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THE IMPACT OF SCIENCE EDUCATION ON ROLE PERCEPTION OF SOCIO  
ECONOMICALLY DEPRIVED FIRST GENERATION LEARNERS

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The Homi Bhabha Centre for Science Education (HBCSE) has been conducting for the past seven years an action research project to study factors that hinder the scholastic progress of students coming from the deprived sections of the community, to design and test remedial measures to overcome these hurdles. Batches of forty students each studying in class VIII of the secondary schools of the Bombay Municipal Corporation (BMC), and belonging to the scheduled castes (formerly untouchables - untouchability was abolished by law after independence), were selected in 1980, 81 and 83, and were given remedial treatment at the HBCSE in weekly sessions. It was found that scholastic performance of these students could be boosted, not marginally but substantially. Details of this project were reported in the third symposium held at Brisbane<sup>1</sup>, and have also been published elsewhere<sup>2,3,4</sup>. The following table summarises these results.

Table 1

Comparison of performance of students of batch I, batch II and batch III with B.M.C. general population

SUBJECT	GROUP	Percentage of students obtaining			Failures
		First Class	Second Class	Third Class	
SCIENCE	Batch I	81 (19)	19 (36)	0 (24)	0 (21)
	Batch II	83 (19)	14 (36)	3 (24)	0 (21)
	Batch III	62 (14)	27 (29)	11 (36)	0 (21)
MATHS	Batch I	59 (10)	22 (14)	14 (16)	6 (59)
	Batch II	67 (10)	19 (14)	8 (16)	6 (59)
	Batch III	24 (5)	35 (9)	30 (19)	11 (67)
ENGLISH	Batch I	31 (6)	28 (10)	31 (31)	9 (54)
	Batch II	19 (6)	25 (10)	50 (31)	6 (54)
	Batch III	27 (7)	21 (10)	46 (26)	5 (57)

Figures in brackets show % of all the BMC students for comparison.

This paper deals with a study concerning the impact of science education in general, and particularly on the role perception of students participating in the project. As a first step, the students were interviewed for obtaining

information regarding their choices for careers at three different stages; in their childhood, when they were in the HBCSE project, and their final choice after they passed the Secondary School Certificate examination (S.S.C.). Since career aspirations are a multifaceted behaviour, it was interesting to study if the aspiration changed over time and also to study factors influencing the change. It was also hoped that the study would throw some light on how education is perceived by the receivers as a tool for overcoming deprivation.

This study was conducted in two parts on a sample of thirty-five students from the third batch of forty students, who had joined the programme in 1983. The first part of the study was undertaken in November 1985, when the respondents were studying in standard X, which is the final year of schooling. Students were interviewed about their childhood choices, and about the choices currently held by them. The latter choices were called Intermediate choices.

The second part of the study was conducted in June 1986, when the results of the S.S.C. examination were out and the respondents knew which options were open to them on the basis of their performance. The choices at this stage were called the final choices. Data regarding career choices of these students were collected by interviewing the students individually. The salient features of the findings of this study are presented below.

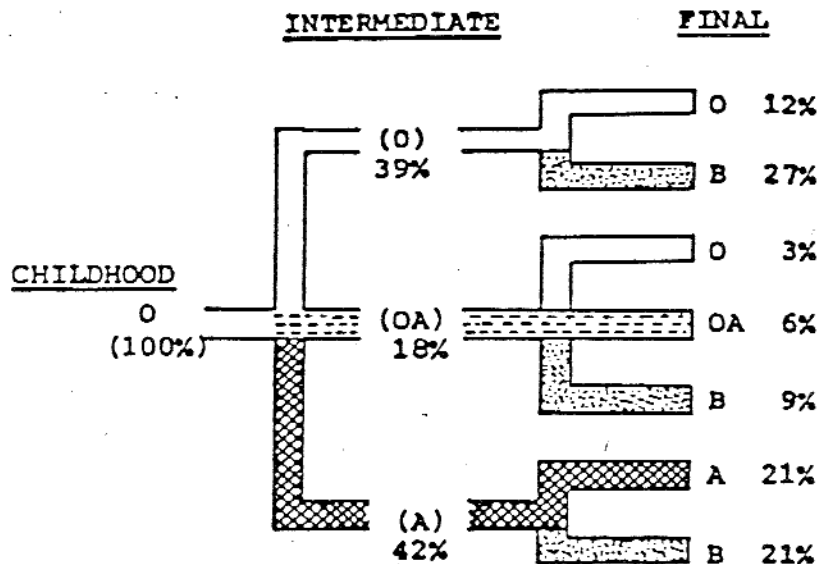
The first few questions in the interview were aimed at collecting demographic data. These data brought out the nature of deprivation of the community. Fathers of the respondents had low education, held blue collar jobs while, mothers were mostly illiterate and unemployed.

The career aspirations of the respondents in their childhood were ambitious. About 88% of those who remembered their childhood choice had chosen prestigious professional careers. White collar work was preferred to blue collar in spite of the family background. The career choices in childhood varied with the sex of the respondents. Boys gave more 'glamorous choices' as compared to girls who nursed clerical choices even in their childhood. Even the professional choices when analyzed into specifics indicated sex-role stereotyping; law and nursing were chosen only by girls while, engineering was chosen only by the boys.

Childhood choices changed at the Intermediate and Final stages. The changes were of two types. Some respondents gave up their earlier choices completely and opted for new ones. Some others continued to nurse the earlier choices but offered an alternative in case the earlier choices were not attainable. Fig.1 shows the changed choices at the three stages.

Figure 1

Change in the choices at the three stages



O = Original choice    OA = Original+Alternative  
(partially changed choice)

A = Changed choice at intermediate stage

B = Changed choice at final stage

The figure shows that most of the childhood choices (85%) do change eventually. It is interesting to see if these changes correspond to a better appreciation of reality, and whether choices that remained stable were more realistic to begin with.

For the sake of analysis, respondents were asked to arrange a set of twenty-nine occupations according to their perception of the hierarchy of these occupations. This list was used to develop a scale of occupations on which each occupational choice could be ranked. The changed choice could then be analysed in terms of upward or downward direction of change. It was found that most of the changed choices had moved lower in the scale, as seen in Table 2.

Table 2

Direction of change	Final stage as compared to childhood	In final stage as compared to Intermediate
	%	%
Upwards	7	9
Horizontal	21	32
Downwards	71	59
<hr/> Total	<hr/> 99	<hr/> 100

The scale of occupations and the corresponding choices of respondents also shows this lowering in another way, in Table 3.

Table 3

<u>Scale of occupations</u>	<u>Percentage of Respondents Choices</u>		
	<u>Childhood</u>	<u>Intermediate</u>	<u>Final</u>
Professional	88	63	29
Clerical	6	20	60
Semi-Professional	-	11	9
Others	6	6	3
<hr/> Total	<hr/> 100	<hr/> 100	<hr/> 101

The above tables indicate that professional choices decreased steadily over the three stages and clerical choices increased. Thus, choices which are "higher" in the hierarchy were changed and choices "lower" in the hierarchy were selected. The respondents were asked why they opted for a lower choice in spite of a fairly good performance at the school leaving examination. Table 4 presents an analysis of reasons given by the respondents for changing their aspirations.

Table 4

<u>Reasons for change</u>	<u>Percentage of respondents</u>
Increased awareness	9
Family	27
Interest in something else	5
Failure	18
Low marks	5
Low marks + family	14
High marks	5
Others	14
<hr/> Total	<hr/> 101

This analysis reveals an important aspect of education in influencing social changes. It is seen from the table that finance, which is often an inoperable parameter in action research projects in education, was not an important criterion in deciding upon careers. However, it is the family (41%) and academic performance (41%) which have been influential in changing career choices. Both these aspects are manipulable in an action research project. An attempt was made to get a feel for the reasons for lower career choices of respondents in spite of their high performance. Most respondents seem to harbour some fears regarding their ability to enter the competitive world of professional careers. The softer option is to settle for lower choices which are certainly open to them and where they seem to feel free from a fear of failure. High scholastic achievement makes the respondents confident of doing well in lower choices and their families encourage them to play safe. This aspect needs further in-depth study.

Another manipulable variable is the amount of information students possess about various other career options and also about the total requirements of the careers chosen by them. In this study it was found that a majority of the respondents had inadequate information about the careers chosen by them. In fact 39% of the respondents suggested during the interviews that HECSE should provide in addition to academic inputs, information about various career options and career guidance. A detailed analysis of the responses recorded in these interviews shows that information regarding academic preparations for entering a profession, an adequate feel for the nature of competence needed for completing the course, and the financial backing needed for establishing oneself in the profession (along with information about resources available in a welfare state) is badly needed.

In the absence of this input one is not able to assess one's chances.

It thus appears that familial expectations, academic performance and awareness of the occupational world are three essential factors in career decision-making. HBCSE is planning to undertake in collaboration with the state government a large scale try-out of this experiment of nurturing talent among the underprivileged. This try-out will cover twenty-six secondary schools and more than a thousand students. It is planned to make at the same time systematic attempts to improve awareness of career opportunities both in students and in their families.

#### References

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Over the past two decades India has adopted a 10 + 2 + 3 pattern according to which children enter school at the age of six and spend ten years in school. Those who pass the school leaving examination can enter college where they spend two years in a junior college and three years in a degree college before appearing for the Bachelor degree examination. Two years of pre-school education is also available for those who can afford it. The constitutional guarantee for free education is valid upto the age of 14. This paper deals with the last three years of the first stage, that is, with the age group of 13+ to 15+, and describes the results of an action research project aimed at improving the performance of students coming from the socio-economically deprived sections of the society.

1) Professor V. G. Kulkarni (b.1932) is a physicist. Joined the Tata Institute of Fundamental Research (T.I.F.R.) in 1953 and conducted research in nuclear physics and solid state physics. Developed a keen interest in science education since 1970. These interests led to the establishment of the Homi Bhabha Centre for Science Education (HBCSE) at TIFR in 1974. He has been directing its activities since inception. Special interests include, development of pedagogy for the socially deprived, role of language in science education, use of technology like mass media and computer in education. Current position Director HBCSE.

2) Sugra I. Chunawala (b1962) is a graduate student at HBCSE. She holds a Bachelor's degree in psychology and a Master's degree in "Medical and Psychiatric Social Work". She is investigating the impact of science education on various behavioural aspects of first generation learners.