Role of women in STEM

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Subject: Science & Technology

Why is in news? Women's empowerment is crucial in ensuring food security and sustainability. Discuss in the context of STEM (Science, Technology, Engineering and Mathematics) fields.

Women are the agricultural workforce's backbone, working tirelessly to feed nations. Women's empowerment in STEM allows them to better explore applications of new and emerging technologies in the delivery of various rural practises, mostly centred on agriculture.

To realise the dream of a progressive India, we must prioritise empowering women farmers. This includes giving them equal access to land ownership, financial resources, modern farming techniques, and agricultural education on sustainable practices.

About:

The STEM acronym was **introduced in 2001** by scientific administrators at the U.S. National Science Foundation (NSF).

The organization previously used the acronym SMET when referring to the career fields in those disciplines or a curriculum that integrated knowledge and skills from those fields.

It is a curriculum based on the idea of educating students in **4 specific disciplines — science, technology, engineering and mathematics** — in an interdisciplinary and applied approach.

India is one of the countries that produce the highest number of scientists and engineers, the growth of STEM has picked up significantly over the last few years.

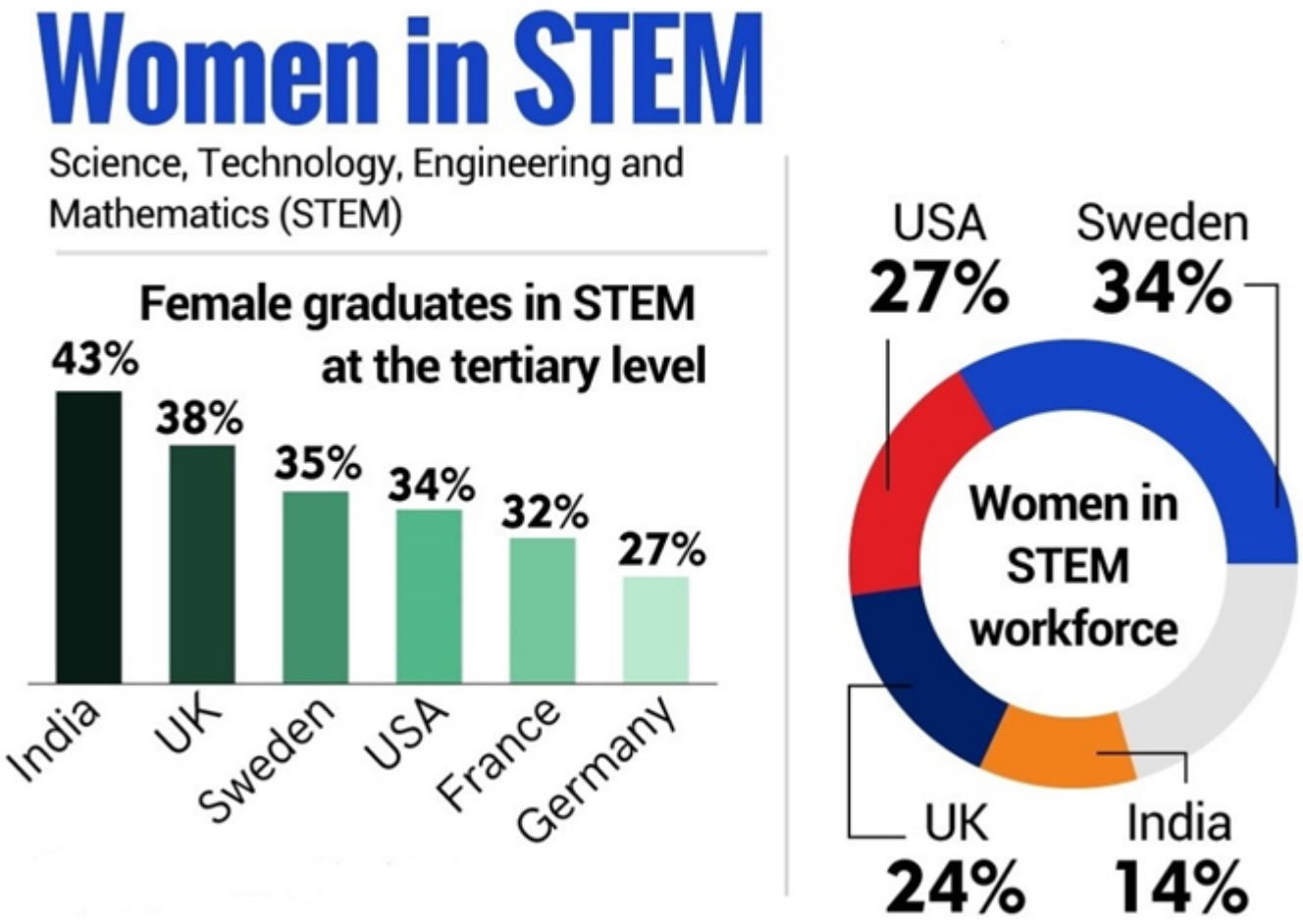
A robust STEM education creates critical thinkers, problem-solvers, and next-generation innovators.

According to the National Science Foundation, it is predicted that 80% of the jobs created in the next decade will require some form of math and science skills.

Datas on Women Participation in STEM:

About 43% of STEM graduates in India are women, which is the highest in the world, but their share in STEM jobs in India is a mere 14%.

In Indian STEM, the primary concern has never been with the number of women graduates, but with the proportion of those who ultimately land STEM jobs.



As per the **annual All India Survey on Higher Education (AISHE) report**, which indicates enrolment in undergraduate, Master, and PhD-level programs, the number of women in India who have opted for STEM courses has increased from 10,02,707 in 2017-18 to 10,56,095 in 2019-2020.

According to recent data from the **Department of Science and Technology** (DST), women made up 28% of participants in extramural Research and Development (R&D) projects in 2018-19, up from 13% in 2000-01.

The proportion of women primary investigators in R&D increased more than four times — from 232 in 2000-01 to 941 in 2016-17. The proportion of women researchers rose from 13.9% in 2015 to 18.7% in 2018.

In India, **one in three research papers is being written by a female** author in over 186 fields, as per the Scopus database.

Yet, the turnaround for women's participation in STEM-related jobs in the country is currently as low as 14%.

As per the recent **Global Gender Gap Report 2023** by the World Economic Forum, women account for 27% of India's STEM workforce, as compared to 32% of the non-STEM workforce.

Globally, 18 percent of girls in higher-level education are pursuing STEM studies, compared with 35 percent of boys.

As per **World Bank data**, only 33% of researchers are women worldwide

S&T has translated into the economic sphere and institutions are structured so, Science & Technology (S&T) could become a changemaker in society by introducing flexible work times, and gender-neutral pays to enhance women

participation in STEM.

Greater women's participation in the tech sector will make women more strong and influential, giving a boost to their socio-economic situation in the society.

Reasons for the Low Participation:

The paucity of women in STEM is not merely due to skill inadequacy, but also a result of assigned **stereotypical gender roles.**

There are **patriarchal attitudes** in hiring practices or awarding fellowships and grants etc.

The situation generates concerns among girls and women about their suitability only for certain "soft" fields and professions leading to self-doubt**Self-doubt** among women professionals limits them from applying for leadership roles.

Lack of role models, pressures to conform to **societal norms** and trappings of domesticity.

Stressors related to marriage, childbirth etc.

Women are **expected to manage both home and work**, for which they require more flexible schedules.

Physical safety during the commute to work.

Sexual and other types of harassment in workplaces, etc.

There are **not enough female role models** whom women may admire and follow. (Of the 866 Nobel winners so far, only 53 have gone to women).

The under-representation of women in STEM starts from school and results from deep-rooted social discrimination, social norms, biases that influence the quality of education they receive and the subjects they study.

Significance of Women Participation in STEM:

Women's participation in STEM fields could **spur economic growth** and promote gender equality worldwide.

Involving more women and girls in science can **help create a more diverse and inclusive scientific community**.

Different perspectives of females can bring valuable insights and advancements to scientific research and discovery leading to **better problem-solving and decision-making**.

STEM is crucial to **achieve the UN's Sustainable Development Goal(SDG) 5** (gender equality) which includes women's use of enabling technology.

When women and other traditionally underrepresented groups are involved in the design and execution of scientific studies, the results are likely to be more relevant to them and their communities.

Including women and girls in science helps ensure that the resulting knowledge is reflective of the needs of society as a whole, not just those of one group.

Government initiatives:

Science, Technology and Innovation (STI) policy of DST:

It is targeting 30 per cent women's participation in science and technology by 2030.

Currently, 35 of the 97 scientists in DST are women and 11 of 18 divisions are headed by them i.e., 61 per cent of women in leadership.

Vigyan Jyoti:

It encourages meritorious girl students of Class 9-12 to pursue education and career in science and technology, particularly in the areas where women are underrepresented.

GATI scheme:

GATI - Gender Advancement for Transforming Institutions

It aims to transform institutions for a more gender-sensitive approach and inclusiveness with the ultimate goal to improve gender equity in S&T.

KIRAN:

Knowledge Involvement in Research Advancement through Nurturing

To encourage women scientists through various programmes in the field of Science and Technology (S&T).

'Women Scientist Scheme (WOS)' under KIRAN provides career opportunities including fellowships to unemployed women scientists and technologists, especially those who had a break in career, for pursuing research in frontier areas of science and engineering.

CURIE initiative of DST:

'Consolidation of University Research through Innovation and Excellence in Women Universities (CURIE)' Programme of DST provides support for development of research infrastructure in women universities to encourage women's participation in R&D activities.

SERB-POWER:

For women researchers interested in undertaking R&D activities, Science and Engineering Research Board (SERB) formulated SERB-POWER (Promoting Opportunities for Women in Exploratory Research) as a funding framework that aimed at providing financial assistance through grants and fellowships, enabling women to pursue their STEM research projects.

BioCARe:

The Biotechnology Career Advancement and Re-orientation Programme (BioCARe), was also undertaken by the Department of Biotechnology (DBT) as a step forward to encourage women scientists to take up biotechnology research.

WISE:

WISE - Women in Science Engineering from Rural Parts of India is an outreach initiative launched by IIT-Bombay to combat the skewed gender ratio in STEM courses.

The initiative aims to introduce STEM courses and includes a periodical mentorship structure through which student volunteers at IIT Bombay will follow up with the girls.

WEST:

Women in Engineering, Science, and Technology (WEST), a new I-STEM (Indian Science Technology and Engineering facilities Map) initiative called “Women in Engineering, Science, and Technology (WEST)” was launched in 2022.

The WEST program will cater to women with a STEM background and empower them to contribute to the science, technology, and innovation ecosystem.

Way forward:

It is hoped the programmes that have been initiated by the Government to empower women in the workforce will usher in gender parity by 2047, which would mark the centenary of India’s Independence.

Need to **create a facilitative gender-neutral culture** of research in institutions and industries.

More women in STEM would **improve the quality and create a meaningful impact** on society and national needs.

More women in these filed would support the development of products, processes, and technology that would support the goal of Women's empowerment.

Women’s participation in STEM should be **encouraged from primary school level rather only in higher studies**.

Initiating **a well-planned role model programme** with successful women scientists

Special fellowships for girl students securing top positions in university exams

Reintegrate women who have **taken mid-career breaks**

Government agencies, universities, and society must work together to ensure that women achieve their full potential

Conclusion:

The PM emphasised the importance of creating a level-playing field where women achievers become the norm, as well as working to remove barriers that limit their access to markets, global value chains, and affordable finance, while also ensuring that the burden of care and domestic work is appropriately addressed.

The number of women in technical education in industrial training institutes has doubled since 2014, nearly 43 per cent of STEM (Science, Technology, Engineering, and Mathematics) graduates in India are women and about one-fourth of space scientists in India are women.