SCIENCE CAREER FOR INDIAN WOMEN:

An examination of Indian women's access to and retention in scientific careers.

REPORT

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The committee is grateful to the Indian National Science Academy (INSA), particularly Prof. M.V.S. Valiathan, President, for taking up the issue of Science Career for Women and for funding the study contracted to SNDT university.

Valuable information on women studying science (university enrolments) was sourced from a recent report of the University Grants Commission (UGC), obtained through the courtesy of Professor Arun Nigvekar (Chairman, UGC). Several heads of organisations, their colleagues, some committee members, and other scientists, whose names are mentioned in the report, have helped to obtain useful information regarding women practicing science. Our thanks to all these scientists, and their colleagues, for the help given.

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Last but not the least, the commendable effort made by the Research Centre for Women's Studies (RCWS), SNDT women's University, in conducting the study on Factors Influencing Science Career for Indian Women (reported in chapter II,) is greatly appreciated. It has provided useful information, and insights.

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INDEX

PREFACE

Gender disparity at all levels and its adverse impact on women has become a fact of life. This is partly due to the biological role and responsibilities of women as mothers, but mostly due to the traditional mindsets, which visualise women as being child bearers and home-makers, and men as breadwinners. Yet in many invisible, un-rewarded ways women contribute significantly to the economic well-being of the family, and take on the double or triple burden of home making, work outside home and fighting male chauvinism. Among the various professional spheres, women seem to miss out more in science and technology, particularly physical sciences, agriculture and engineering fields. Those who do study science, often end up in what are considered as less challenging teaching jobs.

There is a growing realisation that by not allowing the creative talent of women from being expressed through their involvement in research and development, society is missing out, and something needs to be done to make scientific research more gender friendly.

The Indian National Science Academy constituted a committee to investigate the issue of Science Career for Women and suggest measures to increase women's participation in study and practice of science. The present report has attempted to do that. Secondary sources of data were used to get a picture of the status of Indian women in science. To make an objective analysis of the factors, which influence science career for women, a study was contracted to the Research Centre for Women's Studies, SNDT women's University, Mumbai. This is a unique study, which has relied on feedbacks from women scientists and post-graduate students, from many parts of India. Effort was also made to examine the science policy in context of women. This report summarises only salient observations. A detailed discussion of this aspect can be read in the RCWS original report.

Implementation of the recommendations made in the final chapter is possible only with collective determination and effort of several agencies like UGC, NCERT, Science funding agencies, and Academies. INSA can facilitate the process by initiating a dialogue between these agencies and organisations.

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CHAPTER I

STUDY AND PRACTICE OF SCIENCE BY INDIAN WOMEN

Genesis of the Study

Last century has seen an explosion of knowledge in Science and Technology. Science and technology has permeated every sphere of life and has become a part of day-to-day living. Though female sex represents half of humankind (unfortunately less than half in India due to deliberate elimination of females), the status of women in society at all levels is inferior to that of men. Large-scale gender discrimination and inequity have denied females opportunities for education and employment on par with males. Though women contribute significantly to national development and well-being their contribution to the family (child rearing and home keeping) lacks a monitory tag, and is taken for granted and worst still, viewed with cynicism. Even some of the labour intensive economic activities done by women are poorly rewarded, being unskilled or low-skilled jobs.

In the developed world, school education is universal and educational opportunities at college level are more or less similar for both the sexes. However, traditional mindsets internalised over generations prevent women from opting for courses like science (particularly physical sciences and mathematics) and technology, which are perceived as being more in the male domain. Study of science and technology does not ensure further opportunities and smooth career path for women, thanks to the notorious 'glass ceiling'. Numerous studies show that even in these advanced countries there is tremendous sexual nepotism- conscious or unconscious. Women who seek science career have to face the triple burden of professional work, domestic work (including child rearing) and fighting male chauvinism.

The situation in the impoverished communities of developing countries like India is worse because education and health, particularly of females are issues of low priority, the primary concern being livelihood. Apart from child labour to augment family income, girls are often taken away from school to do house work and take care of younger siblings when both the parents go to work. There is also the fear of safety of girls. Denial of school education blocks the stream that would feed into higher education including science education. Those who overcome the hurdles against school education, come up with other obstacles of the kind described earlier for the women from developed countries. Thanks to the curse of dowry system, the first worry of parents is getting the daughters married. Often education is seen as a stepping-stone to marriage. Unfortunately, most girls feel obliged to yield to parental pressure.

In recent years the issue of marginalizing women from scientific career is being seen with concern all over the world. In India the problem is two fold: 1) getting more women to study science and technology and 2) ensuring that those who study are able to pursue a career in science and technology. Attrition after higher education, apart from other things, is a national waste and impoverishment of Indian science.

Against this back-ground, the president of the Indian National Science Academy (INSA), Professor M.V.S. Valiathan identified 'Science Career for Women' as a

thrust area for investigation by INSA. A committee was constituted to bring out a report on the subject, which should include specific suggestions.

The committee included the following members, representing different disciplines of science.

Bal Vineeta	Medicine/ Immunology
Balasubramanium D	Biophysics/ Molecular cellular biology
Bamji Mahtab S. --- Chair person	Biochemistry/ Nutrition
Buti Bimla	Plasma Physics
Datta Kasturi	Biochemistry/ Molecular cellular biology
Godbole Rohini	Theoretical high energy physics
Khanna Chopra-Renu	Plant physiology/biochemistry
Raman Parimala	Mathematics-algebra
Sahni Ashok	Geology

In its first meeting held on March 8, 2003 it was decided that the report should cover three aspects. 1) The present status with regard to study and practice of science by Indian women, 2) Factors influencing science career for women- a behavioural study and 3) Recommendations for facilitating women's entry and continuation in science career.

The second aspect, which involved study of behavioural and sociological dimensions, was contracted out to the Research Centre for Women's Studies (RCWS), S.N.D.T. University, Mumbai, headed by Prof. Veena Poonacha. They also offered to examine using secondary sources, the first aspect, which involves obtaining quantitative data on women studying and practicing science. However, much of this effort on the first aspect was left to the committee and its chairperson.

SNDT has also attempted to examine educational policies and government policies to find out if these policies are gender sensitive. However for brevity, this aspect has not been included in depth in this consolidated report. Information can be sourced from the SNDT report (Poonacha and Gopal, 2004).

The present report deals primarily with science since Parikh and Sukhatme have recently published a comprehensive report on Women in Engineering Profession in India (Parikh and Sukhatme, 2002).

The term 'study of science' means women who enrol in university to get a degree in science and pursue further studies to obtain post graduation and doctorate in science. The term 'practice of science' means those who after post graduation pursue a career in science.

Methodology

Information on women's enrolment at different levels of university education was obtained through a recent report of the University Grants Commission (Courtesy Dr. A. Nigvekar, Chairman, UGC) (University Grants Commission, 2002). Information on women scientists working in different government organisations and some universities was obtained directly from the heads of concerned organisations such as Department of Biotechnology (DBT) (Dr. Manju Sharma, courtesy Dr. Renu Swarup), Indian Council of Medical Research (ICMR) (Prof. N. K. Ganguly), Department of Ocean Development (DOD) (Prof. Harsh Gupta), or through some scientists working in those organisations (Dr. J.C. Katyal, DDG education, ICAR and Dr. Parimala Raman, DAE). Prof. Indira Nath helped to source some of the information from DST. Only three universities- University of Hyderabad (courtesy Professor K. Subbarao), Indian Institute of Science, Bangalore (courtesy Prof. Goverdhan Mehta, V.C) and Jawaharlal Nehru University (courtesy, Prof. Kasturi Datta) could be covered. Though the data are incomplete, trends are apparent. No private institution could be covered.

Salient Observations

Indian Women Studying Science

Growth in women's enrolment in different faculties

Since 1951 there has been a steady growth in universities/university level institutions and colleges in India (Table 1). The growth of student enrolment and percentage of women is shown in table 2. While over the years there is a steady rise in the proportion of women entering university, the wide gap between women and men entering university persists (Table 2).

Table 1. Decadal growth in Universities and Colleges

Year	University/university level Institutions	Colleges
1950-51	32	695
1960-61	56	1,542
1970-71	102	3,604
1980-81	133	4,722
1990-91	190	7,346
2000-01	256	12,806

Table 2. Decadal growth in women's enrolment

Year	Total	% Women
1950-51	3,96,745	10.9
1960-61	10,49,864	16.2
1970-71	19,53,700	22.0
1980-81	27,52,437	27.2
1990-91	49,24,868	29.2
2000-01	83,99,443	39.4

Table 3 shows comparison of numbers and percentages in the year 1995-96 and 2000-01 in various disciplines. The highest representation of women is in education. During 2000-01 more than 50% students in the field of education were women. This is followed by disciplines like arts and medicine. In 2000-01, 44% of medical admissions were women. Contrary to these fields, very few women seem to opt for fields like engineering, agriculture and veterinary science. Over the five-year period, (1995-96 to 2000-01) overall preference of students for different subjects has not shown much change (Table 3, values in parenthesis). Slight reduction in preference for arts and increase in preference for science and engineering followed by commerce seems to be there.

Table 3. University Enrolment in different faculties

Faculty/Year	1995-96		2000-01	
	Total enrolment	% Women	Total enrolment	% Women
Arts	31,62,582 (48.1)	40.6	38,75,102 (46.1)	44.2
Science	12,27,359 (18.6)	37.0	16,70,263 (19.8)	39.4
Medicine	1,88,117 (2.9)	39.8	2,62,753 (2.9)	44.0
Agriculture	40,505 (0.6)	14.3	50,308 (0.6)	17.4
Veterinary Science	12,340 (0.2)	18.0	13,588 (0.2)	20.9
Engineering & Technology	3,86,879 (5.9)	16.0	57,664 (6.9)	21.5
Commerce/management	11,23,633 (17.1)	32.5	15,00,609 (17.8)	36.5
Law	2,61,130 (4.0)	16.8	2,67,043 (4.0)	20.0
Education	1,00,602 (1.5)	46.5	1,09,196 (1.3)	51.2
Others	70,788 (1.1)	35.0	73,932 (0.9)	37.7
Total	65,74,005 (100)	36.0	83,99,443 (100.5)	39.4

However, data for girls over a longer period (1970-1971 to 1995-96) (Table 4, sourced from SNDT report), show a marked increase in preference for commerce from 1.9% to 14.1%. On the other hand, percentage of females in arts came down by over 10 percentage points and that in science over 5 percentage points. Marginal increase in law was also seen. These long-term data do support the general feeling that a shift in preference from science to subjects like commerce (which may include computer science), and law, which perhaps have better job potential did occur. But this trend seems to have been arrested and between 1995-96 and 2000-01 there was no further attrition in science.

Table 4. Women students enrolled in different faculties- change over time

Courses	Women Students Enrolled in 1970-71		Women Students Enrolled in 1995-96	
	Total Number	Percentage	Total Number	Percentage
Arts	4,21,850	64.3	11,91,774	54.4
Commerce	12,675	1.9	3,09,830	14.1
Science	1,68,540	25.7	4,40,354	20.1
Education	20,799	3.2	85,699	3.9
Law	2,626	0.4	39,551	1.8
Engineering and Technology	910	0.1	26,368	1.2
Others including medicine, agriculture, veterinary science, music, fine arts/ social work, physical education etc.	28,422	4.3	97,562	4.5
Total	6,55,822 (21.9% of all enrolment, men and women students)	99.9	21,91,138 (34.1% of all enrolment, men and women students)	100

Source: University Grants Commission, *Towards Equality-The Unfinished Agenda-* Status of Women in India 2001, National Commission For Women 2002.

Graduation to post graduation

Table 5 gives information on proportion of women persisting with education as one moves from graduation to post graduation and Ph D. During index year 2000-01 there was increase in the proportion of women studying science at PG level compared to graduation level but some decline occurred at the level of Ph.D. It would therefore appear that relatively more women tend to persist with studies after graduation though some attrition occurs at the level of Ph.D.

Table 5. Percentage enrolment of women at various levels in different faculties in the year 2000-01.

Year	Percentage of women		
	Graduation	Post-graduation	Ph.D.
Arts	44.2	44.7	38.6
Science	39.0	42.5	37.2
Engineering /Technology	21.8	15.8	16.5
Medicine	45.5	34.4	29.3
Agriculture	17.2	18.8	14.6
Veterinary Science	21.6	18.6	14.5

Differences between Indian states

Among the different states of India, some states like Goa, Kerala, Punjab, and Pondicherry had more than 50% women enrolling in college during 2000-2001 (Table 6). On the other hand, states like Arunachal Pradesh, Bihar, Jharkhand, Orissa and Rajasthan had less than 35% women entering college (Table 7). The enrolments in the other states were between these two extremes.

Table 6. States with more than 50% women enrolment

State	Total	Science	Engineering & technology	Medicine	Agriculture	Veterinary science
Goa	58.6	59.8	26.2	61.4	-	-
Kerala	60.0	63.9	30.6	56.5	53.8	47.6
Punjab	53.2	53.8	19.4	56.0	26.4	22.9
Pondicherry	54.5	57.3	29.2	47.3	-	41.3

Table 7. States with less than 35% women enrolment

State	Total	Science	Engineering & technology	Medicine	Agriculture	Veterinary Science
Arunachal	33.1	37.8	28.8	46.3	-	
Bihar	23.9	21.0	11.9	20.7	32.2	12.8
Orissa	34.6	28.3	18.6	25.0	34.0	-
Rajasthan	32.6	37.7	11.3	24.4	10.6	-

Differences among different universities

Out of 233 universities and institutions giving degrees, only 24 had 50% or more women. This includes the three women's universities- Padmavati Mahila Vishvavidyalaya (AP), SNDT university (Maharashtra), and Mother Teresa university (TN). On the other hand 50 universities had less than 20% women. This includes some large universities like BB Ambedkar (Bihar), Jai Prakash (Bihar), Veer Kunwar Singh (Bihar), and Allahabad University (UP) (Table 8). Most technical universities had low representation of women. On the other hand some medical universities in AP like Nizam's Institute and Sri Venakateshwara Institute of Medical sciences had more than 60% women. The prestigious All India Institute of Medical Sciences (AIIMS) had only 38.6% women. Agriculture universities including IARI had less than 20%. Most IITs had less than 10% women.

Table 8 Large universities with less than 40% or more than 40% women students

University	Total enrolment	% women
BB Ambedkar (Bihar)	47,810	19.6
Veer Kumar Singh (Bihar)	50,000	19.8
Allahabad University (UP	22,515	18.0
MS University (Gujarat)	33,500	45.5
Mumbai	3,83,891	50.5

Indian Women Practicing Science

Venues of employment for people with science degrees include universities (teaching and research), research institutions under government departments and councils, and private R&D institutions- industries. Due to constraint of time and resources, in the present study it was not possible to cover all the organisations. Attempt was made to obtain information about women employed in faculty and technical positions in various government institutions (DST, DBT, CSIR, ICAR, ICMR, DAE, and DOD) and 3 universities – Indian Institute of Science (IISC), Bangalore, Hyderabad

University, Hyderabad and Jawaharlal Nehru University (JNU). IISc is one of the oldest and most reputed postgraduate teaching and research Institutes. University of Hyderabad is a relatively young central university, but has acquired good reputation for both teaching and research at postgraduate level. Couple of other universities were approached but no response was obtained. Table 9 shows that DBT followed by ICMR are the best employers of women. Representation of women in the other organisations is less than 15% both at scientific and at technical levels. Data could not be obtained from DST, despite efforts.

Table 9. Relative presence of women as scientific and technical staff in Government R&D institutions, and some universities.

Organisation	Grade of the scientist	Scientists-total	% women	Technical-total	% women
CSIR	---	5030	13.0	3250	14.0
DBT	---	179	31.8	277	23.1
ICMR	---	615	27.3	1939	20.1
DAE	---	436	16.5	-	-
DOD	---	127	8.7	-	--
ICAR	Assistant Professor	12750	10.4		-
ICAR	Associate Professor	4750	6.2	-	-
ICAR	Professor	2500	3.5	-	-
IISc	Academic	316	6.6	34	14.7
IISc	Scientific	113	9.7		
Hyderabad University (Science departments)		101	15.8 (Only one professor)		
Jawaharlal Nehru University (Science schools)		82	16	20	0

Perusal of the annual reports from a few institutions showed that in most cases the presence of women in advisory committees was less than 15%. One very prestigious biological sciences institute where 30% of faculty members were women, did not have a single woman in the advisory committee (Bal, 2004).

Achievements and Recognition of Indian Women Scientists

Recognition in science can be judged on the basis of variety of factors such as ability to secure permanent faculty position, attract research grants, and research scholars, publications and patents, invitations to speak in conferences, travel fellowships, invitations to be on various policy making, and review committees, awards, academy fellowships etc. Some of the criteria such as publications are objective but others depend on the scientists' visibility and recognition by peers. In a recent study, Vineeta Bal (2004) has tried to assess the performance of Indian women biological scientists on the basis of publications in 38 high impact journals (Impact factor 5 and above). According to that limited analysis, 85.7% of the papers from India had men as the corresponding/senior authors and only 14.3% had women. This observation will be discussed later.

Very few women are elected as fellows of science academies (Table 10). Women seldom receive awards open to both the sexes. For instance, National Biosciences award, instituted by the DBT in 1999, has given 24 awards between 1999 and 2003. Only 2 awards (8%) have gone to women. Bhatnagar prize for young scientists was instituted in 1958, by CSIR. It is one of the most prestigious awards in natural sciences. Out of 333 awards given between 1958 to 1998, women received only 8 awards (2.4%). Maximum recognition for women was in medicine (7.5% awards), whereas in physics, earth science and engineering not a single woman got the Bhatnagar award. Even more shocking is the fact that, in the last 5 years (1999-2003), not a single woman has received the Bhatnagar award (Bal, 2004).

Table 10. Science Academy fellowships for women

Academy	Total fellowship	% Women
Indian National Science Academy	744	3.2
Indian Academy of Sciences- Bangalore	841	4.6
National Academy of Agricultural Sciences	395	4.0

Not a single woman has become fellow of INSA in the sectional committee IV- engineering and technology, and in sectional committees VI- plant sciences, IX- Molecular biology and genetic engineering, and X- Agriculture sciences only one woman each is a fellow. Thus in biological sciences also women fail to get recognised though they are present in reasonably large numbers.

Out of the 502 awards and medals given by INSA over the years, only 14 (2.8%) have gone to women.

No woman has become INSA president, and out of 41 recent past office bearers, only one was a woman (Prof. Indira Nath).

Discussion

Study of Science

When secondary school level enrolments are compared with college enrolments, it is interesting to note that the proportion of women enrolling in college (39.4%, in 2001-02) is comparable to the percentage of girls enrolling in secondary school as quoted in Table 11 (Bal, 2002).

Table 11. Indicators of Education- School enrolment

Country	Primary enrolment (% Females)	Secondary enrolment (% Females)
USA	49.7	50
India	45.2	39.8
Sri Lanka	49.5	52

Source: Derived from UNFPA (2001), quoted by Bal, 2002.

While in the USA the gender distribution is similar at primary and secondary school levels, in our neighbouring country, Sri Lanka the proportion of girls at secondary level increases, suggesting that more boys drop out of high school. In India on the other hand the situation is reverse and more girls drop out after primary school. The reasons for not going to school at all or discontinuing after primary school are complex, and mostly related to societal prejudices and economic compulsions. The value of education for girls is not perceived in poor communities like India.

Though India has never had any official restrictions on women entering universities, societal pressures, economic factors and access to colleges, which are away from home, restrict the entry of Indian women into university. At a recent conference in Delhi, it was interesting to learn from a Saudi delegate that though Saudi Arabia opened the portals of university education for women only in 1973, currently 43.1% of the Saudi undergraduates in Science colleges are women. This figure is higher than the figure of 35% for Egypt – an Arab country, which liberalised university education for women in 1920s (Islam 2004). Higher literacy rate and economic affordability may contribute.

The greater visibility of women at the university level in the more progressive states of India is expected (Tables 6-8). It needs to be noted that though Punjab has shown progress in terms of women's education, the female-male sex ratio is one of the lowest in the country in Punjab. This suggests that greater presence of women in the university does not necessarily imply better status of women, and detailed sociological studies are needed to understand Punjab type of situation. Dowry problem is even more acute among some educated and rich societies.

An interesting observation that differentiates India from other developed countries relates to the absence of attrition in women's percentage (if anything there is some improvement) as we move from graduation to post graduation in science (Table 5). Thus, the percentage of girls studying science increased from 39% at graduation to

42.5% at post graduation. Some reduction occurred at Ph.D. level. On the other hand a survey done at MIT in 1999 (quoted by Bal, 2002), shows continuous attrition in female representation as one moves from under-graduate level, to graduate, post doc and faculty levels (Table 12). This phenomenon is seen even in biology where women's presence is more than in other fields. It would therefore appear that in India the phenomenon of 'leaky pipeline' in education, including science education, disfavouring women occurs mostly at school level and if school drop out can be plugged, the presence of women in higher education including science may increase. It is possible that more men than women, find job opportunities after graduation or branch out into other areas like management, civil service etc. for greener pastures whereas women persist with post graduation because of lack of any other alternative till they settle down in marriage.

Table 12. Gender disparity at MIT in the year 1994 : % women at each level.

Level	Biology	Chemistry	Mathematics
Undergraduate	50.8	52.7	30.1
Graduate	46.1	29.3	15.2
Post docs	30.5	22.0	28.6
Faculty	14.0	6.2	2.1

Derived from Bal (2002)

Far fewer females seem to opt for engineering, agriculture and veterinary science. However, in agriculture and veterinary science, some southern universities show higher percentage of women (Table 6). On the other hand, medicine does seem to attract women. In medicine, women tend to cluster in disciplines such as obstetrics/ gynaecology, paediatrics, and pathology. Few women enter into more lucrative male-dominated disciplines like surgery, or orthopaedics (Sagar, 2004).

Unfortunately the UGC report clubs all disciplines of science. It does not provide split into different branches of natural science. However, the general perception is: more Indian women, like women in other countries, tend to cluster in biological sciences than physical sciences. According to a recent report, however, 32% of enrolment in physics in India is of women (Godbole *et al.*, 2002). This is considered quite high in global context where the representation of women in physics ranges from 6% in Netherlands to 36% in Poland. New research from UNESCO's Institute of Statistics (based in Montreal, Canada) shows that while many developed countries have low percentages of women doing post graduation, in some developing countries of South America like El Salvador and Argentina women make up almost 60% of S&T post graduates.

There is a feeling all over the world that interest in science among students is declining, and more students opt for courses like commerce, management and computer science. Data in tables 3 and 4 suggest that while some shift away from science did occur between 1970-71 and 1995-96, the trend has probably been arrested. These data do not permit any comment on the quality of students opting for different subjects. It is possible that the brighter ones still opt for commerce, management,

computer science, engineering, medicine etc. where there is better employment potential.

Women Practicing Science – Is there a glass ceiling in India?

Women who qualify in science either take up teaching jobs or faculty positions in Universities or Institutions, which are engaged in research with or without teaching. While the present analysis does not provide estimate of women opting for teaching in schools or undergraduate colleges with no research opportunities, numbers in table 9 show that proportion of women in national laboratories and prestigious universities is less than 15%, except in DBT and ICMR where the percentage exceeds 25%. These figures when compared with the figures in table 5 (42.5% women at post-graduate level and 37.2% at doctorate level), clearly show attrition from studying science to practicing science- the infamous 'glass ceiling'. The figures in table 5 apply to all natural sciences. The percentage in biology must be much higher. The higher presence of women in DBT and ICMR is obviously due to the fact that these organisations are primarily engaged in research in biological sciences

Women Fail to Get Recognition

Recognition of women scientists as judged by awards and fellowships is meagre compared to men even assuming their smaller numbers in academics (Table 10). The fact that not a single woman in last 5 years has got the Bhatnagar award might imply that situation is getting worse, rather than improving. It is possible that fewer women get nominated, because of their lower visibility. They are not part of the networks, which give visibility to men.

Within an organisation, the career path for women tends to be slower as seen from the number of professors vs. assistant professors/ lecturers. Is the performance of women who are in the academic stream inferior to that of men? There are no robust studies to assess that. The fewer papers in prestigious biology journals published by women compared to men (Bal 2004), can be due to fewer women in higher ranking positions in academics. Scientific productivity as judged by publication output tends to be proportional to the academic position, because ability to attract research grants, students etc. improves with position. Several reports from other countries show that once differences in structural positions and resources are adjusted for, sex differences in research productivity disappears (Feist and Gorman, 1988, Xei and Shauman, 1998, quoted by Kumar, 2001). A recent study by Neelam Kumar from NISTADS, shows that gender inequity in the academic hierarchy is an important aspect of the social organisation of Indian science (Kumar 2001). The study included physical scientists of both the sexes in four different Indian cities, working in universities and national laboratories. Out of 490 scientists, only 56 (18%) were women. The percentage distribution of male and female scientists by position – Professor, Associate professor, and Assistant professor was as follows. Male- 18.0, 37.7, and 44.3. Females- 3.6, 35.7, and 60.7. Clustering of women in the lower grades is obvious. Objective scores of productivity were obtained through a scoring system for types of publications. The results showed statistically significant differences in academic rank, social class, background, and rural/urban origin. Though the mean for research performance for men was higher than that for women, it was statistically not significant. The lower means for productivity may be related to the ranks. The study supports the thesis of 'glass ceiling' in Indian context. According to the authors the study refutes the traditional argument that women because of their family responsibilities and family-

work conflict, have lesser time, energy and commitment to invest in their professional careers and are therefore less productive than men.

Conscious or unconscious marginalisation of women from science job market is a worldwide phenomenon. According to the Greenfield report, 2002 (commissioned by UK government) fewer than 10% of senior scientific positions in any country are held by women. In UK even in a faculty like biology, where women's presence is substantial, the graph dipped from 50% women obtaining Ph.D. to less than 10% professors. Relatively more women tend to settle down in less challenging teaching jobs (Greenfield report, Peters et. al 2002).

The European Commission's ETAN Expert Working Group on Women and Science reported in 2002 that women make up less than seven percent of science professors, five percent of academy members and have a very small proportion of senior scientific positions in six member states. Another European Commission report this year points out that although women obtain nearly 40% of all PhDs (even more in life sciences), in the European Union, only 15% of industrial researchers in Europe are women (http://unesdoc.unesco.Org/images/001/001181/18131/e.pdf.). According to a report from Korea, women constituted only 3.8%, of full time faculty in natural sciences and engineering (Jeong-Ro, 2002).

A study from Sweden points out the shocking level of nepotism and sexism in this advanced country where women are believed to enjoy a high status in society. During selection of post-doctoral candidates by Medical Research Council, 62 men and 52 women applied. While the success rate for men was 26%, that for women was only 7%. When the scores given by the review committee based on publications quality etc. were analysed there was mismatch between this objective parameter of scoring and the rank given to judge competence. According to the authors, the females had to be 2.5 times more productive to get the same competence score (Wenneras and Wold 1997).

While remedial suggestions can be made for problems related to support systems and encouragement, changing mindset is not going to be easy.

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