UNIT 5 CONTEMPORARY POLICIES AND PRACTICES

Structure

5.0 INTRODUCTION

With evolving policies and institutional efforts to promote women scientists globally, there is a significant gap still in STEM education. A recent report of UNESCO reveals that only 35% of STEM students in higher education are women. They comprise 28% of STEM workforce across all the world's researchers. Differences are observed much more in the core disciplines of natural science; for example only 3% of female students choose information and communication technologies (ICT) studies. Statistics show that almost one-third (32%) of women in the United States, 30% in China followed by 22% in Brazil and 20% in India intend to leave their science, engineering, and technology (SET) jobs within a year. This is resulting in a lower representation of women in leadership positions. A substantial gender gap in engineering and computer occupations contributes to women's overall underrepresentation in STEM. The Unit will cover some of the key challenges faced by women in science. Further, it will introduce you to the major policies and programmes of the Government of India (GOI) in the field of women and science.

5.1 LEARNING OUTCOMES

After reading this Unit, you would be able to:

- Know about the participation of women in Science, Technology, Engineering, Mathematics, and Medicine (STEMM);

- Discuss the challenges and issues of women scientists and technologists in the world and in India;
- Learn about the existing programmes and policies and new initiatives of the government for gender parity in science

5.2 WOMEN IN SCIENCE

In this section you will learn about gender science policies, programmes and their implementation in India.

5.2.1 Existing Situation in the World and India

In India, research studies and academic reports focusing on the key elements of women's participation in science employment and research discuss the relatively higher concentration of women in junior faculty positions. However, these reports ascribe reasons such as: lower representation of women on advisory committees; gender-differentiated wages; poor infrastructural facilities in educational institutions; and inherent challenges faced by women scientists in both public and private spheres. These also contribute to a lower participation of women in science education. In line with the recommendations given by past studies and reports, contemporary gender-sensitive policies conceptualize science as a gender-inclusive discipline and seek to improve women's access to careers in science and research. The Research and Development statistics 2019-20 released by the Department of Science and Technology (DST) showed that in all, there are 56,747 women employed in Research & Development (R&D) establishments in India, which is 16.6% of the total human resource employed in R&D establishments across the country. The present data signifies that there is a need to stimulate interest from the early years of the education, introduction of gender-sensitive curricula, and change the mindsets of young girls to combat stereotypes.

Though, women participation in extramural R&D projects has increased significantly to 24% in 2016-17 from 13% in 2000-01 due to various initiatives undertaken by the Government in S&T sector. In absolute terms, 941 women Principal Investigators (PIs) during 2016-17 availed extramural R&D support as against 232 in 2000-01.

India is ranked 108 out of 149 countries in the 2018 Global Gender Gap Report. Despite having the world's largest higher education system – 799 universities, 39,071 colleges and 11,923 stand-alone institutions – a number of systemic barriers and structural factors plague the upward movement of women scientists in academia and administration.

5.2.2 Challenges and Issues

There are many systemic, societal, and cultural barriers. These include balancing work/life responsibilities, career breaks, workplace culture, differential access to mentoring and networking opportunities and the lack of access to senior roles for women. Patriarchal culture in certain professions also forces women out of these professions.

- Lack of family support/motivation to pursue education and long-term career in Science & Technology.
- Lack of awareness regarding available opportunities.
- Lack of avenues for knowledge and skill enhancement leading to capacity building, self-employment, and entrepreneurship.
- Obstacles in re-entry in science-oriented career after career -break due to various reasons.
- Lack of opportunities for an alternate career path.
- Lack of mentorship, networking and role models.
- Lack of representation in higher forums, committees, and higher decision-making positions.
- Job insecurity from one-year (or shorter) contracts.
- Impact of maternity leaves and part-time work on their careers (due to motherhood responsibilities).
- Unconscious bias hinders women's employment in STEMM.
- Sexual harassment at the work place.

Statements of women scientists/ technologists

'Most of the industries do not have policies, who ever have, it's difficult to access these. Negotiations are not possible as per existing policies. However, your boss decides your work flexibility or work/ life balance as per industry's convenience'.

'My motherhood responsibilities reflect me less professional as compared to my male counterparts, hindrance my career progress and create prejudice opinion about me'.

Check Your Progress Exercise I

Note: I. Use this space given below to answer the question.

II. Compare your answer with the course material of this Unit.

1. Explain the meaning of gender parity in STEMM with examples.

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2. List challenges and issues of women in science.

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5.3 GOVERNMENT INITIATIVES: POLICIES AND PROGRAMMES IN INDIA

Quality Education and Gender Equality are among the 17 Sustainable Development Goals (SDGs) adopted by all United Nations Member States in 2015. Nations are working hard to achieve them through the implementation of new policies and innovative programmes. India recently launched a new National Education Policy in 2020 and a new Science, Innovation, and Technology (SIT) Policy is in the pipeline. Indian government understands that Science, technology, and innovation are keys to accomplish goals of the SDGs and often referred to as the jobs of the future.

5.3.1 Gender- Science Policy in India

The underlying principle of engagement between Indian women and science is about inclusion of women in science discourse and S&T for women. The Government of India had adopted the National Policy for Empowerment of Women in 2001 with the objective to bring about empowerment of women and to eliminate all forms of discrimination against women. The policy emphasized aspects relating to strengthening and bringing about a greater involvement of women in S&T through recourse to training programmes in awareness generation, motivation, participation, skill development and through generating appropriate technologies for women.

National Policies including science and gender

- National Policy for Empowerment of Women in 2001.
- 6th Five-Year Plan (1980-85)-Science and Technology for Women' (S&T for Women)
- 10th Five-Year Plan (2002-2007)-Women Scientist Scheme
- Science & Technology Policy 2003
- Task Force for Women in Science 2005
- Biotechnology Career Advancement and Re-orientation Program (Bio-CARe) 2010
- Science, Technology, and Innovation (STI) Policy 2013
- 12th Five-Year Plan (2012-2017) - KIRAN-Knowledge Involvement in Research Advancement through Nurturing
- Science, Technology, and Innovation (STI) policy 2020 (to be released)

With evolving policies and institutional efforts to promote women scientists in India, significant change has been observed over the years about women's access to science education and careers. Further, this has been a frequent subject of inquiry by academics and development practitioners. In India, under the 6th Five-Year Plan (FYP, 1980-85), the government started a scheme, 'Science and Technology for Women' (S&T for Women) through the Department of Science and Technology (DST), Ministry of Science and Technology. One of the significant initiatives of this scheme was to consider as to how science and technology can contribute to improvement in the life and status of women generally.

During the 10th FYP (2002-2007), S&T policy 2003 was released by DST with the objective of empowering women in all the fields of science and technology and to ensure their full and equal participation in science. In 2005, the government appointed a task force for women in science to suggest measures for enhancing representation of women pursuing a career in Science and Technology (ST) and to suggest suitable gender enabling measures specifically for working women. Similarly, the Department of Biotechnology (DBT) launched the Biotechnology Career Advancement and Re-orientation Program (Bio-CARe) in 2010 to facilitate participation of women scientists in biotechnology research that aimed to provide research grants to women scientists - including employed and unemployed women.

The Science, Technology and Innovation (STI) policy formulated in the year 2013, acknowledged the participation of women in STI activities as an important area of intervention and emphasized the introduction of new and flexible schemes to address the mobility challenges of employed women scientists and technologists. It envisaged expanding the scope for re-entry of women into R&D and providing new facilitation mechanisms for women with special career paths in diverse areas.

During 12th FYP (2012-2017) the consolidation of all women-oriented schemes was carried out under the DST and termed '*KIRAN*-Knowledge Involvement in Research Advancement through Nurturing'. The primary objectives of *KIRAN* are to utilize the potential of women scientists/ technologists in S&T, ultimately leading to the empowerment of the nation. As a broader platform it creates opportunities for the re-entry of women scientists/technologists into professional mainstream.

5.3.2 Components of KIRAN

Table 1 provides a summary of the existing gender-equality programmes or schemes for women scientists in India. Hence, the significant focus of *KIRAN* is to bring women scientists back into S&T employment. The scheme has many components to support women scientists and technologists.

The 'S&T for women' scheme was initiated during the 6th five-year plan **t**o promote research, development, and adaptation of technology to improve the quality of life, workings conditions for women**.** The Department of Science and Technology (DST) launched 'Women Scientists Scheme (WOS)' during 2002-03. This initiative primarily aimed at providing opportunities to women

scientists and technologists between the age group of 27-57 years who had a break in their career but desired to return to mainstream. Scheme: (i) Basic Research Fellowship (BRF); (ii) Societal Research Fellowship (SoRF); and (iii) Intellectual Property Rights (IPR). These three components of WoS are also known as WoS-A, WoS-B & WoS-C.

In the year 2008-09, DST took a special initiative, 'Consolidation of University Research for Innovation & Excellence in Women Universities (CURIE)', to support women universities for improving R&D infrastructure and enhance research facilities. CURIE support has been extended to 08 Women Universities in the country. In the year 2019, DST established an Artificial Intelligence lab in 6 CURIE beneficiary universities with the goal of fostering AI innovations and set up AI-friendly infrastructure to prepare skilled manpower for AI-based jobs in the future. This facility is exposing women students from these universities to different AI tools and will improve the employability of women in this upcoming sector.

The Mobility Scheme is aimed to provide an opportunity to women scientists who are facing difficulties in their present job due to relocation (marriage, transfer of husband to any other location within the country, attending ailing parents, and accompanying children studying in different city) and will act as filler while searching other career options at new place. The initiative intends to provide a harmonious environment during early phases of life of women scientists where they would like to stay active in research in addition to attending and fulfilling other responsibilities on the domestic front. It offers a contractual research award to women scientists and enables them for independent research.

National Award for Women's Development has been instituted to recognize the contributions of individuals/institutions who have worked at the grass root level for women's development through application of science and technology. Applications are invited once a year.

Table 1: Component of KIRAN

Name of the Scheme	**Objectives/Mandate**
S&T for Women	To promote science & technology-based empowerment of women
Women Scientist Scheme (WoS)	Project based fellowship scheme for women scientists who have had a break in their career
Internship-Mode under Women Scientist Scheme (discontinued)	One-year internship program on formulating research projects
Consolidation of University Research for Innovation & Excellence in Women Universities (CURIE)	Enabling infrastructural facilities in only women universities for promoting R&D activities in S&T emerging areas
Capacity-Building Opportunities	Organising training programmes for working women scientists

Entrepreneurship Development: Women Entrepreneurship Development Programmes (WEDPs)	WEDPs are meant to train women with S&T background in various facets of entrepreneurship
Awards	National Award for women's development through application of Science and Technology (S&T)
Mobility Scheme	To provide feasible employment opportunities or an alternate career path for employed S&T women professionals
Vigyan Jyoti	To encourage girl students for STEMM careers especially in underrepresented areas for women
Indo-U.S. Fellowship for Women in STEMM (WISTEMM)	To provide opportunities to Indian Women Scientists, Engineers & Technologists to undertake international collaborative research in premier institutions in U.S.A, to enhance their research capacities and capabilities
Athena SWAN Charter	An evaluation and accreditation programme to promote good practices in higher education and research institutions towards the advancement of gender equality

Biotechnology Career Advancement and Re-orientation Programme (BioCARe)

The Department of Biotechnology launched a Biotechnology Career Advancement and Re-orientation Programme (BioCARe) for women scientists in January 2011. The programme is mainly for Career Development of employed/ unemployed women Scientists upto 55 years of age for whom it is the first extramural research grant. The scheme is open for all areas of Life Science / biology (including agriculture, veterinary science, and medicine). Women scientists who are employed or unemployed or are desirous of coming back after a break can get back to the mainstream by getting their first grant as the Principal Investigator.

5.3.3 New Programmes

Indo-Us Fellowship for Women in STEMM (WISTEMM)

Department of Science and Technology (DST), Government of India and Indo-U.S. Science & Technology Forum (IUSSTF) jointly announced the "Indo-U.S. Fellowship for Women in STEMM (WISTEMM)" *(Science, Technology, Engineering, Mathematics and Medicine)* program with an aim to provide opportunities to Indian Women Scientists, Engineers & Technologists to undertake international collaborative research in premier institutions in U.S.A, to enhance their research capacities and capabilities. This fellowship is a pave way for the next generation Women Scientists and

Technologists from India to interact with American peers, thus helping to build long-term R&D linkages and collaborations.

VIGYAN JYOTI

The Annual Report 2019-20 of the DST reveals that DST recently launched a new scheme called 'Vigyan Jyoti' which is a dedicated programme to encourage girl students for STEM careers especially in underrepresented areas for women. The Navodaya Vidyalaya Samiti (NVS) is working as an implementing agency and coordinating with different schools throughout India. During the first phase of this initiative in 2018, around 450 meritorious girls studying in class ninth and eleventh were mentored to pursue higher studies and careers in STEM around the three weeks' residential programme. The faculty from the prestigious research organisations such as Indian Institute of Technology (IITs), National Institute of Technology (NITs), Council for Scientific and Industrial Research (CSIR), Indian Council of Medical Research (ICAR) and Indian Council of Agricultural Research (ICAR) were directly involved with these young aspirants and delivered motivational lectures to encourage their interest in STEM professionals. This pilot project was expanded in the year 2019 and further reached 2500 meritorious girls from different states of India. The guidance and mentoring of eminent scientists would help these schoolgirls to choose their career paths in STEM areas.

Apart from 'Vigyan Jyoti' scheme, Sharma & Yarlagadda reported other several government initiatives for school students like the establishment of Atal Tinkering Labs in schools, National Children's Science Congress (NCSC), Innovation in Science Pursuit for Inspired Research (INSPIRE), Million Minds Augmenting National Aspirations and Knowledge (MANAK), and Initiative for Research and Innovation in Science (IRIS). These programmes are designed and executed to inculcate the scientific temperament among school students and encourage them to choose STEM as a profession.

Athena SWAN Charter

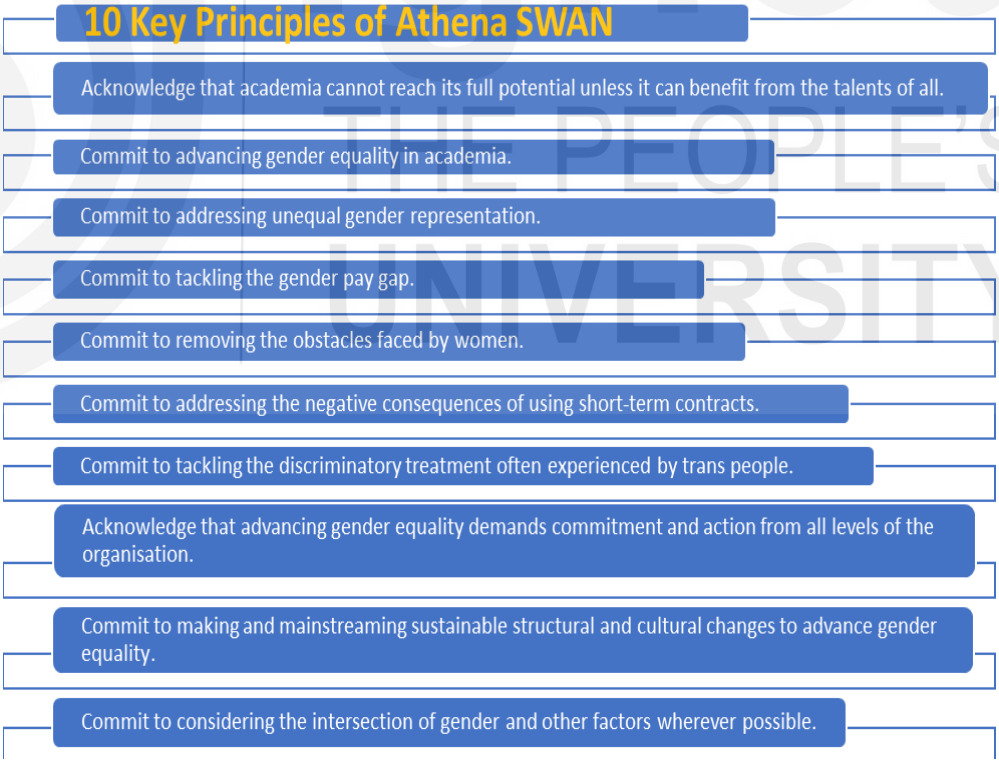
India's Department of Science and Technology (DST) and the British Council are giving final shape to the implementation of the Athena Scientific Women's Academic Network (SWAN) Charter in Indian universities and research institutions. The scheme will pilot in an estimated 20 Indian higher education institutes, research laboratories and academies by 2020 to build capacities as laid out in the Athena SWAN framework.

The Athena SWAN Charter is an evaluation and accreditation programme successfully running for over a decade in the United Kingdom (UK) enhancing gender equity in science, technology, mathematics, and medicine (STEMM). Participating research organisations and academic institutions are required to analyse data on gender equity and develop action plans for improvement. They can apply for a Bronze, Silver or Gold accreditation to get recognised for their progress in addressing gender equity. Established in 2005 with 10 founder members in the UK, the charter has now been

implemented in two more countries, Ireland, and Australia. The Charter's reach has grown to 170 UK and Ireland members, and 812 awardee institutions and departments.

The charter raises awareness of gender diversity issues and the reasons behind them, facilitates better monitoring and reporting of gender diversity in STEMM and encourages an organisational culture that fosters a professional and diverse environment for everyone to excel. Advance Higher Education Academy (AHEA), the owners of the Athena SWAN Charter, receive around 400 applications a year. Athena SWAN member institutions commit to the underpinning principles of the Charter. Their progress in addressing gender equality is recognised through the awards.

Currently, the Athena SWAN Charter is being adapted to the Indian context and a questionnaire for Indian institutions is being finalised for its proposed roll out later this year. The roll-out will include sensitisation and awareness building sessions to create an enabling environment in the institutes and laboratories being selected. The programme will develop materials and tools for training and handholding at the institutional level to promote gender equality. It will also look at developing and strengthening networks of women in science in India, by engaging with similar networks in the UK. The objective would be to connect, collaborate and amplify the impact of the project.



The DST will run the Athena SWAN programme in a pilot mode for three years to fund trainings and meetings, workshops, and project-related travel and logistics for participating institutions. It will also fund setting up of processes and systems in participating institutes as well as mentoring and support activities from UK organisations.

British Council will help develop and deliver the workshops, training, and assessment via AHEA. This will prepare the participating institutes to critically self-assess their structures, systems, and cultures within the proposed framework. AHEA and DST will collectively evaluate the programme and propose any amendments for the future.

5.4 IMPLEMENTATION OF PROGRAMMES: CHALENGES

Some structural and policy issues may affect the implementation of the Athena SWAN model in India. While it will be easy to adopt this model in premier research institutes like the Indian Institute of Technology (IITs) or the National Institute of Technology (NITs), which receive most of their grant from different wings of India's science and technology ministry, the central and state universities are funded by the Ministry of Human Resource and Development (MHRD) Now ministry of Education (MOE) and state governments. These universities, governed by single central rules, do not have direct control over institutional policies, recruitment processes, and leadership positions. Therefore, the support of the MOE will play a significant role in the successful implementation of the Athena SWAN model in Indian universities. The Charter confers awards at both institutional and departmental levels in the UK and Ireland, but it will be difficult for a department of a University or institution in India to participate in the pilot project as departments don't have an individual identity in higher education institutions.

Data collection within the prescribed timeframe is also a key factor in the success of the programme. Indian institutes are not equipped in data building as they lack appropriate tools and training programmes. In-depth training, strict monitoring and transparency in self-evaluation will be essential for the programme's success. Allowing insufficient time to institutions for self-assessment could go against this. Timing should, therefore, be carefully considered in building a pilot project. As an example of the implications of not building sufficient time, in Australia, deadlines had to be delayed for each of the three pilot cohorts based on the feedback received from the participating institutions.

5.5 THE WAY FORWARD

It is important to hold intermittent workshops on 'Leadership, Mentoring and Networking' for young and mid-level women scientists. Sometimes networking developed during such workshops helps them to inspire and motivate to move forward and take leadership positions. 'Paper Writing and Career Development' workshops may also become a useful tool to enhance career of young women scientists. Publishing the work in some form and submission of well written projects to funding agencies will certainly help scientists to grow in their career.

The initiatives such as 'Vigyan Jyoti' would play an important role to change the mind-set of young bright girls and provide them an opportunity to

connect them with mentors and role models. Though, no single strategy can entirely plug the leak, there is a need for a multi-faceted approach for debunking the myths and spreading the facts. Strengthen the capacity of countries to deliver gender-responsive STEM education, including through the involvement of women role models, their photographs in textbooks, teachers' trainings, and enhance awareness of the importance of STEM education for girls and women. To achieve all targets of Sustainable Development Goals (SDGs) and future wellbeing, the STEM workforce must equally represent by women.

Conducive environment, mentoring, the depiction of role models and self believes play a significant role in determining the differences in male versus female science and mathematics performance.

Check Your Progress Exercise II

Note: I. Use this space given below to answer the question.

II. Compare your answer with the course material of this Unit.

1. Describe any four key principles of the Athena Swan programme.

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2. Explain the significance of Vigyan Jyoti scheme in the context of gender and science. for

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5.6 LET US SUM UP

The Unit discussed some of the critical issues within the field of women in science in India. It looks at how women are equally capable and interested in STEM as men. Divergent attitudes formed by girls and boys in childhood and systemic biases limit the range of career options and opportunities available to them in adulthood. It also outlines the contemporary policies and programmes in India with regard to women in science. These programmes are developed to address the societal, cultural, and institutional factors which are impediments to women in STEM.

5.7 UNIT END QUESTIONS

1. Critically analyze the relationship between women, science and society.
2. Describe government initiatives for promoting women in science in India.
3. How does one challenge gender stereotypes in science disciplines? Critically discuss.

5.8 REFERENCES

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5.9 SUGGESTED READING

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