Uncovering the Gender Politics of Science Policies and Education

This paper examines the educational and science policies of India to understand some of the reasons for women's exclusion. Examining women's access to higher education, it discusses the impact of current socio-economic and political realities on women's participation in science education and research. Not only is there a disjuncture between professed policy statements and prevailing ground realities, certain assumptions about class, caste or gender operate here unquestioned. The resultant anomalies have created a major gap in women's access to education and they are likely to increase, which has implications not only for gender equity, but also for the future of theoretical research in the country.

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Emerging from the scientific revolution of the 17th century, the growth of science and technology in succeeding centuries has transformed the world. The influence of its theories and methods of inquiry permeates every branch of human knowledge. More importantly, knowledge constructed through the use of scientific rationality infuses and shapes prevailing socio-political and economic institutions as well as the most intimate parts of our lives. The ways in which knowledge gained through scientific rationality dominates our public and private worlds can be gauged from an understanding of the process of social engineering attempted by the state through its policies and programmes. It can also be seen in the ways in which scientific information disseminated through the media moulds our sexual norms, reproductive practices and interrelationships.[1]

In India, the rapid expansion of science and technology has taken place in the post-independence era. This growth can be largely attributed to the Nehruvian vision that infused development planning in the country since the 1950s. The institutional structures that have evolved to promote the growth of science and technology can be classified as those funded by the central government, state governments, higher education sector, public and private industry and non-profit institutions and associations. Since the 1970s, the Department of Science and Technology (DST) has played a critical role in identifying and promoting front-line and priority areas for research in various disciplines of science and engineering. It supports the development of science through the Science and Engineering Research Council (SERC), an advisory body comprising eminent scientists and technologists to peer review research and identify new interdisciplinary areas of research. There are also other professional bodies to promote specialised fields of science and technology. These include organisations such as the Council of Scientific and Industrial Research, Indian Council of Agricultural Research and Indian Council of Medical Research. There are also departmental laboratories of various departments/ministries, such as the Department of Atomic Energy, Department of Electronics, Department of Space, Department of Ocean Development, Defence Research and Development Organisation, Ministry of Environment and Forests, Ministry of Non- Conventional Energy Sources, and the Ministry of Science and Technology. In addition, there are about 1,200 in-house research and development units in industrial undertakings supporting research in their respective industries [GoI 2003a].

Very few women have been a part of these structures in senior positions. Their participation is confined to the junior level and the few women who do make it to senior decision-making positions are unable to change the essentially masculine ethos of these institutions. Scientific institutions in India are extremely hierarchical and competitive. Women either drop out of the rat race or learn to compromise on their ambitions. Women scientists also seem to cluster in life sciences and chemistry and are not necessarily found in earth sciences or physics and mathematics. They also seem to prefer taking research topics that do not require long hours in the laboratory or extended periods of fieldwork.

This paper examines the educational and science policies of the country to understand some of the reasons for women's exclusion. It begins by examining women's access to higher education. Subsequently, interrogating education and science policies, it discusses the impact of current socio-economic and political realities on women's participation in science education/research. What emerges is that there is not only a disjuncture between professed policy statements and prevailing ground realities; but also, there are certain unquestioned assumptions about class, caste or gender underlying these policies. The resultant anomalies have created major gaps in women's access to science education/research; and they are likely to increase in the wake of current socio-economic and political processes. These questions have implications not only for gender equity, but also for the future of theoretical research in the country. The validity of these questions in any equity project (ie, projects that address not just the needs of women but also raise questions of caste and class inequities) can be gauged from the fact that although India has more than 250 universities and other institutions of higher education, only 6 per cent of the population have any access to higher education [Mulimani 2004:12-18]. Needless to say, those that can access this education are predominantly elite men.

The uncovering of the politics of exclusion in institutional practices and policies governing science education and research is premised upon the insights gained by various subaltern movements that emerged on the political landscape in the 1960s. In their struggles against racism, colonialism, capitalism, sexism

supply to universities and research institutions would lead

and homophobia, these movements have argued that the creation of knowledge does not occur in a vacuum. A critical examination of the process of knowledge generation throughout history indicates that the prevailing ethos within its institutions is not uninfluenced by the predominant norms and values in society. Influenced by the existing social, political and economic context, scientific institutions and ethos perpetuate certain exclusionary practices that prevent large sections of the population (including women) from participating in the exciting process of knowledge creation [Harding 1986: 15-30]. This paper subsequently argues that these exclusions have emerged not merely because of policies and restrictions, but also from the foundational assumptions of scientific knowledge, which when applied to society, reinforce inequities.

Women's Access to Higher Education in Post-Independent India

Any discussion on equity of access to educational opportunities at the highest level must begin by recognising the processes of exclusion at various stages of education. The prevailing educational system denies opportunities to vast sections of the population – both men and women. But when the figures are examined from the standpoint of gender equity, it becomes apparent that women are specially disadvantaged. The existing data on educational access reveals that barely 54.16 per cent women in the country are literate. There are also significant rural and urban differences. In some rural parts of the country, the female literacy rate is as low as 18 per cent, while in urban areas it is 48 per cent. The estimated dropout rate for girls is 56 per cent at the middle school stage and is unlikely to change in the near future. The male-female literacy gap is 21.70. This means there are 226,754,947 illiterate women and about 113,223,101 more female illiterates than males, despite the fact that there are 35,538,909 less women in the country than men [Census 2001, Poonacha 1999: 129-55].

Undoubtedly, the problems that assail girls education at the primary and secondary stages are different from those that affect their access to education at the tertiary level. The point (which needs to be noted in any discussion of equity of access) is that majority of the population is excluded from institutional structures that enable them to participate in the process of knowledge creation. Further, this failure to resolve the crisis of access to and retention of girls in the primary and secondary stages gets compounded at higher education levels.

Tables 1 and 2 show that these gender inequalities in access to higher education have continued through the decades. These tables also indicate the rate of growth of men's access to higher education is greater than that of women. Further, there is no appreciable increase in the growth rate of access to higher education in the period of economic liberalisation.

Further, women tend to cluster in the general disciplines rather than in professional courses (Tables 3 and 4). Table 4, in particular, is revealing as it indicates access figures at two points of time, namely, 1971-72 (when political ideology of the state was aimed at creation of a welfare state), and 1995-96 (when political ideology argued for withdrawal of the state from the social sector). Since the data does not show an appreciable increase in women's access to higher education, the lack of commitment to changing the prevailing gender equation may be inferred. On a positive note, Table 3 indicates that in the 1990s there were more women entering pure science than men, while the latter straddled all other professional courses. This marginal increase in women's participation in science may not necessarily translate itself to a greater visibility of women's scientific research.

Education Policies

Apart from the socio-economic constraints that circumscribe women's access to higher education in science and their career growth, there are failures in policies and programmes to address the question. The first two Five-Year Plans, for instance, emphasised the development of a socialist pattern of society and the growth of basic education. Consequently the period saw the rapid expansion of women's education. This expansion however cannot be attributed (despite the professed aim in the plans to encourage women's access) to any concerted efforts made by the state to increase access, but rather to other socio-economic causes. In a bid to rapidly modernise the country, the Third Five-Year Plan paid particular attention to the growth of science and technology. But while devising strategies to translate the plan into action, it did not address questions of the inclusion of various categories of people (including women) in the process of knowledge creation. The reasons for these shortfalls could be attributed to the lack of clarity on the purpose of women's education in educational planning [Chaudhary 1995: 27-48].

Table 1: Gender Distribution at Graduation Level and Above
(In per cent)

	Women			Men		
Year	1971	1981	1991	1971	1981	1991
Rural	0.27	0.74	NA	0.87	2.07	NA
Urban	0.87	2.07	NA	2.75	5.75	8.67
Total	1.35	2.96	4.50	2.38	4.42	6.44

Source: *Women in India: A Statistical Profile*, Department of Women and Child Development, Government of India, New Delhi, 1997.

Table 2: Enrolment in Higher Education

Year	Women	Men
1991-92	32.0	68.9
1992-93	32.7	78.1
1993-94	33.2	66.8
1994-95	33.8	66.2
1995-96	34.1	65.9
1996-97	34.1	65.9

Source: (1) *University Development in India: Consolidated Data Statewise, 1998-89 to 1993-94;* University Grnts Commission (UGC) (2) *Annual Report 1994-95*, UGC, Appendix VI, p 110-135; (3) *Annual Report 1995-96,* UGC, Appendix VI, p 163; (4) *Annual Report 1996-97,* UGC, p 20, cited in Chanana: 2000: 1015.

Table 3: Gender Distribution by Discipline, 1993-94 to 1991-92
(In per cent)

Discipline	1993-94		1992-93		1991-92	
	Women	Men	Women	Men	Women	Men
Arts	54.24	35.41	54.24	35.44	54.24	35.63
Science	19.78	18.94	19.78	18.99	19.78	19.00
Commerce	14.64	24.17	14.64	24.40	14.64	24.26
Education	3.73	1.71	3.73	1.72	3.73	1.74
Engg/Tech	1.18	6.91	1.18	6.78	1.18	6.73
Medicine	3.49	3.28	3.49	3.31	3.49	3.31
Agriculture	0.25	1.60	0.25	1.51	0.25	1.51
Veterinary science	0.06	0.35	0.06	0.32	0.06	0.33
Law	1.79	6.97	1.79	6.89	1.79	6.84
Others	0.84	0.66	0.84	0.64	0.84	0.65
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: University Grants Commission, cited in Desai and Thakkar 2000.

The National Policy on Education (1964-66), for instance, also looked at women's education as a means of social transformation and not as an intrinsic value or right. Conversely the policy focused on the need to rapidly expand science and technology education in the country. Addressing this need the National Policy on Education (better known as the Kothari commission report) called for a comprehensive programme to promote scientific temper in education, develop research potential and excellence as well as collaboration between institutions. In seeking to advance India's scientific capacity, the document did not examine the need for including various marginalised groups in the process. This disjuncture between the various goals of education meant that the goal of realising excellence in science and technology was not seen as concomitant with the constitutional goals of equality. It is true that the policy does speak of taking science to the people and building a scientific temper in the country, but it does not assume that people from marginalised groups should also be partners in the exercise [GoI various years]. Similarly, the Fifth and Sixth Five-Year Plans that also talked of women's education did not stress the need for any planned programmes to ensure women's participation in science or technology. For instance, the Fifth Five-Year Plan spoke of the need to increase the number of agricultural universities without addressing the question of access.[2]

By the 1970s, however, there was a growing awareness that gender was an important social category, which needed to be taken into account in development planning. The report of the committee on the status of women (1974), better known as the *Towards Equality Report*, set clear guidelines on the aims of female education [GoI 1974]. Responding to the findings of this report (which indicated the ways in which the prevailing development planning had excluded women) as well as to the growing articulation of women, the Five-Year Plans (since the 1980s) have recognised the importance of education as a means of establishing gender equality. Apart from improving facilities for women's education, these plans have suggested the need for restructuring curriculum, removing gender biases and have stressed the importance of higher education for women, particularly their entry into professional or technical careers. These plans, in essence, reflect the new thinking on education since 1985.

Table 4: Enrolment of Women in Higher Education by Courses

Courses	Total No of Women Students Enrolled			
	1970-71		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 per cent of all enrolment, men and women students)		21,91,138 (34.1 per cent of all enrolment, men and women students)	

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

Assessing the sweeping changes in the country over the last two decades (since the education policy statement of 1966), the government circulated a document known as the *Challenge of Education: A Policy Perspective*, to initiate discussions on new directions for education [GoI 1985]. Admitting the failure of the state in promoting equity of access to education, the document called for: educational restructuring; universalisation of elementary education; reduction of the dropout rate; creation of model schools and the de-linking of education from jobs. The ensuing nationwide debate identified certain basic issues that the new education policy must resolve to prepare the next generation for the 21st century – an era of advanced scientific, technological and industrial development. The document, in particular, stressed the role of education in realising gender equality and ensuring women's entry into professional education. Following the recommendations, the new education policy (1990) was formulated, which saw gender equality as a central component of education [GoI 1992a:10]. This forward looking policy thrust, however, was developed at a point of time when, in response to structural adjustment policies, there had been no expansion of higher education. As a result of this changed political economy, the access figures for women show a marginal downward slide.

The UGC's *Tenth Plan Profile* shows the growth of student enrolment (both formal and informal) had increased in the last decade from 62.17 lakhs in 1992-93 to 93.14 lakhs in 1999-2000 (i e, 50 per cent increase), but women's enrolment had not risen proportionately to that of men [UGC 2001]. For although women's enrolment increased from 20.92 lakhs to 33.24 lakhs, it represented a marginal improvement, from 33.6 per cent in 1992-93 to 36.15 per cent of the total in 2000. Indicating this limitation in access to higher education, the document further stated that India's access parameters were approximately one-sixth of developed countries.

Science Education in India

Currently, the most pressing problem faced by universities and other institutions of higher education is the resource crunch. No doubt, some institutions like the Tata Institute of Fundamental Research (TIFR) are well funded and comparable to the best in the world; but others (particularly those run by state governments) are starved for funds. The science departments in some universities lack even basic infrastructure, such as laboratory facilities, equipment and scientific journals. The funds, which the University Grants Commission (UGC) makes available to universities once in five years, are insufficient to replace obsolete equipment and other materials [Mulimani 2004]. This paucity of funds is evident in colleges particularly women's colleges. Consequently, despite the professed policy reference to link institutes of science education with research and technology institutions, this interface has not necessarily taken place [GoI 2003b]. Nowhere is the hierarchy between various kinds of institutes more apparent than when examining the interface between universities, colleges and research institutes. In the course of our interaction with women teachers of women's colleges, we found that the management tended to discourage research. Also, the universities to which these colleges were affiliated neither drew upon the educational capacities of teachers to develop their own research programmes, nor did they make available any laboratory facilities for women to continue research.

This abysmal lack of facilities is particularly evident in remote areas and in minority institutions.

An Examination of Science Policies

Against the backdrop of these discussions, an attempt has been made here to examine science policies. The four important documents that address the growth and development of science in India are the *Scientific Policy Resolution* [GoI 1987], *Technology Policy Statement* (1983), *Perspective Plan for 2001 AD: Role of Science and Technology,* brought out by the Science Advisory Council to the prime minister [GoI 1992b], and *Science and Technology Policy* [GoI 2003a]. These plans have broadly addressed the following issues: (1) strengthening of basic research; (2) development of applied research and technology; and (3) transference of laboratory knowledge to the end users.

An examination of these policy statements reveals some of the underlying assumptions that guide the development of science and technology in the country. These are as follows: (1) the development of science and technology is the necessary solution to all problems in the country, ranging from unemployment to poverty, population to environment degradation; (2) these solutions can be found through the right use of reason; (3) this quest for knowledge is an intensely individualistic process; and (4) the findings or the research process are not coloured by the social location or identity of the scientist.

The most striking feature of the documents (with the exception of *Science and Technology Policy,* 2003) is their failure to address questions of equity (i e, the inclusion of women and other marginalised groups) in the process of knowledge generation, or to consider that the process of knowledge transfer could be built on a two-way communication model, rather than a top-down approach from laboratories to people.[3]

Developed by a predominantly male group, the policies do not reflect the concerns of women or other marginalised groups. When these policies are translated into plans of action (as articulated in the Five Year Plans), it is apparent that women and other marginalised groups such as peasants, tribals and minorities figure only as receivers of technology transfer and not as creators of knowledge. None of these documents address questions such as the waste of human potential (when women dropout of science careers), or question the prevailing construction of gender identities. Taking a biologically determinist position, these documents, see women as receivers of scientific technologies (i e, when low cost efficient fuel, water supply and other simple technologies for the household are developed).

There are also other apparent contradictions in the aims: for instance, the aim of promoting social welfare through appropriate technologies does not necessarily coexist with the aim of giving India a competitive edge in a capitalist social order. It suggests that the idea of science for profit precludes the possibility of creating a sustainable and equitable development model. Also the assumption that science can find a solution to prevailing socio-economic problems without questioning the politics of equitable resource distribution in society is not borne out in reality. Going by the current trends of food distribution in the country, it may be argued that the justification for genetic modification of foods is not so much to feed the masses, as it is to accrue profits from enhancing the shelf-life of fruits and vegetables.[4] Seen through the lens of gender justice, some policy statements are directly dangerous to women. The *Perspective Plan for 2001 AD: Role of Science and Technology* calls for scientific solutions to the problem of population explosion. The solution obviously refers to the use of reproductive technologies and ignores women's rights over their bodies.

Implications of the New Challenges for Science and Education

The parameters of these debates have changed drastically. Today the mantra in all spheres of life is globalisation, privatisation and deregulation of capital. To accommodate these changes, *Science and Technology Policy* (2003) on the one hand, addresses questions of equity, poverty alleviation and sustainable development, and on the other, speaks of knowledge as a source of economic might and power. It follows that when knowledge gains an economic value, a legal framework governing, monitoring and controlling intellectual property rights and trade must necessarily develop and that such knowledge monopolies will inevitably restrict the realisation of the equality principles of social organisation.

The policy also calls for science undertaken through multidisciplinary, multi-institutional and multi-country collaboration without taking into account the prevailing unequal power equation between countries. Therefore, would the memorandum of understandings (MOUs) signed between multi-country research institutions reflect the unequal bargaining powers between nations? Would this mean that field trials will be conducted in India while the theory building will be the prerogative of the more powerful countries with funds to support research?[5] Additionally, science functions within institutional structures requiring major experimental facilities (even in several areas of basic research), large material human and intellectual resources. These institutional structures (with its deeply embedded hierarchies) mediate power by bargaining for certain immunities in the name of merit, intellectual freedom, research and development. These phrases are often used to avoid socio-political accountability and any kind of monitoring of institutional functions. It could function in ways that increases the chasm between those who have membership of such institutions and those without. These institutions in turn are seen as wielding power over socio-economic development, for the policy envisages that there will be a greater integration of the programmes in socio-economic sectors with R&D activities. It argues that a certain percentage of the fund allocation of each socio-economic ministry will be set aside for the development of relevant programmes and activities in science and technology. Does this mean that the social transformation will be guided through a top-down approach and ignore the rights of local communities to have a say in their development?

Further, the prestige associated with careers in science and technologies in a capitalist society will make the cost of science education extremely expensive and thus elitist. This elitism is likely to increase as science education and research will increasingly operate in the context of privatisation of educational/ research institutions and the withdrawal of the state from these sectors. These trends are evident in the *Tenth Plan Profile of Higher Education in India* [UGC 2001] and the *Report on Policy Framework for Reforms in Education* brought out by the prime minister's council on trade and industry [CTI 2000]. Calling for public and private investment in higher education, these documents indicate that education and research are now services within which knowledge becomes a commodity. Within this

framework, science education and research is seen as developing through a tripartite collaboration with industry, research institutions and education centres [Ramamurthy 2003]. Thus, insofar as research and teaching in science is guided by the requirements of industries, only those areas of science that are potential money-spinners will develop.[6]

Therefore, when policy documents speak of using scientific knowledge for social development, the economic compulsions of knowledge generation and transference will create its own rationale for research. The much touted aims of using science/education for reduction of poverty, economic and civic growth must necessarily take a secondary position to the goal of research and teaching as an economically profitable enterprise. These compulsions of the market will also make the institutional structures within which science is practised exclusive.

Some of the suggested structural changes in the management of scientific research and education (namely, the need for flexibility in programmes, in their structure, curricula and delivery systems) are, indubitably, necessary to make research and teaching relevant to the present age. The problem with the policy statements is the ways in which existing structures are being commercialised and made responsive to market demands. With regard to education, the approach operates at two levels: it proposes a cafeteria approach to education so that students "as consumers of a service" will have multiple choices. They will be able to 'buy' courses that will enable them to meet the challenge of a competitive job market. This in essence leads to the second point of education as a competitive enterprise [Cohen 2000, UGC 2001]. Ironically, as policies open the educational/research market for foreign/private entrepreneurship, educationists/scientists are also seen as suppliers of services. They are also expected to be able to market their research and make it commercially viable.

To facilitate this process of commercialisation, the documents call for greater autonomy for private teaching/research institutions and loosening of the present controls exercised by universities over other institutions of advanced studies. The documents, particularly those referring to education, imply that the private sector (both national and international) would like to have a share in educational/research spending, which according to the estimates provided in the UGC *Tenth Plan Profile*, is about Rs 47,00,000 crore in all sectors of education.

Beyond doubt, the application of market principles of profit will increase social inequalities, despite claims that state support to education will continue for some more time to maintain equity of access. What is not taken cognisance of is that this pitting of public institutions with private enterprise (in an environment that is adversely loaded against the former) is not the most effective way of realising social equity [Sisodia 1991]. At present, there is a steady erosion of state spending on education: in Maharashtra, for instance, universities suffer from paucity of funds and are short staffed. Therefore, can universities and institutions of advanced studies withstand the competition from foreign universities and private institutions that affiliate with them?

Apart from these questions on the ability of Indian educational/science institutions to survive the competition posed by foreign institutions, there are important pedagogical and ideological issues. The application of market principles of demand and supply to universities and research institutions would lead them dwindling into "assembly line factories" churning out human products and knowledge required by industries. Indubitably, any rise in the cost of education, on the principle that the user pays for services, and the withdrawal of state support for education will have a negative impact on women's access to education. It is well known that within Indian families the education of daughters does not receive the same priority as that of sons. While families are prepared to sacrifice some expenses for the education of sons, they would not do the same for their daughters.

Thus when policies governing the production of knowledge and its transmission see them as economic currency, to give individual power and status, then exclusionary practices get reinforced into institutional frameworks. These institutional structures then become the means of political control. Education and research will cease to develop critical thinking and resistance to regressive and superstitious belief systems. Treated as a vehicle of indoctrination, education is increasingly being used for narrow political purposes and the promotion of right wing ideologies that justify (using the language of science) women's return to the home.[7]

Politics of Exclusion in Epistemological Practice of Science

If women and other marginalised groups are excluded from the process of knowledge generation by the economics and politics of it, the knowledge created by elite men (particularly from certain races) to maintain the status quo will get reinforced. Women's studies epistemologies have pointed out that the absence of women's perceptions in codified knowledge and the inability of existing theories to explain women's lives is political. It arises partly because the creation of codified knowledge and the institutional structures for knowledge generation have been historically controlled by men from certain classes and nationalities, and partly from the political aim of perpetuating women's subordination. Therefore, mainstream theories that ignore the gender, class, race and nationality dimensions of social reality are seen as culture-specific and limited [Langton 2000: 273-93].

In seeking to validate women's knowledge and ways of knowing, women's studies has also critiqued scientific rationality. It argues that the scientific method, based on experimentation and the use of deductive (logical deduction) as well as inductive reason (to co-relate phenomena and cause), has excluded the possibility of even acknowledging the validity of other ways of knowing (i e, the knowledge of the less powerful members in society). The results of such unrecognised biases and trends are necessarily counterproductive as they foreclose the possibility of developing alternative and divergent ways of knowing and restrict the growth of scientific enquiry and knowledge. Langton (2000:127-45) suggests that the epistemological grounding of scientific method in the Cartesian framework arises from the following assumptions: (1) there is an objective reality that is knowable through the right application of reason in conjunction with senses; (2) that this pursuit of knowledge is individualistic and is not influenced by the researcher's social position as a member of a historically changing group; (3) that all individuals (regardless of their social position, culture, race or sex, have the same faculty of reason and sensation; and that (4) the prevailing differences in human beings (rather than being recognised as providing alternative perspectives on reality) are seen as

conquerable impediments to a neutral and objective view of things.

Women's studies scholarship has pointed out that these assumptions have resulted in the ontological dualism between the mind and body, nature and culture, private and public, man and woman. Such a dichotomous world view creates hierarchies and exclusionary practices in theorising, particularly in the social and life sciences. Encoded in the scientific method are certain assumptions of value neutrality and objectivity, which often serves to hide the bias of the researcher. Although these biases influence the identification of the problem, formulation of hypotheses, design of research, and the collection and interpretation of data, they are unacknowledged. Dominated by theories generated by men who also have institutionalised power, the politics of knowledge generation lends credence to the male world view. Apart from denying the validity of women's knowledge, the process (based on the assumption that knowledge is apolitical and objective) fails to acknowledge the political interests, goals and desires of the dominant group [Harding 1990: 83-106].

What emerges from this brief overview of educational/research policies from the standpoint of women's access to education is the ways in which hegemonic politics seek to control the process of knowledge creation and dissemination. While overtly claiming to extend access and outreach, the implicit policy motivation is the maintenance of an exclusive social order. These exclusions (particularly of gender) are also likely to be increased in the current economic compulsions of global capitalism for the following reasons: (1) the historical resistance to women getting education, public recognition or jobs available to similarly talented men is replayed in scientific institutions, as these institutions are part of the prevailing social milieu; (2) these discriminatory practices are often informally maintained even when formal barriers have been eliminated; (3) in the implementation of social policies, scientific rationality is often cited as justification for control of marginal groups and their exclusion; (4) the epistemological emphasis on rationality and objectivity in science often hides the bias of the researcher; (5) encoded in the knowledge created in an institutional set-up is the world-view of the dominant group, which is reflected in the choice of the problem, selection of methodology and solutions; and finally (6) the results of such unrecognised bias and trends are necessarily counterproductive to the practice of science for they foreclose the possibility of developing alternative and divergent ways of knowing, which in turn restricts the growth of scientific enquiry and knowledge [Harding 1990:83-106]. This last position also opens up a whole line of enquiry about whether science is an enlightening project or not. But these questions are not addressed in any policy discussion on science or in the institutional practices of scientific institutions. The unquestioned assumption is that science is value neutral and intrinsically good. The failures of science to address these questions are attributed to bad practices rather than to any inherent limitation of either the technique or its political location. EPW

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Notes

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1 A case in point is the current population control policies in India. Malthusian theories of rapid population growth are cited as reasons to control population and are used as justification for the use of reproductive control technologies that may harm women's bodies. These policies do not address the more pertinent political questions of equitable resource distribution.

2 A similar gender-blindness is evident in all the other subsequent plans. While addressing questions of equity in access to higher education, no mention is made to specifically ensure that women have access to science education. It is as if the gender component need not be considered while discussing ways to strengthen science teaching or improving infrastructure. Further, while discussing the need to upgrade curriculum and nurture talent, the plans do not consider how the criteria for adjudging merit could be developed in ways that would take into account the differences among people.

3 The politics of knowledge generation has created a hierarchy of knowledge, by which those aspects of basic and applied research get more funds and accrue more prestige to scientists that promote or increase the power of the dominant group. Moreover, technology transfer is generally carried out without addressing questions of its impact on the community. For instance, the mechanisation of farming activities meant that men entered many of women's traditional areas of control. The surplus thereby generated meant that women from the landowning communities were withdrawn from work. Simultaneously it increased the burden on poor women who were left with back breaking tasks of weeding, and applying fertilisers to the land [Boserup 1970, Agarwal 1994, Poonacha 2000].

4 There are also other anomalies in the science policy documents. It, for instance, calls for the preservation of traditional knowledge. The contradiction arises because the assumptions underlying traditional knowledge are often in stark conflict with the explicit scientific project of rationality. As the two world views cannot coexist, what the project suggests is that traditional knowledge of medicinal herbs will be selectively appropriated [Banerjee 2004].

5 The concern over the power relationships between institutions in the developed and developing worlds are real. Studies have indicated that developing countries have an unequal bargaining power in all areas of international cooperation. These inequalities between nations get replayed in research projects. For instance, the testing of vaccines and other drugs are often carried out in the developing countries, while the theory building and profits accrue to the institutions in the first world [*EPW* 2004].

6 The department of science and technology has also initiated several schemes to usher in research based education and to identify and nurture talent in young students who have an aptitude for science and technology Apart from liberal research grants for individual scientists on a competitive basis, core groups and centres of excellence have been established within the university framework, involving scientists with a proven track record.

7 Educational documents, in particular, seem to promote conservatism. The *Tenth Plan Profile*, for instance, talks of defence studies and internal security as interdisciplinary areas of research and the introduction of areas such as vedic studies and astrology as legitimate areas of university education.

References

Agarwal, Bina (1994): *A Field of One's Own: Gender and Land Rights in South Asia*, Cambridge University Press, Cambridge.

Banerjee, Madhulika (2004): 'Local Knowledge for World Market: Globalising Ayurveda', *Economic and Political Weekly*, January 3, Vol XXXIX, No 1.

Bosrup, Ester (1970): *Women's Role in Economic Development*, St Martin's Press, New York.

Chaudhary, Pratima (1995): *Women's Education in India: Myth and Reality*, Har-Anand Publication, New Delhi, pp 27-48.

Chanana, Karuna (2000): 'Treading the Hallowed Halls: Women in Higher Education in India', *Economic and Political Weekly*, March 18, Vol XXXV, No 12, pp 1012-20.

Cohen, Griffin Majorie (2000): 'The World Trade Organisation and Post-Secondary Education: Implications for the Public System in Australia', Working Paper Series 1, Hawke Institute, Magill, South Australia.

Census (2001): *Census 2001: Provisional Population Totals*, Government of India.

CTI (2000): *Report on a Policy Framework for Reforms in Education*, Prime Minister's Council on Trade and Industry, New Delhi.

Desai, Neera and UshaThakkar (2000): *Women in Indian Society*, National Book Trust, New Delhi.

EPW (2004): 'Wrong Remedy', *Economic and Political Weekly*, January 3-9, Vol XXXIX, No 1.

GoI (various years): *Report of the Education Commission*, Ministry of Human Resource Development, Government of India, New Delhi, 1964-66.

– (1974): 'Educational Development', *Towards Equality*: *Report of the Committee on the Status of Women in India*, Department of Social Welfare, Ministry of Education and Social Welfare, Government of India, New Delhi, pp 234-81.

– (1985):*Challenge of Education*, Government of India, New Delhi.

– (1987): *Scientific Policy Resolution*, No 131/CF/57, March 4, 1958, cited in *National Science Day, A Commemorative Volume*, Council of Scientific and Industrial Research, Government of India, New Delhi.

– (1992a): *National Policy on Education, 1986 (with modification undertaken in 1992)*, Department of Education, Ministry of Human Resource Development, Government of India, New Delhi.

– (1992b): *An Approach to a Perspective Plan for 2001 AD*: *Role of Science and Technology*, Har-Anand-Publications, Government of India, New Delhi.

– (2003a): *Science and Technology Policy*, 2003, Ministry of Science and Technology, Government of India, New Delhi.

– (2003b): *A Reference Annual*, compiled and edited by Research, Reference and Training Division, Ministry of Information and Broadcasting, Government of India, New Delhi.

Harding, Sandra (1986): *The Science Question in Feminism*, Milton Keynes, Open University Press, pp 15-30.

– (1990): 'Feminism, Science and the Anti-Enlightenment Critiques' in Nicholson Linda (ed), *Feminism and Postmodernism*, Routledge, New York, pp 83-106.

Langton, Rae (2000): 'Feminism in Epistemology: Exclusion and Objectification' in Fricker, Miranda and Horsby, Jennifer (eds), *The Cambridge Companion to Feminism in Philosophy*, Cambridge University Press, Cambridge, pp 127-45.

Mulimani, V H (2004): 'Science Education in Universities', *University News*, 42 (02) January 12-18.

Poonacha, Veena (1999): 'Understanding Women's Studies', *Contributions to Women Studies No 1*, Research Centre for Women's Studies, SNDT Women's University, Mumbai, pp 129-55.

– (2000): 'Coffee and Ginger: The Impact of Social Change on Gender Relationships and the Subsistence Needs of the Community' in Prabha Krishnan (ed) *In Search of Annapurna: Meeting the Evolutionary, Ecological and Ethical Needs of the Community*, Trust for Re-education and Understanding True Headings (TRUTH), Mumbai, pp 82-99.

Ramamurthy (2003): 'Science and Technology Education in the New Knowledge Era' *University News*, 41 (45), November 10-16.

Sisodia, M L (1999): 'Collegiate Education of Disadvantaged Population: Education for Equality', *University News*, November, Vol 37, No 44.

UGC (2001): *Tenth Plan Profile of Higher Education*, University Grants Commission, New Delhi.