gives girls the skills and knowledge that they need to interact with the world.

Call to Action

All actors must coordinate their work to create an ecosystem in which girls can thrive as users of new technologies and members of the workforce of the future. This ecosystem is comprised of government, private sector, civil society, bilateral and multilateral development partners, academia, families and communities, and girls themselves. **It is an ecosystem in which workplaces do not merely inherit a workforce developed from community and government investment in education but are active partners in its formation**.

We call on governments and their partners to **reimagine girls' education and empowerment through STEM education** by transforming education systems so that even the poorest girls have access to quality STEM Education. The following actions will be critical:

- **Make clear budget commitments and allocations** for gender responsive STEM education at national and provincial/regional levels.
- **Include gender-responsive STEM learning and career opportunities** in national development plans, education sector policies, ICT and science policies.
- **Invest in innovative gender-responsive STEM pedagogies** at all levels of education.
- **Invest in upskilling women teachers** and women teacher educators in STEM.

- **Revise** STEM learning materials, removing gender bias and stereotypes.
- **Increase access to STEM education through increased digital connectivity for all children,** especially for girls in hard-to-reach areas with limited capacity.
- **Provide community-based digital skills training** for out-of-school girls – using existing community groups or forming new STEM clubs for girls.
- **Introduce innovative education solutions** that reimagine classrooms, particularly in marginalized and remote areas, with limited teaching capacity for STEM.
- **Create initiatives to support girls' school-to-work transition**, such as career guidance at school, apprenticeships, mentorships and work experience programmes.
- **Work with industry networks and enterprise-based STEM career programmes** connecting STEM professionals with girls in schools for role modelling and mentoring.
- **Instigate financial incentive schemes** to draw young women into STEM jobs.

We call on employers to **reimagine future jobs for girls** by creating supportive and safe environments where girls and women can apply and develop their STEM knowledge and skills. The following actions will be critical:

- **Sponsor incentivized apprenticeship schemes** and **offer stipendiary internships** to girls and young women to enhance their transition into labour market.
- **Forge public-private partnerships** between education systems, governments and companies working in emerging technologies.
- **Create networks for women STEM professionals** for large scale communication campaigns that help transform perceptions of women in STEM.
- **Develop and enforce anti-harassment policies** to make workplaces safer for women.

We call on stakeholders to work closely with the community to **reimagine a world where communities support girls to engage, achieve, and excel in STEM**, by transforming gender norms. The following actions will be critical:

- **Engage men and boys** in valuing the capacity, abilities and contributions of women;
- **Community participation in monitoring progress towards reduction of gender-gaps in participation and achievement** in STEM subjects and STEM work opportunities.

We call on stakeholders to work together to **back girls and young women with evidence** to monitor change towards gender equality in education. The following actions will be critical:

- **Develop collection and reporting mechanisms** for STEM-based data;
- **Sponsor academic research** to understand barriers to girls participation and achievement in STEM for advocacy and to map future opportunities;
- **Build a global framework for information-sharing** on national solutions for digital literacy and STEM skills;
- **Document best practices** of girls' STEM education and workforce engagement.

We call on stakeholders to take action to accelerate gender equality in technology and innovation by joining **Generation Equality**, a movement and multi-partner platform that takes action to accelerate gender equality. The International Telecommunication Union and UNICEF will co-lead the action coalition and leverage established initiatives (EQUALS, the Global Partnership for Gender Equality in the Digital Age and GIGA) to get more girls learning online.

Endnotes

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