



Review Article

Science and Technology: Where do Women Stand?

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Abstract

Women's empowerment means equality of women with men. It's about giving women the equal freedom to make their own choices without judgment. Women's empowerment means allowing them to live life on their own terms, to take their own decisions, making them independent in all aspects from mind, thought, right, decisions etc. leaving all social and family limitations. Women's empowerment and women education are highly correlated. Empowerment of women will occur only women are educated, efficient, better in found, financially independent and allowed to take rational decisions. Their awareness is very important not for themselves but also for bright future of family, society or country. It is very important to promote their participation in all areas and sectors for stronger economics, better quality of life and gender equality.

Key words : STEM, Stereotype, Biological clock, OEKO countries ISRO

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Introduction

Women's empowerment means equality with men. It's about giving women the equal freedom to make their own choices without judgment. Women's empowerment means allowing them to live life

on their own terms, to take their own decisions, making them independent in all aspects from mind, thought, right, decisions etc. leaving all social and family limitations. (1-4)

Women's empowerment and women education are highly correlated. Empowerment of women will occur only women are educated, efficient, better in found, financially independent and allowed to take rational decisions. Women empowerment is very important not for themselves but also for bright future of family, society or country. In order to get a fully developed country women

empowerment is essential tool. It is very famous quotation from Napoleon Bonaparte "Give me good mothers and I shall give you a great nation".

It is very important to promote their participation in all areas and sectors for stronger economies, better quality of life and gender equality. Sugra Chunawala an associate professor at Homi Bhabha centre for science education, Mumbai analysed NCERT text books (2006-07) from class III to class X and found that majority of representatives were of men and women were also shown but traditional role like nursing, mothering and playing a passive role. She concluded that suggestion to girl student was that some profession were not meant for them.

Former HRD Minister Smriti Irani said prejudice against female scientists "dramatically exists" and doing away with

it is a fundamental challenge. Irani claimed that no school going child in the country in this day and age would be able to name an Indian female scientist.

The inauguration of the recent seventh Women Science Congress held at Imphal (Manipur University) was mostly a mens affair with just two women scientists on the stage. The event ironically reflected the severe lack of women in science and challenges faced by few women who do make it.

Sri Keshari Nath Tripathi Governor of West Bengal pointed out that representation of women in science and technology is less than expected. According to him "Women empowerment may be through innovative scientific activities and integrating action oriented literacy. (7)

Science is still seen as male profession. As many as 81% of women in STEM (Science Technology Engineering and Maths) in India felt a gender bias in performance evaluation. Data from a subset of OECD countries show that among graduates with science degrees 71% of men and only 43% of women work as professionals in Physics, Mathematics and Engineering. (8) Women more often choose to become teachers. Only 13.7% of inventors who filed patents are women. It is highly surprising that only 25% of women are in scientific faculty of various institution and universities. Although biological research institutions are an exception. Women make up only 14% of 2.8 lakh scientist, engineers and technologists employed in research and development institution in India. Numbers are very low only 39,389. On an international level it is about only 28.4%.

Women account for only 20% of ISRO's total work force of 14,246. Since its founding in 1963 Indias space agency has had nine chair persons none of them was women. Out of 744 Indian National Science academy fellowships only 3.2% went to women. Out of 841 Indian academy of Science fellowships only 4.6% went to women. Out of 395 national academy of agricultural sciences fellowships only 4% went to women (Inter Press Service News agency report 2009). (3)

According to this report which revealed that women scientists were side lined by male centric selection committees for awards and for appointment to research and development positions in government funded organizations.

When it comes to awards the situation is extremely surprising women are far behind the men in receiving prestigious awards. Most important one is noble prize. Marie Curie was the first women to receive a Noble prize in 1903 (Physics). As of 2018, Noble prizes have been awarded to 853 men 24 unique organisations and only 51 women (Marie Curie won it twice). Shanti Swaroop Bhatnagar award is one of the most important award in the field of science and technology in India, presented annually by the CSIR as an effort to recognize outstanding scientific work by researchers, working in various areas of basic and applied sciences. It was established in 1958. In total more than 450 scientists have been honoured only 15 are women (less than 3.33%). Seven out of those fifteen awards were won in the last 10 years i.e. very less improvement. Following tables show position of women in science and technology at various institutions.

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Organisation	% Women	
	2004	2008
CSIR	13.0	16.05
DST		20.8
DAE	16.5	15.0
DBT	31.8	27.4
ICMR	27.3	29.0
DRDO		14.0
DOD	8.7	
ICAR	8.5	14.3

Women faculty in selected University

University	2004		2008	
	Total scientists	% women	Total scientists	% women
IISc Bangalore	Academic 316	6.6	Total 330	7.7
	Scientific 113	9.7	Asst. Prof. 91	9.9
			Assoc. Prof. 92	5.5
			Prof. 147	8.3
University of Hyderabad	Total 101	15.8	Total 330	20
			Asst. Prof. 91	31.7
			Assoc. Prof. 92	40.6
			Prof. 147	8
JNU	82	16	120	20
Delhi University			Sciences	
			Asst. Prof. 184	37
			Assoc. Prof. 22	6
			Prof. 85	10
			Maths 38	34
			Asstt. Prof. 8	25
Assoc. Prof. 9	47.4			
			Prof. 11	18.2

Ref. Report of DST task force for women in science Ed. M.S. Mauji (2009-10)

Fellowships of Indian Academy of Sciences

Subject area	No. of men	No. of women	Total no.	% of men	% of women
Mathematics	67	6	73	91.78	8.95
Physics	127	5	132	96.21	3.78
Chemical Sciences	121	2	123	98.37	1.62
Earth and Planetary Sciences	67	3	70	95.71	4.28

Engineering and tech.	108	0	108	100	0
Plant sciences	118	6	124	95.16	4.83
Animal Sciences	57	10	67	85.07	14.92
General Biology	100	9	109	91.74	8.25
Medicines	61	16	77	79.22	20.77
Multidisciplinary Committees	8	1	9	88.88	11.11
Total	834	58	892	92.21	7.85

Source (*Women in science and technology*) www.nasi.org.in

There are many more data which tells the same story. Women scientists are of the opinion that when they get enrolled in P.G. and Ph.D. in greater numbers they fail to convert their degree in to careers due to the biological clock and family pressure. (4)

According to Aruna Dhathathreyan (retired as chief scientists and head of the biophysicist laboratory at central leather research institute Chennai) who completed her Ph.D. in 1984, if you are away from research in science particularly experimental work, even for six months, your works get left behind and you become irrelevant soon.(9)

According to a 2010 reports by national institute of advance studies 14.1% of women in science research work were never married as against 2.5% of men. Because of the dual burden of home and work and lack of lab networking facilities. Female scientists say more men are given important positions such as membership of institutes of committee.

This is a well known phenomenon in society that the higher the level and rank of power and prestige the smaller the population of female participating. According to AAUW report (2010) in the

present time when women are increasingly prominent in medicine, law, business and teaching their numbers as scientists and engineers are very few. This is due to environmental and social barriers such as stereotypes, gender bias and the climate of science and engineering departments in college and Universities that continue to block womens participation and progress in STEM (Science, technology engineering and mathematics). Recently at the convocation held in IIT Roorkee (2018) 2026 student got degree out of which 949 were UG students, surprising thing is that out of 949 undergraduate students only 74 were females. Two of the older IITs. Kharagpur and Kanpur stand out in that they have no women assistant professors at all in the three departments.

It is general stereotype that women are not good at Maths. Due to which they remain underrepresented in STEM field. When girls and women believe they have a fixed amount of intelligence they are more likely to loose confidence and remove themselves from science and engineering. The preference for a trouble free career may be one reason why even now only 14.39% of science researchers in India are women (world economic forum report recent).

Nothing has changed in last three decades. Although there is rise in numbers around 40% of undergraduate in science. (10)

There has been a rise in enrolment of women in science 7.1% (1950-51) to 40% in (2009). Although 25-30% of science Ph.D. are of women but in faculty positions it is around 15%.

The crucial period after a woman gets Ph.D. coincides with the period when some women decide to get married or have children. Motherhood can't be compromised but as a scientist a woman has to work twice as hard as men. Above all in India it is society's perception that only women are responsible for home making, rearing a child, no matter which profession she is in. On June 9, 2015 Nobel prize winning biochemist Tim Hunt spoke at the world conference of science Journalist in Seoul. Prior to applauding the work of women scientist he described emotional tension saying "you fall in love with them, they fall in love with you and when you criticize them they cry." This remark was highly condemned and he was forced to resign. But this really shows the

mental status of exhausted women. She has to bear various strains regarding family, married life and kids. When she feels she is going to fail she quits or get frustrated. (6)

In India women are sub-ordinated which is actually a socially economically and culturally constructed phenomenon. Not only in India same is the case at international level.

Our society accepts women in certain roles readily and in some profession, they are not that easily accepted. Things are changing but not as fast as we would like them to. Despite the school and other facilities provided by the government women are disproportionately represented in science and technology compared to men. Women are given less opportunity and discriminated in all areas.

Education is the key to gender equality and women's empowerment. Government should focus on female education towards science and technology. Above all most important one is to break this stereotype themselves. Science and technology should be equally represented by them.

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