



Office of the Principal Scientific Adviser
to the Government of India



WHITE PAPER

Based on the discussions held during the roundtable
“Women in STEM: Redefining Science Through
Collaboration, Skills, and Cutting-Edge Innovations”

Organised by



Syngene CSR

Enabled by *Biocon Foundation*

Research and Innovation Circle of Hyderabad
(RICH) in collaboration with Biocon Foundation and
Syngene International



Executive Summary

Women's representation in Science, Technology, Engineering, and Mathematics (STEM) remains a crucial challenge.. Despite significant progress, gender disparities persist in academia, research, and industry. The barriers preventing women's full participation in STEM include systemic biases, lack of structured industry-academia collaborations, and insufficient funding for women-led research initiatives. Additionally, skill gaps between academic training and industry requirements further restrict women's career growth in STEM disciplines.

Numerous studies highlight that increasing women's participation in STEM leads to greater innovation and economic growth.[1] However research indicates persistence of gender-gaps, in terms of opportunities, nature and duration of employment, rank and seniority and overall career development. Women are likely to face dual role syndrome wherein professional decisions are largely affected by their domestic responsibility. There have been many studies on the problems related to retention of trained women scientists.. These studies have come up with interventions with regards to work/study environment, overall quality of academic resources, support services, research productivity and professional excellence. [2]

Research suggests that it is imperative to work towards breaking gender stereotypes and retention of women in STEM through early investment in reskilling and promotion of STEM education. In recognition of this, National Education Policy (NEP) aims to work towards increasing women enrolment in formal education and equipping them with relevant skill sets to reduce the gender gap. This will help to prevent leakage of competent, productive and valuable human capital that can contribute positively to the country's economy.[3]

With all this in mind, Research and Innovation Circle of Hyderabad (RICH) in collaboration with Biocon Foundation and Syngene International has launched a holistic scholarship, internship and mentorship programme, which focuses on promotion of STEM education and skill development of marginalised women students studying in Tier 2 and 3 institutions. The programme provides these students with an opportunity of experiential learning through internship to work in premier R&D institutions or industries. We aim that the programme will be helpful in increasing awareness of higher education and career opportunities and can encourage the female students to take up a career in STEM.

As part of this initiative, a roundtable discussion was organised on the topic of 'Women in STEM: Redefining Science Through Collaboration, Skills, and Cutting-Edge Innovations'. The discussion has helped us to create a comprehensive document, which highlights and addresses the challenges through strategic interventions, policy changes, and collaborative initiatives. This white paper identifies key areas where intervention is required, including promoting stronger industry-academia partnerships, enhancing skill development opportunities for women, increasing corporate and government funding for STEM education, and supporting research innovation. Through targeted efforts and structured interventions, we can reshape the landscape of women's participation in STEM and ensure a more inclusive and dynamic future.

1. Introduction

The science industry is evolving rapidly, driven by breakthroughs in biotechnology, artificial intelligence, and data-driven research methodologies. However, gender inequality and skill mismatches continue to hinder women's progress in this field. Despite the rising global demand for skilled STEM professionals, women remain underrepresented in leadership positions, scientific research, and technical roles. [1]

1.1 Global Perspective

Women in STEM fields worldwide continue to face multiple structural and societal challenges. Despite international efforts to close the gender gap, women are still significantly underrepresented in leadership positions, research grants and positions, and technology-driven careers. According to the World Economic Forum (2025), women constitute only 28% of the global STEM workforce, and less than 30% of researchers worldwide are women. [5] This lack of representation is amplified by implicit biases, lack of mentorship, and lower access to funding opportunities.

Furthermore, women-led startups in STEM fields receive significantly lower venture capital funding compared to men-led startups. [6] Studies have shown that women's research contributions are often overlooked, leading to fewer patent filings and innovations attributed to women scientists. [7]. These barriers contribute to a cycle of exclusion, where young women are discouraged from pursuing careers in STEM due to a lack of visible role models and professional support.

1.2 Indian Perspective

India, with its strong emphasis on science and technology, has made progress in increasing women's participation in STEM fields, but significant gaps remain. Women make up nearly 43% of STEM graduates in India, one of the highest percentages globally. However, their representation in the workforce drops to around 14% in research and development roles.[8]

Indian women in STEM face multiple challenges, including cultural and societal barriers that often discourage full-time careers, resulting in high dropout rates. Workplace challenges such as gender bias, inadequate support systems, lack of role models, lack of mentorship, and limited access to funding and opportunities further hinder career progression. Additionally, women remain underrepresented in leadership roles, holding less than 10% of leadership positions in India's STEM industries.[9] Funding gaps also pose a significant obstacle, with women-led startups receiving less than 18% of total venture capital funding, limiting their entrepreneurial opportunities. [10]

Despite these challenges, initiatives such as Women in Science and Engineering (WISE), GATI (Gender Advancement for Transforming Institutions), Vigyan Jyoti, KIRAN (Knowledge Involvement in Research Advancement through Nurturing), DST's CURIE (Consolidation of University Research for Innovation and Excellence in Women Universities), and various CSR-backed STEM scholarships have been introduced to support women in STEM careers. Additionally, programmes like the National Initiative for Developing and Harnessing Innovations (NIDHI) and the Biotechnology Career Advancement and Re-orientation Programme (BioCARE) aim to empower women researchers and entrepreneurs. However, more structured interventions and policy reforms are needed to ensure equitable access to education, research opportunities, and leadership roles.

Key statistics:

Women constitute only 28% of the STEM workforce globally.

In India, 43% of STEM graduates are women, but only 14% enter the workforce.

Less than 30% of the world's researchers are women.

Women-led STEM startups receive significantly lower venture capital funding compared to men-led startups.

These statistics highlight the pressing need to address gender disparities and ensure equitable opportunities for women in STEM careers globally and in India.

2. Roundtable Discussion

Given the many challenges women face in STEM, we organised a roundtable to understand these issues better and identify actionable solutions. The discussion focused on three sub-themes areas: improving collaboration between industry and academia, addressing the skill gap, and finding ways to improve funding and research opportunities. Through small group discussions (breakout groups), experts from different sectors came together to share ideas and find practical solutions to help women in STEM succeed and create a more inclusive environment for them.

The guest speakers for the roundtable event were Dr. Jayesh Ranjan, IAS, Special Chief Secretary of the Industries & Commerce (I&C) and Information Technology (IT) Departments, Government of Telangana; Dr. Renu Swarup, Former Secretary at the Department of Biotechnology, Government of India; Dr. Bheemashankar Kulkarni, Discovery Services Lead at Syngene Scientific Solutions, and Dr. Anupama Shetty, Mission Director, Biocon Foundation. These key speakers delivered opening addresses and shared their expert insights during the event. In addition to these speakers, 25+ other participants joined the roundtable discussions to deliberate on three sub-themes. These participants came from a wide range of organisations such as government bodies, academic and R&D institutions, industry leaders and CSR entities such as SCERT, Syngene International, Telangana Social Impact Group, Micron, Qualcomm, RealPage, Inc., 30M Genomics, Huwel Lifesciences, Bharat Biotech, Sai Life Sciences, National Institute of Animal Biotechnology (NIAB), ICMR-National Institute of Nutrition (NIN), Centre for DNA Fingerprinting and Diagnostics (CDFD), University of Hyderabad, BITS Pilani Hyderabad Campus, TIE Hyderabad, and Women in Tech India. Their contributions in breakout sessions helped address issues like improving industry-academia collaboration, bridging the skill gap, and navigating funding and research opportunities.

3. Recommendations from sub-thematic insights

3.1 Sub theme-1: Enhancing Industry-Academia Collaboration

The collaboration between academia and industry is an important aspect of bridging skill gaps and ensuring that graduates are workforce-ready. However, a significant disconnect exists between academic curricula and the expectations of industry, leading to inefficiencies in workforce preparedness and research commercialisation.

3.1.1 Curriculum Alignment with Industry Needs

One of the major challenges is the misalignment between academic training and industry demands. While universities primarily focus on theoretical instruction, industry sectors require graduates with practical, application-based skills. This results in a skill mismatch that affects employability. To address this, universities must work closely with industry stakeholders to develop curricula that incorporate real-world applications, ensuring that students are equipped with both theoretical knowledge and the hands-on experience required for professional success.

3.1.2 Faculty Development and Industry Exposure

Another key aspect of enhancing industry-academia collaboration is faculty and student exposure to industry practices. Many faculty members lack direct industry experience, which limits their ability to impart contemporary skills to students. Industry-led faculty development programmes can bridge this gap by equipping educators with the latest advancements in STEM fields.

3.1.3 Internship and Training Programmes

Similarly, mandatory internships for students (lasting 6–12 months) can facilitate a smoother transition into the workforce by offering real-world exposure and practical training. Further, structural reforms in STEM education are needed to keep pace with the rapidly evolving industry landscape. Most academic institutions follow rigid curricula that do not adapt quickly to industry advancements. By integrating industry-driven research projects, cooperative education programmes, and case-based learning, universities can ensure that students receive practical exposure to the latest technological developments and methodologies.

3.1.4 Promoting Joint Research and Innovation

Additionally, strengthening research and innovation collaborations between academia and industry is critical for driving scientific advancements and economic growth. Academic research often struggles to find commercial applications due to limited industry participation. Encouraging joint industry-academia patent initiatives can promote innovation and drive technological advancements. Furthermore, increased funding from industries for university research projects can help translate scientific discoveries into market-ready solutions, benefiting both academia and industry.

Participants during Group 1 deliberation sessions





By promoting structured policies, joint research efforts, and knowledge-sharing initiatives, industry-academia collaboration can bridge skill gaps, create employment-ready graduates, and translate innovation in the STEM ecosystem. Such initiatives will ensure that academia remains aligned with industry advancements, thereby strengthening India's position as a global leader in science and technology.

3.2 Sub theme-2. Bridging the Skill Gap

To address the skill gaps in women's STEM careers, it is essential to ensure that women have access to quality technical training and industry-standard equipment.

3.2.1 Enhancing Technical Training and Infrastructure

According to a report by UNDP (2024), many women face challenges in acquiring the hands-on experience needed for success in STEM due to limited access to modern training facilities. Establishing dedicated STEM skill development centers within academic institutions can help bridge this gap by providing practical training with the latest tools and technologies. Providing hands-on training in cutting-edge fields such as AI-driven biotech and data science will ensure students gain practical expertise. Additionally, developing specialized technical certifications tailored to the needs of the industry will further strengthen workforce readiness.

3.2.2 Strengthening Mentorship and Career Guidance

Strengthening mentorship and career guidance requires structured mentorship programmes connecting female STEM students with industry professionals and researchers. Career counseling initiatives should highlight opportunities in academia, industry, and entrepreneurship, while faculty mentorship programmes should offer personalized career support.

3.2.3 Internship and apprenticeship models

Another important aspect is the creation of effective internship and apprenticeship models. Many valuable internship opportunities remain out of reach because of statutory constraints and industry reluctance. Industries should be encouraged to offer structured and accessible internships. Universities can further support these initiatives by partnering with companies to set up industry-sponsored training labs. These labs enable students to work with real-world equipment and processes, providing them with crucial practical experience and a smoother transition into the workforce.

3.2.4 Leveraging Technology for Skill Development

Finally, leveraging technology can significantly enhance STEM training opportunities. Emerging fields like Artificial Intelligence (AI) are transforming the STEM sectors, and it is important to encourage women to engage with these innovations. Online STEM learning platforms offer flexible and accessible opportunities for remote learners to develop their skills. These platforms allow women to learn at their own pace, accessing quality training regardless of geographical limitations.

Participants during Group 2 deliberation sessions





Together, these approaches will help in improving direct access to technical training, strengthening mentorship support, creating robust internship models, and harnessing the power of technology. We can create a more supportive and inclusive environment that empowers women to thrive in their STEM careers.

3.3 Sub theme-3: Navigating Funding and Research Opportunities for Women in STEM

To better support early-stage women students and researchers, research-focused CSR funding programmes need to be carefully designed.

3.3.1 Expanding CSR Funding for Women in STEM:

It is important to partner with organisations that truly understand local challenges so that funds reach the intended beneficiaries. These programmes should not only provide financial support but also include mentorship opportunities that guide young women through their career paths. By introducing flexible funding criteria, these initiatives can recognise and accommodate the diverse career trajectories that women in STEM may follow.

Additionally, collaborations among grassroots organisations, local governments, and educational institutions are crucial. Grassroots organisations are in a unique position to identify talent in marginalised communities, while local governments can offer the necessary infrastructure and policy support. Educational institutions can further support this effort by creating bridge programmes that help students transition into higher education or research roles.

3.3.2 Ensuring Gender-Inclusive Research Funding:

Existing CSR funding mechanisms can be made more inclusive by adopting gender-sensitive evaluation criteria and focusing on long-term impacts rather than one-time funding. Industry partnerships are also essential as they can create employment-linked opportunities that help women build sustainable careers in STEM. One major challenge is that although many CSR entities focus on STEM, the flow of funds to these initiatives remains limited. This disconnect occurs because CSR policies often aim for immediate, measurable outcomes, while STEM research and programmes focusing on STEM typically yields long-term results. Moreover, many corporations are not fully aware of the challenges that women in STEM face, and the complex administrative processes in research funding can discourage ongoing CSR investment.

To better align with the priorities of CSR organisations, women-centric initiatives need to demonstrate clear key performance indicators and share success stories that highlight their impact. Collaboration with both industry and government can enhance the credibility of these initiatives and improve their chances of receiving funding. It is also important to create clear pathways for women to pursue advanced studies, including support for PhD programmes. This can be achieved by extending scholarship programmes, fostering international partnerships for research exposure and funding, and establishing mentorship networks to help women navigate academic challenges.

3.3.3 Enhancing Access to Higher Education and Research Opportunities

Enhancing access to higher education and research opportunities requires expanding scholarships for women pursuing PhDs and advanced STEM research. International partnerships should be fostered for research exchanges and collaborative projects. Additionally, mentorship networks should be developed to support women in overcoming academic and research challenges

3.3.4 Building Sustainable Funding Models

Finally, for CSR-funded initiatives to become self-sustaining, there must be a transition from initial CSR support to models backed by industry. Building strong alumni networks can provide ongoing mentorship and funding, while skill-based training programmes can improve employability and promote financial independence of women.

Together, these steps can help create a more inclusive and sustainable funding environment that supports women in STEM over the long term.

Participants during Group 3 deliberation sessions





4. Conclusion

The STEM field has the potential to drive major advancements, but challenges like weak industry-academia connections, skill gaps, and limited funding for women in STEM must be addressed. This white paper provides practical solutions to create a stronger, more inclusive system.

Bringing industry and academia closer through updated courses, faculty training, and real-world projects will help students gain the skills they need for the workforce. Hands-on training, internships, and mentorship programmes will give women in STEM better career guidance and opportunities.

Funding is a key challenge, and expanding CSR support, creating long-term research grants, and making funding opportunities more accessible to women will help bridge this gap. Encouraging gender-inclusive funding policies and building sustainable support programmes will ensure that women researchers can grow and succeed.

By working together; academic and R&D institutions, industries, CSR, policymakers, and communities, we can create a future where opportunities are equal and women in STEM can contribute fully to scientific progress.

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6. Participants List

Industries & Commerce (I&C) and Information Technology (IT) Departments, Government of Telangana

- » Dr. Jayesh Ranjan, IAS, Special Chief Secretary

Department of Biotechnology, Ministry of Science & Technology, Government of India

- » Dr. Renu Swarup, Former Secretary

Biocon Foundation

- » Dr. Anupama Shetty, Mission Director

Syngene International

- » Dr. Bheemashankar Kulkarni, Discovery Sciences Lead
- » Dr. Meena Bisht, Research Scientist
- » Dr. Swapan Kumar Samanta, Assistant Director
- » Dr. Anuradha Ramanathan, Director, Discovery Biology
- » Dr. Ashwani Gaur, Assistant Director
- » Kubra Rasooli, Syngene International Limited Deputy General Manager-HR (Site Head & HRBP lead)
- » Aparna (Assistant Manager)

State Council for Educational Research and Training (SCERT), Telangana

- » Ch. Bharani Kumar, Faculty in Psychology

Telangana Social Impact Group (T-SIG), CSR Wing, Telangana Government

- » Archana Suresh, Director

Micron

- » Vyshali Sagar, Government Relations Policy and Public Affairs Lead

Qualcomm

- » Nitin Sharma, Sr. Director Technology and Patent Counsel

RealPage, Inc.

- » Mohammad Osman Akthar, Vice President - Legal & Compliance, Company Secretary

30M Genomics

- » Dr. Benet Das, Founder

Huwei Lifesciences Private Limited

- » Mrs. Sarita Tigulla, Senior Scientist

Bharat Biotech

- » Dr. Mahabubi Shadick, President, QA Operations

Sai Life Sciences

- » Dr. Saritha Biruduraju, Director, Drug Discovery Research

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- » Dr. Madhavi Gorla, DST Inspire Faculty

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- » Prof. Sajeli Begum, Professor, Department of Pharmacy

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- » Shanthala Veigas, Senior Director

Women in Tech India

- » Radhika Iyengar, Country Director

CMR College of Engineering and Technology

- » Mubashira Shaik, Student

Edtech Startup

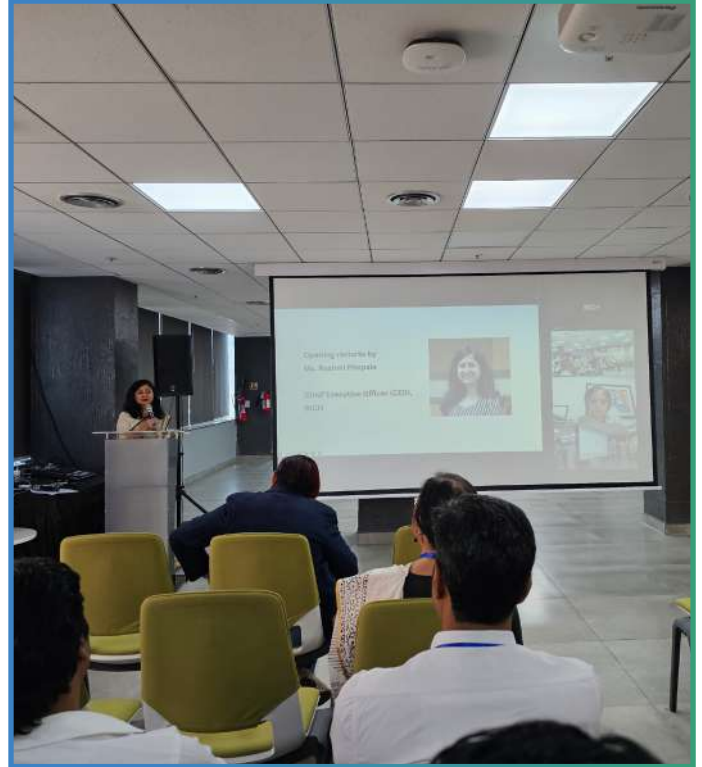
- » Mr. Gopi, Founder
- » Ms. Vyshali, Member

7. Photograph

1. Successful participation of 25+ various stakeholders at the roundtable event



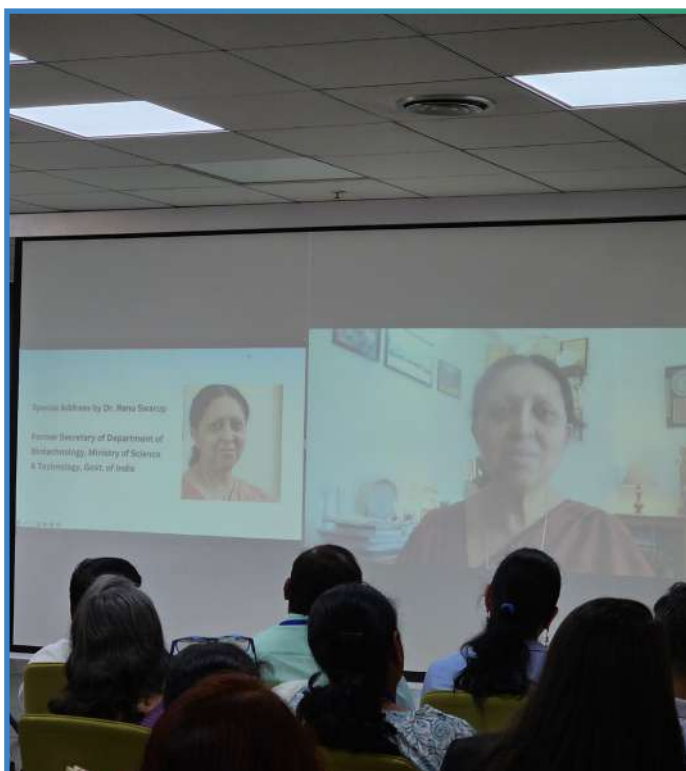
2. Opening remarks by Ms. Rashmi Pimpale, Chief Executive Officer, Research and Innovation Circle of Hyderabad (RICH)



3. Special Address by Special Chief Secretary of the Industries & Commerce (I&C) and Information Technology (IT) Departments, Government of Telangana



4. Special Address by Dr. Renu Swarup, Former Secretary of Department of Biotechnology, Ministry of Science & Technology, Government of India



5. Address by Dr. Bheemashankar Kulkarni, Discovery Sciences Lead, Syngene Scientific Solutions, Hyderabad



6. Address by Dr. Anupama Shetty, Mission Director, Biocon Foundation



7. Dr. Krishnaveni Mishra, Professor at University of Hyderabad, during presentation of deliberation insight of breakout group 1



8. Dr. Madhavi Gorla, DST-Inspire Faculty Fellow at National Institute of Animal Biotechnology (NIAB), during presentation of deliberation insight of breakout group 2



9. Radhika Iyengar, Country Director at Women in Tech India, during presentation of deliberation insight of breakout group 3



10. Some more pictures if the media team would like to retain in the final white paper





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