

POLITICS OF SCIENCE EDUCATION: EQUITY, SOCIAL MOBILITY AND MARGINALISATION OF GOVERNMENT SCHOOL STUDENTS IN INDIA

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ABSTRACT

The government of India weaved a policy frame over a period of time to inculcate the scientific culture in school education which were considered by various commissions and committees. Education and social mobility of the underprivileged groups are integrally related to the issues of social equality and equity. This study intended to explore the underlying dynamics of government school student's science aspirations, carrier choice, their family background, access and its quality etc. The data collection constituted two stages-(1) data collected from 114 students on their profile and science interests and (2) data collected in detail from 32 students who showed fairly strong interests in science on carrier choice and its reasons. The analysis showed that though possessing strong aspiration for SE and awareness of the ground reality, the abysmal status of SE in terms of infrastructure, science teaching, lack of carrier guidance from school and family etc have prevented the students from mainstream social and economic upward mobility. The policies must take cognizance of their plight and safeguard the legitimate space in the society.

KEYWORDS: Educational Policies, Equality, Equity, Science Education, Social Mobility

INTRODUCTION

Science Education Policy

The scientific and technological breakthrough has touched upon the privileged individuals of our nation. It has been seen that the government owe the responsibility of promoting education at primary and secondary level. Yet, the country has not gained desired momentum in field of science education. The familiar approach by the policy makers is from top down which has been typically taking into consideration the national goals and needs, and appropriate strategies; when executed they are far from satisfactory. The government of democratic India has weaved a policy frame over a period of time to inculcate the scientific culture in the country, and the active role of school education in promoting science was considered by various committees and commissions namely *National Science Policy framework 1958*, Kothari commission in 1964, and National Commission on Education of 1964; and the recent National Curriculum Framework, 2005. Though these commissions articulated the nation's commitment well, it has to be converted into learning teaching realities if the benefits are to be reached the government school children at large. The collective interest and priorities of these children should be accommodated genuinely without compromising on the national needs and aspirations. The children from government school, rural background and economically weaker section must benefit out of the aforesaid policies. But it is just a commitment to invest in science and technology to facilitate economic development. The science education policy should be developed from below taking into consideration the social context of its application. The problems of participation and achievements by these marginalized groups are often overlooked or even omitted.

Equality, Equity and Science Education

Social inequality is a universal phenomenon found in all societies from the simplest to the most complex, although the inequalities vary considerably in form, nature and extent, and function from one society to another. Social inequality refers to the unequal pattern of distribution of wealth, income, occupation and education. Indian Society is apparently stratified on basis of class and caste. Educational system is not unaffected by it. The clash between aspiration and attainment of aspired career has been the outcome of educational inequality.

Educational inequality is the disparity that certain students experience in their education as compared to other students. The measures of educational success focus on examination marks, drop-out rates, attainment of cut-off marks in the admission of professional educational institutions, and successful completion of courses etc. The access and availability of infrastructure and financial grant makes huge difference in the outcome of educational attainment. The learners from lower socio-economic strata and disadvantaged family background fail to convert their aspiration into reality. The science education stems multiple career paths but huge cost of pursuing the course and longer duration of such courses cause large number of learners with scientific aptitude to slip out of the channel. However, the common sense understanding of schools perceives them as democratic, liberal institutions, committed to make social progress. It would be fallacious to assume that the school curriculum imparts neutral knowledge. Education enhances the inequalities existing in an already unequal and stratified society. Apple (2004) reiterated that close relationship exists among those who have economic, political and cultural power in the society and the ways and means in which education are thought about, organized and evaluated.

Apart from the misconceived science education policy, the conception of equity is also at the centre of public debate in India, especially in the government schools with its abysmal condition of infrastructure facilities. In much of the debate, the government school sector is characterized as fostering inequality, segregating society on socioeconomic grounds, where the demographic reports suggest very large number of learners from weak socio-economic strata, increasing the growing gap between the haves and have-nots and marginalizing the common man. It creates a gap which eludes government schools to create a more equal and productive Indian society and thus attempts to improve the life chances of students from disadvantaged backgrounds. The issue of 'equity' is taken up as a challenge before the school and society. The NCF attempts to address the equity by use of science curriculum as an instrument of social change to reduce the socio-economic divide and to help fight prejudice related to gender, caste, religion and region, and the content of the curriculum should promote respect for diverse lifestyles, even if there is a focus on contextualization.

Science Education and Social Mobility

The theme of education and social mobility of underprivileged groups is integrally related to issues of social equality and equity. Equality refers to the numerical distribution of a good or service (such as income, land, or years of schooling), whereas equity refers to judgments concerning the fairness or justice of that distribution. It is widely assumed that 'equality of opportunity' exists when each person regardless of such ascribed characteristics as family background, religion, ethnicity, race, or gender, has the same chance of acquiring a favorable socioeconomic position.

It should be noted that equal educational opportunity does not necessarily imply that people will end up equal but simply that an individual's socio-economic position will be the result of a "fair and open contest - one in which the winners are those who work hardest and demonstrate the most ability" (Parelius and Parelius, 1978). In the debate over inequality, one critical question concerns the degree to which advantage is passed on from one generation to another. For example,

if the social-class standing of a family is high in terms of income, occupational status, and educational attainment, will the family's offspring have greater access to the highest levels of a school system? And what is the effect of family socioeconomic position on the relationship between level of schooling attained and subsequent income and occupational status? The correlation between individual's educational attainment and future occupational status should increase over time.

In the context of education, the role of science education is important not only because it stems numerous career choices but also creates a general awareness that aims at optimum development of potentials. Thus, the productivity of the nation in general and social mobility in particular is largely dependent on education with impetus towards scientific learning.

Aldridge (2003) defined social mobility as '...opportunities for movement between different social classes or occupational groups.' (p.189). An 'open' or 'fluid' society is one where individuals are able to move freely, as a result of factors such as aptitude, intelligence, ability and effort, up the social scale, regardless of their social position in childhood (Heath & Payne, 1999). As such, the extent to which social mobility is possible is often used as one proxy measure of societal fairness.

The importance of the concept of social mobility as a measure of social fairness has increased, being seen as a measure of equality of opportunity in a world where outcomes are not equal. Social mobility, therefore, is closely associated with related concepts such as inequality, social exclusion and inclusion, class and social stratification where mobility refers to movement between different and unequal social groups, or classes and between exclusion and inclusion. As Miller (2005) argued that chances for social mobility were one aspect of the concept of equality of opportunity, which itself is, in turn, one of the four foundational principles of social justice, alongside equal citizenship rights, a guaranteed set of minimum social rights and fair distribution of additional social rights that are outside of citizenship and the absolute social minimum. There are various ways of facilitating social mobility, such as political power, marriage, family affiliations and education (Lipset & Reinhard, 1959). But the most sought after is education which is more readily available to more people as educational facilities are under the state's primary list expanded all over the world.

Education has also been considered as main dissolver of barriers to social mobility. In a study, the authors pointed out that education opens up class structure and keep it fluid, permitting more circulation through class position which would otherwise not be possible. (Tumin & Feldman, 1961). From individual point of view, the demand for education had triggered, as masses began to perceive education as catalyst for social mobility (Comitas, 1972). Education in general was viewed as potent, democratizing element that binds people on the basis of sharing common experiences (Thompson & Fogel, 1976). It has been discussed widely that high educational achievement is the aspiration of most people.

Science Education as Career Choice

Education has appropriate relationship with income and occupation. The higher the educational level, the more prestigious the occupation, leading to higher annual income. This in turn is associated with property, prestige, and power.

Science education has been seen as major factor to produce differential workforce needed for sharply divided industrial society (Lipset & Reinhard, 1959). There seemed to be low supply and low demand for science education in the

government schools which could be attributed to the issues of access, teaching facilities and absence of link to labor market. The solution to their inclusion need to be based on an understanding of the reasons related to participation, retention and proper outcomes. Therefore the national policy on science education has to systematically approach the problem and promote science education to the government school students.

CONTEXTUAL BACKGROUND OF THE STUDY

According to current estimates, 80% of all schools in our country are government school, making the government the major provider of education. However, because of poor quality of public education, 27% of Indian children are privately educated (World Bank Report, 2009). More than 50% children were enrolled in private schools in urban areas; even in rural areas, nearly 20% of the children in 2008-09 were enrolled in private schools. In Delhi, out of 698 Schools, only 132 Schools are providing science stream. According to India Science Report 2004, at the (class six to eight) middle level, 22% of the students would like to study pure science at higher levels of education. Yet, when it comes to students in class 11 and 12(senior secondary), just 13.4% wanted to study pure science at the graduate/postgraduate level. The data shows that career aspirations in science are strongly built up at the elementary level. Whether it is lack of interest or lack of support system for students of government school, especially one belonging to low socioeconomic zone, they are either compelled to either forsake their aspiration or get pushed out to different channels. This can be viewed as an instance of marginalization against the backdrop of policy of equity as mentioned in our policy documents.

In the Indian Education System, science is a compulsory subject till the class X. At the higher secondary level, the students have to choose a stream of discipline namely science, commerce, humanities, art etc. The students who aspire to study science have little choice at the senior secondary school level. This study has explored the interplay of student's socioeconomic background, aptitude for science and corresponding career choice and aspirations.

The present study tried to understand the dynamics of politics of science education (the Educational Policies for educational reforms developed by the Government) with the underpinning factors namely government school student's science aspiration, their carrier choice, access to science education, marginalization and ultimately push-out from the upward social mobility.

RESEARCH DESIGN

From the above discussion, the study tried to explore the following research questions:

- What is the general socioeconomic profile of the government school students under study?
- What is the nature of scientific aspiration in these children?
- What type of carrier choice and carrier guidance do they get?
- What kind of access to science education available in terms of infrastructure?

At the end, the study attempted to ascertain the inter linkages with the solution obtained from the field.

DATA COLLECTION

The students studying in a government school, Rajkiya Sarvodaya Vidyalaya, Chillagaon (East Delhi) were taken as the 'sampling frame'. The choice of the school was made to get the representatives from lower strata of society having

educationally poor background in general. The mode of sampling involved in the study was *Non-probability sampling (convenient sampling)*. The school had six sections for class X (*end of secondary level*) and the school did not offer science stream at senior secondary level. A total of 114 learners were selected from the three sections of class X namely A, D and F as per the convenience and instruction of the school administration. The details of the sample group are presented in table below:

Table 1

Sample	Section A	Section D	Section F
Boys (Class X)	18	14	15
Girls (Class X)	20	22	23

The collection of data included information on the socioeconomic status of learners and their perception about the career. The tool used in the **first stage** was a questionnaire which included sections on general information, learner's aspiration and perception of science teaching in the school. The data analysis of questionnaire **I** helped to frame a questionnaire **II** (which is open ended) used at the **second stage**. In this stage the sample consisted of 32 students (20 girls and 12 boys) who showed fairly strong science aspiration. Here the study was aimed at learners understanding of reality, factors around him and choice of career in science.

The data obtained from first and second stages of research is analyzed using quantitative as well as qualitative techniques. The data obtained from the first stage was tabulated to get themes likes socioeconomic background of learners, family size, parental Income, parental educational qualification, learner's area of interest, basic facility for science education in the school and career aspiration. The second stage questionnaire was analyzed qualitatively to derive themes and inferences on career aspirations, factors affecting career aspiration, learner's idea about the chosen career, and impediments in pursuing science career.

DATA ANALYSIS AND DISCUSSIONS

Profile of the Students

The group was heterogeneous in the sense that about one third of the students each belonged to scheduled caste and tribe, other backward classes and general category, i.e. almost equal number. Though 83% students have come from nuclear family, the family size was varied: 4 members (24.6%), 5 members (37.7%), 6 persons (22%), and 7 members (13.1%). It was large size family sharing meager resources. Almost 47% of the students come from a family where the annual family income was below Rs. 50000. 39% of the family had monthly earning of around Rs. 5000 to 10000. The rest (2.6%) has just above 2 lacks annually. The parental educational qualifications of the students have direct bearing on the carrier guidance and carrier choice of their wards. Regarding father's qualification, 28.5% studied till secondary level (X std.) 17.3% (XII std.), and 19.2% till tertiary level. The corresponding figures for mothers were 20.2%, 5.1%, and 10.6%. The rest of the sample were uneducated or passed up to VII std. Further one can find that parents of girls were more educated than that of boys.

Regarding the carrier choice of the students were concerned that the boys wanted to become policemen (12), engineers (8), advocates (5) and others like singer, doctor, mechanic, computer scientist etc contributed to 1 or 2 persons. The girls predominantly wanted to become teachers (16), doctor (11), engineers (10), bank officer (4) and chartered accountant (5). The higher aspiration level of girls was related to the parent's education. It was reiterated in the

answers to the open ended questions later. The data pertaining to the choice of subjects they would like to pursue in the senior secondary level revealed that students opted for science stream were 36.8%, commerce 43.8%, and arts 19.3%. This data has agreed with the Indian Science Report 2004 that at the middle level, 22% were enthusiastic to pursue science at the higher level whereas when they come to XI Std, only 13.4 % were serious about it. Recently the commerce stream attracted far more students. It was learnt that the carrier guidance was almost negligible (10.1%) from the school as well as from parents.

Status of Science Education in the School

There were five questions dealing with various factors like basic laboratory facilities, science teachers and teaching etc. Most of them (1/3) felt that science lab was very small with few equipments and poorly managed. The students were never taken to the lab till x std. They were unanimous that the practical periods were utilized for other purposes. The science teaching was monotonous and often the teacher read from the textbooks. Some of them who can afford were taught by tutors outside the school. The students who have participated in science exhibition confided that the science models were bought from commercial centers because the teachers were not helpful and guiding them.

Student's Science Interests and Carrier Choice

The questionnaire administered in the second stage on the selected 32 students from the first stage consisted of questions on the reasons for their choice and various dimensions of the chosen career.

Table 2

Reason for Career Choice	Boys	Girls
Monetary Affluence	11	14
Social Status	2	18
Fulfillment of Childhood /parental dreams	0	8
Social service	6	10
National Pride	3	0
Technological edge	5	0

Note: The responses are overlapping and indicate individual view of learners

The career aspirations in Boys are mainly driven by financial concerns, technological advancement patriotism and national service, sense of social service to alleviate social disparities. Girls on the other hands were more expressive on diverse issues. They attributed their career aspiration to factors concerning parental aspiration and expectation, financial prosperity social service, and childhood interest. Achieving a defined social status is clearly indicated in majority responses. The aspirations are tightly bound with upward social mobility. The second theme has been planned at portraying the impact of science on learner's personality and also regarding their perspectives about the inherent qualities needed to achieve their career.

Table 3

Qualities Needed to Pursue the Career*	Boys	Girls	Total	Percentage
Hard work	10	14	24	75.00
Discipline	6	13	20	62.50
Analytical abilities	4	8	12	37.50
Time management	4	6	10	31.25
Goal oriented	2	8	10	31.25
Awareness about prerequisite of career	3	0	3	9.38

* The responses are overlapping and represent multiple views and not exactly number of respondents

Most of them were aware with the rigor and challenges they would face to pursue their aspired career. It was expressed by most of them that hard work, perseverance and timed effort are necessary component to achieve the target.

On being asked about the influence of science on their personality, the data revealed following points:

Table 4

Influence of Science on Personality	Boys	Girls	Total	Percentage
Develops sense of inquiry	5	7	12	37.50
Improves logical thinking	10	8	18	56.25
Imparts positivity in approach	10	15	25	78.13
Sensitize towards nature	5	7	12	37.50
Makes aware of self and society	7	6	13	40.63
Instills confidence	10	16	26	81.25
Improves our outlook	8	14	22	68.75
Helps understand technology better	11	5	16	50.00
Develops problem solving approach	9	4	13	40.63

* The responses are overlapping and represent multiple views and not exactly number of respondents.

Next is the learner's perception of the reality of the environment needed for science education by comparing with private school students.

Table 5

Facilities	Private School	Government School
Class rooms	Sophisticated/ Well managed	Lacks ventilation & proper lighting
Boards	Green Boards/Smart board	Black board on which writing not legible
Desks and bench	Single seaters/Desks and bench in good Condition	broken desks, less in number
Class Strength	40	60-90
Science Laboratory	Separate lab for Physics /Chem./Biology	Combined Lab Insufficient for whole class
Computer Lab	Good/ internet ready	Formal/No internet for Us
Teachers	Updated/ uses teaching Aids	Conventional/ Chalk and talk teachers
Sanitaion	Good	Average
Library	with new books/ Spacious	Small library/ fewer books
Common Room	Present	Absent
School fee	Very High	Minimum/ free for Girls

Though they admit that government school have minimum basic facilities available to them but sees a sharp divide between themselves and private school learners in the area. They have explicitly expressed that the condition of classrooms in their school is congested and needs proper ventilation. During summers, the electricity supply is discontinuous and the overall strength of class is very high. The desk and benches are insufficient. They had to adjust with their sitting capacity accommodating 3 to 4 students on single bench. The learners have mentioned that the condition of blackboard has gone worse and the writing on board is not clear.

The practical lessons are dictated and findings are written on board to be copied down. Most of respondents were of the view that the library facility also needs improvement as it has dearth of new books. It has limited copies of certain useful books and even library keeps closed mostly. The respondents were unhappy at the level of sanitation especially of toilets, which caused inconvenience especially to girls. The last section aims to look into the support system and its impact on learner. It has questions on the learner's view of impediments in culmination of their aspiration into reality.

Table 6

Impediments in Achieving Aspired Career	Boys	Percent	Girls	Percent
Economic constraints	11	91.67	19	95
Overcrowded Classrooms	12	100.00	20	100
Poor infrastructural Support	10	83.33	18	90
Lack of Purpose	6	50.00	12	60
Lack of career guidance	8	66.67	17	85
No environment for English	9	75.00	18	90
No support at Home	6	50.00	16	80
Large family	6	50.00	13	65
Growing cost of living	8	66.67	18	90
Huge cost of Courses	10	83.33	16	80
Household workload	3	25.00	18	90

Note: The responses are category wise and represent more than one choice of single learner

On the issue of change of career, 80% of them answered in negative showing their determination to pursue science education.

CONCLUSIONS

The present study brought out of several factors influencing student's occupational goals. They include family, level of parental education, school, peers, personality, and socioeconomic status are important in shaping the career aspirations of the learners. The learners have strong aspiration for science as indicated by the analysis of science interest questionnaire. The dearth of resources in school needed for science education is important factor in pushing the learners away from choosing science as career. The crux of the argument is that the learners are aware of the career choice, although having superficial information, but the conversion of aspiration into reality is very slow and discouraging.

The learners have fair amount of understanding of the reality of conditions that they are placed in. They felt left out on the front of having access to facilities for pursuing science education, when compared to private schools. The learners brought out their opinion regarding considerable difference in the infrastructure facility, standard of teaching between government and private school. They were very well aware of their poor economic condition which has stopped them from having access to private tuitions, necessary learning materials etc needed for science education. The feeling of being subjected to compromise due to their financial condition on one hand and lack of concern for quality education on other was overtly visible in their responses. They expressed that the limited number of government school offering science is another area which forces them to opt for other streams.

More number of schools in different areas could have yielded better inferences. Also, triangulation of data using parental interviews would have added to the validity. The educational system needs to ensure that the issue of equity is not only reduced to documental execution rather it should be pronounced in the action of each and every member of the educational system. The utilization of resources and providing ample choice to learners can help to reduce the marginalization.

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