Gender equality in science in India: an undeveloped agenda

Women scientists are a significant human resource for any country. Their under-representation and a lower position in academic and elite institutions of research in India[1–3] is a cause for concern. Expanding the number of women scientists and improvement of their position within the institutions is a difficult task, since the problems facing women scientists are not readily visible and hence there are no obvious solutions. It requires scholars from across multiple fields and disciplines, including sciences and social sciences, to analyse the nature of gender gap in sciences and work on mitigating and treating gender differences.

In India, the writings of social scientists have brought to light the tremendous inequity and masculinity inherent in the science institutions. The problems indicated by these writings include minority status of women in science, biases in hierarchical distribution of women[1,2,4,5], lack of infrastructural support, dual burden on women in science academia and government research laboratories in India[2,5] and spillover of patriarchal considerations in the workplace[6]. The informal environment of academic science poses problems of isolation, tokenism and socio-cultural biases for women[3,7]. Indian women, as common in some developing countries, are less likely to travel or receive education abroad than men due to family and security reasons. Hence, they develop less contacts and networks[8]. Subramanian[9] has demonstrated how a narrow definition of 'merit' as an individually inherited trait denies the role of social and institutional factors, such as significance of contacts and networks within and outside the organization, in recognition of merit.

There are several organizational and professional issues pointed out by the above and many other studies on women in science. These derive from the Indian socio-cultural context and professional context of the practice of science. While issues derived from the latter affect women scientists everywhere and are difficult to tackle at the national level, the impact of the former can be dealt with substantially at the organizational level. The significance of the social context of science organizations is acknowledged world over in studies of women scientists since those who work in the organizations are from the same society. Hence despite the claims of rationality, biases creep in through 'social relational contexts'[10] as, for instance, when decisions are made by individuals in interviews, committees, etc. Thus, although formal rules (written rules for appointments and promotions) do not discriminate, biases in the informal environment (comprised of norms, practices, contacts and networks among the people working together) in organizations create inequities for the women scientists. According to Etzkowitz *et al.*[11] '…much of the process by which disadvantage is created and reinforced occurs within organizations and at the level of the department. It is at this level that recruitment, socialization, learning through networks, and access and referral benefits are created and combined with human capital factors.'

Unfortunately, this understanding of organizational issues is missing in policy-making. The policies of DST regarding women in science are of two types: (i) those aiming to bring back women who lost time due to marriage and family into science through projects; (ii) those for full-time women scientists aiming at reducing dual burden through child-care leave, day-care centres, etc. None of the policies of the government addresses the issue of discrimination and bias at the organizational level. This is not likely to happen in the near future either. The reason appears to be a lack of knowledge of the work of the social scientists.

In recent years there has been substantial awareness among the women scientists that the issues faced by them are not individual but common to their group and this is witnessed in various recent workshops, conferences and committees. Such gatherings, however, appear to defeat the cause of women scientists in three inter-related ways. As a first-hand witness to some of the conferences and workshops, I have observed that there is a disproportionate concentration on dual burden problems of women and therefore government intervention is sought in terms of crèche, flexi-hours, etc. Of late, there has been a growing understanding that since men and women are equal partners in shouldering family responsibilities, men should be given the same leave concessions as women (e.g. child-care leave). However, the suggestions on policies seldom seek to resolve problems other than those related to a dual burden or family issues.

Secondly, there is an acknowledgement of a glass ceiling (discrimination that prevents women from moving up) for women scientists and this is rightly shown through statistics which indicates that few women are at the top positions or receive prestigious awards and fellowships. But why is there a glass ceiling and how does it come about is seldom discussed. The organizational biases are sometimes downplayed or not clearly understood. For instance, there is no comprehensive study of an institute from the gender angle similar to the MIT study[12] which was carried out by women scientists employed at MIT. Written accounts of women scientists in India, e.g. *Lilavati's Daughters*[13], are the first of their kind and hence invaluable for highlighting the lives of women scientists. However, only a few of those refer to organizational discrimination. There have been recent suggestions of gender auditing of organizations. But what it will entail is not discussed.

Third, while formal rules and procedures in India do not discriminate, women scientists acknowledge subtle discrimination at all levels, junior and senior, during conferences and workshops. Women scientists are also discriminated at the informal level in their institutions. These experiences are related to the selection committees, meetings and interactional situations. However, the pattern and logic behind such discriminatory practices is hardly a part of the discourse at such gatherings.

As a result, the solutions to these problems lack depth. Most of them are either related to family issues such as child-care leave for men, day-care centres, etc. or, those which are only concepts whose details are lacking such as, 'gender mainstreaming' or 'gender auditing'. It is here that the work of social scientists could be crucial in highlighting the organizational issues and in providing a perspective through which women scientists can voice their grievances. The reasons for the glass ceiling and the logic behind subtle discrimination need to be widely discussed. An active participation and inputs from both social scientists and scientists alone will make it possible to

explore measures that can solve these problems. This is vital so as to enable women scientists a rightful status and representation in the community of scientists in India and abroad.

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The prospects of university teaching: a futuristic reality check

Teaching has been the intellectual backbone in human society for millennia[1]. This unique livelihood continues to be reflected as a noble duty across cultures. Without qualified teachers and deserving students, there will be no prosperous future for education in society. But, what happens when universities do not get enough students? A closer look at Taiwan, which is currently contemplating this bitter question, may shed some light.

In order to promote easy access to education catalysed by rapid economic growth, Taiwan added additional universities in recent decades. Historically, there were only 7 higher education institutes in 1950 that handled 6665 students. But the number exploded to 105 in 1986 to support 300,000 students. Subsequently, it increased to 162 in 2012, supporting 1.25 million students[2]. Taiwan is a small island with a population of 23 million that is spread across an area of 35,980 sq. km, which is slightly smaller than the South Indian state of Kerala. But, it harbours 53 national and 109 privately owned institutes of higher education, contributing to one of the highest densities of universities in the world. The education planners of the past, somehow ignored all the worst-case futuristic scenarios, so that the rapid growth of universities has lately started to backfire.

The excess supply of graduates triggered acute unemployment, from 2.7% in 1993 to 5.8% in 2012 (ref. 2). Taiwan's low birth rate over the years added more misery, because universities now are facing low enrolment. In response, the government came up with a strategy to merge some national universities while certain privately owned ones silently started to die out. By 2020, about 25% of Taiwan's universities will be forced to close due to lack of students. Likewise, South Korea is expected to close nearly 100 universities by 2040 due to declining student enrolment[3]. The looming uncertainty over the future of university teaching has begun to scare many in this noble profession.

India harbours a large number of higher education institutes, and the number continues to grow upwardly. But fortunately, the country's population has been predicted to reach 1.72 billion by 2060 (ref. 4), and then only stabilization will take place. Hence universities will not face the student shortage crisis for some time. Irrespective of economic status and social conditions, parents view education as a way to fulfil the future ambitions of their children. But, when the quality of education and teaching lacks futuristic insights inspired by excellence, graduates may find it even harder to get suitable jobs that they deserve.

Therefore, India may need to strategize education to produce highly skilled manpower influenced by visionary teaching of futuristic subject matters, and then only, the 'Make-in-India' (www.makeinindia.com) catch phrase will have a smooth ride. It is equally important not to ignore basic sciences, so that in future education innovative growth can be properly balanced. When the quality of education and teaching excels, at least some Indian universities will be able to join the global ranking of the 100 most prestigious educational institutions in the world. Even so, without understanding the futuristic direction of humanity, one cannot simply design higher education and teaching strategies efficiently. As the American futurist Alvin Toffler[5] once wrote, 'Unless we understand the future for which we are preparing, we may do tragic damage to those we teach.'

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