

Understanding the Education System: An Eco-Behavioural Approach

T KRISHNA KUMAR

The eco-behavioural approach to the study of education suggests that the achievements of students would depend on the expectations placed on them, and the support they receive from other participants in various behavioural settings. The approach is theoretically constructed and empirically verified in this paper. Using the methodology of such an approach, one can debate the reasoning behind the policy of reservation in higher education. Such an exercise is attempted in this essay.

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T Krishna Kumar (tkkumar@gmail.com) retired as professor from the Indian Statistical Institute, Bangalore and is now guest faculty at the Indian Institute of Management, Bangalore.

Education is the inculcation of the incomprehensible into the indifferent by the incompetent

– John Maynard Keynes

1 Introduction

The reservation debate in 2007 suggests to me that those who participated in it, including those who are in positions to adjudicate litigations on policies related to the issue, are possibly acting with insufficient understanding or knowledge of what education is and what factors affect educational achievements of students of different socio-economic and caste background.

This knowledge must be based on two complimentary pieces of information – a sound conceptual/theoretical basis and an empirical verification of that conceptual/theoretical basis. These two pieces of information must also be contextual to India. A mere compilation of statistical evidence and massive analysis of it is not very useful if it lacks a good conceptual description of the underlying process that generates that data. Mere conceptual description, however sound it may be, sows the seeds of doubt if it is not supported by empirical evidence.¹ These initial remarks place enormous limitations on what I am presenting in this article for providing definitive suggestions for educational policy in India.

A famous saying in management science goes that there are three ways to resolve a conflict – through a fight when the mightiest wins, or by playing a game and the one who is the smartest and who has the best winning strategy wins, or through debates and the one who has the right arguments wins by convincing the opponents. The last option no doubt is the most civilised option to resolve a dispute. It is my hope, therefore, that what I am presenting here might steer the debate on educational policy in the right direction to provide greater credibility for the arguments in the debate.

2 Relevance of 'Ecological Psychology'

As I have not been working in the field of economics of education during the past 40 years, I decided to think on the theme "education" and let my thoughts go free on that subject with my own background and experience to see what I could come up with as a conceptual basis. I used my own thought process as a skeleton to develop this article and added some substance from the knowledge gained from some additional reading. I made only a limited search of the literature to see if what I think as the conceptual basis has any theoretical and empirical support from the academic literature in the fields of economics, sociology, social psychology, and education.

Education is a dynamic process that starts from birth. A child surrounded by parents and other siblings experiences her surroundings and responds. The surrounding environment, the physical and social, “imparts” some information and the child tries to find a pattern in that information and responds. From those responses we assess whether his or her development is normal, abnormal or extraordinary. Different children at the same biological age respond to the same environmental situation differently depending on the development of their perceptive and cognitive skills such as seeing, hearing, smelling, touching, and mentally processing that information to discover the patterns.

The behavioural responses of students with identical perceptive and cognitive skills differ due to the differences in the family environment and the extent of self-study and effort. What a child learns thus depends on what inputs he or she receives from the surrounding environment, and what innate perceptive and cognitive skills he or she possesses and hones through his or her own efforts. This self-effort is something that depends crucially on the motivation the student receives from the social environment he or she is in, and from the teachers. If the teachers do not motivate the students to learn, and if the family surroundings of the student do not attach much value to education then such students will have no motivation to learn. Different children are endowed with different innate skills, motivation, and different socio-economic and family environments. This kind of phenomenon carries forward throughout one’s life so that the behavioural outcomes, including educational outcomes, depend on the physical and social environment and the cumulative effect of the learning process. If these environments differ or if the teaching inputs differ then the educational outcomes also differ. The cumulative effect of the family environment may reduce with acquisition of higher levels of knowledge. The effect of motivation on achievement becomes more and more important as one goes up the education ladder.

Roger Barker, a social psychologist, provided a conceptual framework for this kind of analysis (Barker and Gump 1964; Barker 1968; Fox 1990; Schogen 1989).² According to this framework we may say that each one of us might find ourselves in a variety of “behaviour settings” within a day. Each behaviour setting would be demarcated from the others by identifiable differences in physical and social environment, with their own rules of behaviour – information, command and influence patterns, and their outcomes. For example, we can say that a school student finds himself or herself in the following behaviour settings during the day:

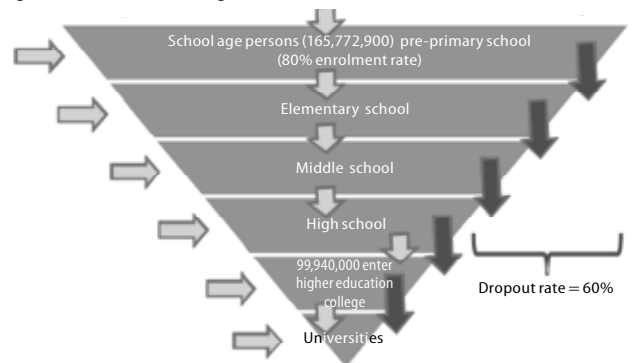
- (1) At home “preparing to go to school” setting and having a meal and drink.
- (2-7) Six different “classroom” settings for different classes, interacting with different teachers, different rules of behaviour with different expectations of behaviour for each class.
- (8) “School lunch” setting with fellow students.
- (9) “School playground” setting with fellow students.
- (10) “Back from school” setting at home with family.
- (11) “Neighbourhood playground setting” with neighbourhood children.
- (12) “Private tuition” setting, away from school and home.

- (13) “Dinner setting” at home.
- (14) “Home work” setting at home.
- (15) “Going to bed” setting.

Learning takes place mainly at behaviour settings 2-7, 12, and 14, but the outcomes of other behaviour settings do have an influence on the learning outcome. In a society ridden with caste discrimination and a variety of home and neighbourhood patterns, occupational and other socio-economic differences of parents, it is expected that students’ performance in schools could differ due to differences in those behaviour settings. The performance also can depend on the method of teaching (class size, continuous evaluation) and teacher quality.

Knowledge consists of understanding systemic patterns in life, communication, information and in developing new cognitive skills that depend on the old ones. Thus, acquisition of knowledge depends on the already acquired knowledge and skills and on the learning inputs received from the formal education sector and non-formal learning environments. Education is a process used by institutions to provide a value added service to the society. Learning is a process that involves the student in different behaviour settings, to use the phrase introduced by Barker, one being a formal learning setting in the school and the other being the non-formal setting at home and outside with family and friends. A student’s performance and academic achievement depends on formal learning as well as non-formal learning. This is a multi-stage process, conveniently delineated into several segments or stages as depicted in Figure 1. Only students who successfully graduate from a previous stage are enrolled at the next stage. There are of course some students who drop out at each stage, and there are very few who enter the education system from outside at each stage. Some of those who drop out during or at the end of a stage may re-enter that stage later.

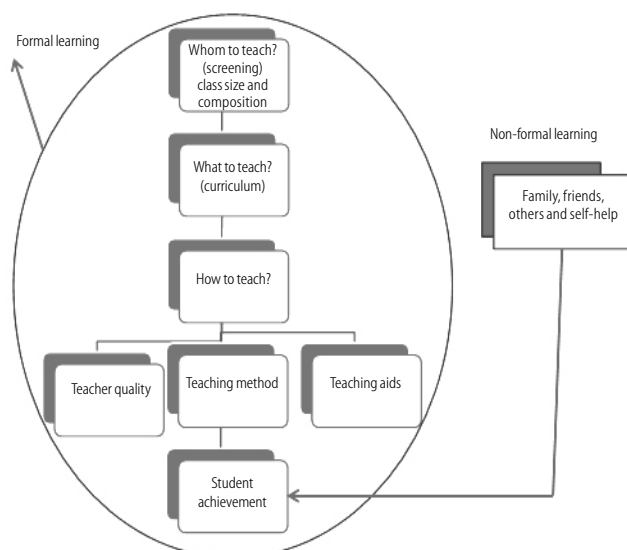
Figure 1: Educational Filtering Process (Illustrative numbers for India 2004)



At each one of these stages we can identify several primary inputs and processes in place. These are illustrated in Figure 2 (p 63) below.

The two diagrams, coupled with an understanding of dynamic mechanism of creation, deterioration, and destruction of educational institutions at various levels, tell the complete story of the educational system. Educational institutions are created by the public sector, private sector and non-profit sector based on the demand and supply considerations together with sustainability of such institutions under the regulatory regimes such as admission policies, tuition policies, etc.

Figure 2



The eco-behavioural approach suggests that the achievements of the students would depend on the expectations placed on them, and the support they receive from other participants in various behaviour settings. A student is not only a consumer of educational service but he or she is a producer of education service through self-learning and through his or her interaction with other students in the class. Hence, when a small number of low achievers are put together with a large number of high achievers the performance of the low achievers improves. Likewise, a small number of high achievers put in a class with large number of under-achievers would underperform. This is why educational institutions organise themselves as institutions of different quality through their admission policies. One can, however, keep the expectations the same and let those expectations be realised, and thereby maintain the quality, by providing additional attention to the low achievers.

Figure 2 also shows that the final educational outcome depends on how the students are admitted and how they are taught. If there are more options for students, and if students can move freely from one subject stream to another, and meet the standards thereof, then quality of education will improve. This point can be highlighted by observing that in India most universities do not have undergraduate degree level courses.³ At the degree level itself students choose various streams of specialisation and it becomes extremely difficult for them to change the stream at a later stage, thereby reducing the options. It is also expected that if the formal school and college inputs are deficient the student would have to depend more on non-formal inputs. The impact of cumulative formal school inputs on performance will dominate over the family's socio-economic background as the level of education increases. An implication of this is that the protection through reservation becomes less and less important as we move up the ladder of education. The effect of non-formal inputs in terms of self-help and motivation will be more as we move up the ladder of education.

The quantity of education in a country is determined primarily by the number of students who enter the education system at

various levels (the top box of Figure 1). As students have to graduate from lower levels to higher levels the magnitude or quantity of knowledge capital depends on the size of the entire primary education system. Thus universal primary education is a critical educational policy instrument. The quantity and quality of education at different levels depends on the demand for education and the supply of educational services at those levels. Supply of educational services depends on the amount of resources made available for the purpose. The availability of these resources, that have alternate uses, depends on the financial viability. If the private sector is financially non-viable the state must subsidise education. Quality of education depends on the educational outcomes at various levels of education (the last box of Figure 2). This depends on various inputs and processes of our education system captured in Figure 2.

3 Empirical Evidence

The design of educational policies must be based on a thorough understanding of the education system with a credible conceptual or theoretical basis such as above that is tested for its validity using statistical methods and credible statistics. One's understanding of the system must be checked continuously as new data become available and as the statistical model of the system gets continuously improved and updated.

Educational outcomes depend on various factors some of which enhance the quantity and quality of outcomes and some others curtail them. It should be the aim of any educational policy to identify such factors and enable those factors that are beneficial and disable those that are undesirable. Quite often the question arises as to by how much a particular factor should be steered in what direction to achieve the desired result. The answer to this question depends on the quantitative relation between that factor and the educational outcomes, keeping all other factors that affect the outcome constant. While choosing the level of affirmative action, whether it is voluntary as in the US or mandatory as in India, one may want to examine what effect any level of affirmative action would have on the education system's basic functions, the student and teacher composition, and what such composition would mean to quantity and quality of education.⁴

If we gather all the relevant information required for quantifying the relationships implicit in Figures 1 and 2 we will get two important types of quantitative relationships, one of enrolment ($E_{i,j,k}$) at each level of education (i), for each type of institution (j), and for each socio-economic group or caste or race or sex (k). Similarly another quantitative relation can be obtained between standardised average achievements ($A_{i,j,k}$) at the end of each stage of education (i), for each type of institution (j), and for each socio-economic group or caste or race or sex (k). As was clear from Figures 1 and 2 these relationships are mutually dependent on each other to a certain degree. These are described below in two equations:

$$E_{i,j,k} = f(\text{demographic factors, socio-economic environmental factors, individual student attributes, number of educational institutions at level } i \text{ of type } j, \text{ admission capacity and admission procedures at level } i \text{ of type } j \text{ institutions, } A_{i-1,j,k}) + \text{Error} \quad \dots(1)$$

$$A_{i,j,k} = g \text{ (admission policies, teaching methods, teaching aids, non-formal inputs from family, class composition, index of motivation level) + Error} \quad \dots(2)$$

With equations 1 and 2 estimated one can decide on policies that improve school enrolments and achievement levels for different groups.

Although the studies reported below did not use a behaviour settings type of model, their analysis is quite suggestive that a detailed eco-behavioural approach such as the one indicated above can yield better research results.⁵ Individual eco-behavioural studies at micro level when aggregated might throw a lot of light on what factors determine the quantity and quality of education so that educational policies can be suitably designed. First I survey briefly the empirical investigations carried out in us and other countries, and then I survey the empirical studies on education conducted for the Indian scene.

Coleman Report

Social scientists in us observed empirically that the socio-economic background of a child plays an important role in a child's performance in pre-primary and primary education as reflected by the Coleman report of 1966 (Coleman et al 1966) to the us government. This report was the basis of several educational intervention programmes in the us at the school level. The Coleman report and its role in educational policy in the us is an illustrative example of how a social policy should evolve. The report was based on a meticulous empirical study by an interdisciplinary team of scholars led by J S Coleman using a nationwide survey data. The policies were guided by the tremendous insights gained by that study on social outcomes as products of socio-economic environment and social institutions.

Coleman et al found that in the behaviour settings faced by a ninth grader, the formal school behaviour setting variables explained only 8% of variation in verbal achievement, while the home behaviour setting variables explained 30% of variation. In particular, they found that the racial composition of students explained 5%, teacher qualities 1%, other school behaviour setting variables such as teacher attitude and curriculum explained 2% of variation.

The black students who had more white students as classmates had scored better, as the socio-economic background of the whites was almost uniformly better than that of the blacks. The desegregation of schools in us was based on this observation. This was an exogenous educational policy in the sense that it was imposed on the education system from outside and the school's autonomy was set aside. Whenever policies are exogenously imposed, without examining the endogenous factors which can bring about the same desired change, there can be some unexpected reactions that would work counter to the desired objectives of the policy. Coleman himself realised that the school integration policy had created an unanticipated "white-flight", the phenomenon of whites leaving cities going to the suburbs to avoid school busing.

The data and model used by Coleman and his colleagues in the us were subject to a careful scrutiny over the last four decades. The paper by Gamoran and Long (Gamoran and Long 2006) is an

excellent review of the literature from Coleman Report to the present. The underlying theory of educational production function was seriously questioned. In the Coleman report the educational production function was assumed to consist of some school inputs and some non-school or family inputs, and the production was assumed to be of constant returns to scale. As there was little variation in school resources between schools the school effects were not captured. This is a typical problem one encounters in quantitative policy analysis that one should guard against. If the data do not show enough variation on a critical policy instrument we cannot make satisfactory inferences from the statistical model on what would be the impact of changing that policy instrument. In their subsequent studies conducted in 1982 and 1987 Coleman and his colleagues included both private and public schools, thus allowing for sample variation in productivity of school inputs. They did find that students in private schools performed better than the students in public schools. One must ascertain whether the observed difference is due to organisation of the school as private or public or due to private schools requiring a higher standard for admission, as the performance at the end of a year could be highly correlated with the admission standard.

Sanguinety (1983) examined the data for several Latin American countries, Argentina, Bolivia, Brazil, Colombia, Mexico, Paraguay, and Peru. He performed regression analyses of scores on reading comprehensions and science scores of individual students by country, grade, and sex. He found a strong correlation between family factors, such as parents' educational background, and academic achievement, but did not find strong correlation between academic achievement and school factors. The following remark by Sanguinety (1983) is worth noting, as it highlights the importance of eco-behavioural approach over a mere statistical analysis of data:

To better understand what factors most contribute to academic achievement, further research should de-emphasise statistical analysis and focus on teacher-student interaction, formulating taxonomy of teacher attributes and identifying those teachers who seem to produce higher levels of achievement in their students.

Espenshade and Chung (2005) estimated the admission function, whether admitted or not when applied (such as equation 1 above) and used it to simulate what would happen if the affirmative action policy were relaxed. They used the data on National Study of College Experience for the years 1980s and the Fall Semesters of 1993 and 1997 and focused on admissions to elite institutions. They provided quantitative estimates, in terms of Scholastic Aptitude Test (SAT) scores, of admission preferences for African Americans, Hispanics, and athletes. They show that while they had a SAT cut-off of 1,500 in general under the affirmative action programme, the African Americans get preference equivalent to 230 SAT points, athletes get 200 SAT points, legacy candidates (candidates whose kith and kin had either attended that college or made donations to the college) get 160 SAT points, the Hispanics get 185 points, and the Asian American suffer a loss of 50 SAT points. They carry out a simulation exercise and ask how the admission pattern would be if the preferential treatment were abolished. They show that Asian Americans would get

four out of five admissions vacated by abolishing the seats meant for preferential treatment.

Desai (1991) examined a random sample of 200 primary school students in rural Andhra Pradesh who dropped out and administered a test as well as a questionnaire to determine the factors influencing the school dropout phenomenon. He found that the type of residential dwelling and its amenities, the occupational status of the parents and their income had significant effect on the drop-out rate.

Goyal (2007) analysed the verbal and mathematical scores in different behaviour settings of primary schools in Orissa in 2006 and observed that the scores in unaided private schools for the 5th grade students were better than those of public schools, the scores with higher pupil teacher ratio were lower than with lower pupil teacher ratio, the scores were higher in schools with greater percentage of teachers who are graduates, the scores of general category students were higher than those of scheduled caste (sc), scheduled tribe (st), and Other Backward Classes (obc) categories. Goyal's study provided very useful empirical insights into various questions on the working of the school education system, with variations in the school inputs and their differential impacts on verbal and mathematical achievements.

These observations of Goyal suggest that one must identify the most efficient schools and their methods and try to replicate them in others. Similarly, if the socio-economic background at home is different for sc and st students, virtual home environments similar to those of the general category students must be designed for sc and st students. A part of the curriculum for such students may involve creating such virtual environments in the classrooms with the help of voluntary participation by parents of the general category. Information technology can be exploited to create or simulate expert teaching systems and virtual ideal home environments.

Using the data collected under the District Primary Education Programme (DPEP) of government schools and Delhi schools Aggarwal (2000) showed that the achievement levels of students dropped as the students move up to higher grades within the government primary schools. This is much more significant in case of students' scores in mathematics. The most disturbing finding from the DPEP programme data by Aggarwal was that even the teachers found it difficult to handle mathematics questions, (such as requiring an understanding of "lowest common multipliers"). He also observed from the Delhi school sample that the achievement scores were higher for unaided private schools than aided private schools and public (government) schools. As government schools form about 75% of all primary schools this observation has a far reaching implication for our educational policy. By not focusing on the quality of primary education over the past six decades after independence, the country allowed the disparities in school education between the students from poor and rich families to widen. While it is not clear what the evidence on this is for private schools, a possible policy implication of this is very important to note. Unless one improves the quality of education through better teaching methods and infusing more resources into primary education the entire education superstructure will crumble. The effectiveness

in teaching mathematics in elementary schools requires maximum possible attention, as it is that skill or competence that determines the nation's strength in the knowledge industry of the future.

Impact of Affirmative Action

Desai and Kulkarni (2008) provided empirical evidence on the impact of affirmative action in India using the National Sample Survey data for four rounds of NSS surveys-38th (1983-84), 43rd Round (1987-88), 50th Round (1993-94) and 55th round (1999-2000). They provided a brief description of social stratification in India and argued that the reasons for differences in educational achievements among different classes were due to discrimination in housing, occupation, etc, corroborating the observation already made by Desai (1991) earlier in the context of school education. Using the 55th round data they show that 67% of the sc population was still engaged as farm labourers or manual labourers in 1999-2000, more than 50 years after independence. They also showed that about 40% of male sc and st people in the age group of 24-29 were never enrolled in any school in 1999-2000, while for females that percentage was 70%.

These percentages for Muslims were about 32% and 55%, respectively. They also note that only 4% of sc males aged 24-29 completed college, while only 2% of sc women aged 24-29 completed any college. These figures do show that keeping 15% reservation for scs at postgraduate admissions may result in giving them four times the preference implied by proportional or equal representation.

They examined the probability of completing one level of education given that the previous level was successfully completed. This is equivalent to their successfully completing the previous level, choosing to continue education, and successfully completing the next level. They used individual data with several socio-economic variables and dummy variables for the four rounds and regions, and estimated the effects of each one of those variables on the probability of completion. They specify a Logit model.

The model they estimated is related to equations 1 and 2 above, except that they exclude the supply side variables such as the number of schools, type of schools, and quality of the schools, etc. To this extent some of the variation explained by the student characteristics may be capturing the effects of the school system. For example, greater completion rates by upper caste Hindus may also be reflecting the fact that they go to private schools. They found that there was a significant improvement over 1983-2000 in narrowing the differences in these probabilities of completion between different socio-economic groups. They however observed that the completion probabilities were similar and close to each other for various caste groups at the college level. They also observed that income is a highly significant explanatory variable for the two extremes of completion of primary education and collegiate education. Since completion of primary education is a prerequisite for higher levels of education, the income cut-off for the sample could be higher for other levels suggesting that income elasticity of education is u-shaped beyond a certain income level.

4 Designing Educational Policies

The above described conceptual framework, supported by empirical investigations should guide our educational policies. There are five major policy issues in education. These are:

– improved access to education at all levels and to all segments of society (the quantity issue). Maintaining and improving quality of education (the quality issue); Equality of educational opportunities; An affirmative action that prefers or gives better opportunities for some sections of the society which seem to have been discriminated against in the past⁶; Competing globally for a due place in the knowledge industry⁷

Improved access to education at all levels requires a careful assessment of number of students who complete one stage of education and wish to pursue studies further, and are prevented from doing so either due to inadequate number of institutions accessible to them or due to lack of financial resources. Improved access thus requires financial resources in the form of funds made available to set up educational institutions or to augment their enrolment levels. Improved access also requires funds as educational scholarships, work-study opportunities, and loans to students.

School enrolments or school dropout rates depend crucially on awareness of importance and magnitude of educational benefits, accessibility of educational institutions, and affordability of education. We need to conduct periodic educational surveys to assess quantitatively the impact of awareness, accessibility, and affordability on the demand for enrolment at various stages of the education process. Those surveys, along with comparable and standardised educational statistics at the college and university levels, will help us estimate econometric relations such as equations 1 and 2 above. From such equations one can estimate the quantitative impact of various policy instruments on enrolment and achievement.

To the extent that some of the factors continue to adversely affect some sections of society at the elementary and secondary school levels, they do not get equal opportunities at higher levels of education.⁸ The main priority of educational policy should be on improving the access to school education to the poorer sections of the society and to reduce quality variations in the educational outcomes of different schools in rural and urban areas, and schools under different types of management.

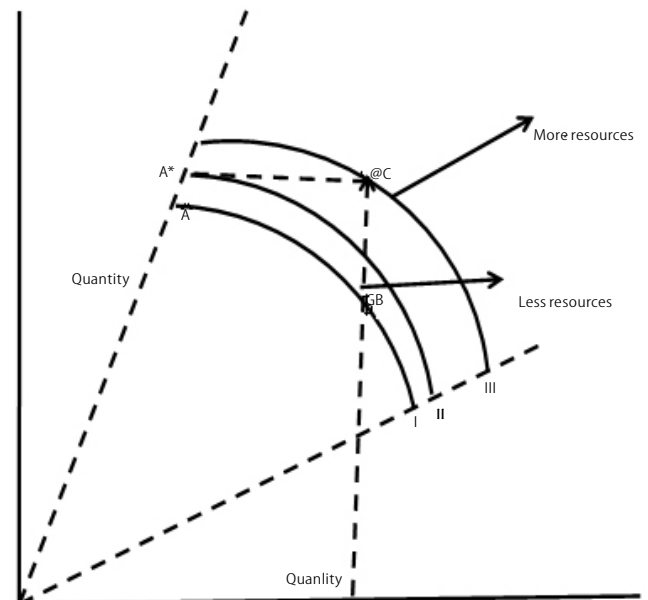
At the elementary and secondary school levels there are a very large number of schools. All of them are catered to serve the population close to the schools. We can attempt to bring about some kind of convergence towards uniform enrolment pattern and uniform educational outcomes in these schools. Once we move to collegiate education the situation is different. There is scope for different types of educational institutions each with its own quality and brand name within a wide spectrum. In the business world one finds monopolistic competition in which a large number of firms produce and market similar products but with some product variety. That institutional structure is optimal in providing the best value for money to both consumers and producers. A similar phenomenon can be true in the field of collegiate education. There exist several educational institutions that offer similar but differentiated educational services, often each with its own brand image. Some cater to the top bandwidth of the achievement spectrum, while others cater to the lower

bandwidths. The educational institutions must be allowed free choice for choosing the bandwidth at which they admit their students so as to find and maintain a brand name for themselves. Professional accreditation bodies, running purely on professional basis without any governmental interference, should exercise control on the minimum quality levels for each level of education. The access to the colleges and universities must not be denied due to lack of financial resources by providing suitable financial aid packages to the students.

Quantity versus Quality

There is often a concern that increasing quantity affects quality adversely. There are two aspects to this issue of quantity versus quality. One is related to the lowering of standards for admission to increase enrolment levels. As described in Section 2, this could result in lowering of the average achievement score at the completion of the course. The next aspect is in choosing the educational technology. Different technologies may require different resources and produce different quality of educational outcomes. This aspect of quantity versus quality can be illustrated by a simple diagram (Figure 3) depicting production of educational outcome through an educational production structure. We may say that all educational resources are fully utilised in producing educational outcome having two dimensions, quantity, such as the number who graduate, and quality, such as the average score on a standardised test.

Figure 3



The production structure A with low quality and high quantity may be associated with very high student to teacher ratio. The points on curve labelled I represent quantity-quality combinations of educational outcomes that can be produced with a fixed level of resources using different education technologies. The points on the curve II show similar combinations at a higher level of resources. Thus at fixed resources depicted by curve I a movement from A to B denotes that the quality can be improved only at the expense of lowering the quantity. But with more resources

one can have more of both quantity and quality. This is illustrated in Figure 3 by a movement from A to c.

Equality of Opportunities, and Affirmative Action

One must distinguish between four types of educational opportunities. First, we must know whether there are sufficient opportunities so that (potential) students have opportunities to pursue education and have sufficient number of alternatives to choose from at collegiate level and above. Second, we must consider giving equal opportunities to all. Third, we must recognise the denial of equal opportunity or discrimination. Outright discrimination on the basis of caste, race, sex, religion, region, etc, can be condemned and punished if sufficient evidence is found for the same as it is unconstitutional. Fourth, we must consider the concept of affirmative action that gives preferential opportunities to some group of students who are at a disadvantage for no fault of theirs.⁹

The concepts of discrimination and affirmative action in general refer to discriminating against or giving preference to a particular class or group of persons when the society is stratified by some criteria such as race, religion, region, sex, ethnicity, etc. Discrimination and affirmative action are equivalent to denying equal opportunity. While discrimination is condemned affirmative action is not only tolerated but even justified. Observed differences in achievement diminish as the level of education improves, and the correlation between achievement levels and these group characteristics diminish with level of education. There is an increasing concern that affirmative action should be based on an individually determined deprivation index that includes education itself as an argument (Nathan, Mishra and Reddy 2008) for measuring deprivation using deprivation indices).¹⁰

The concept of equality of educational opportunities is difficult to interpret, measure, and monitor. For instance, even if schools provide admission to students without any discrimination and charge the same fee for all, the out-of-school expenses such as the transportation cost and opportunity cost of taking the students out of the child-labour market may prevent some students of lower socio-economic backgrounds from receiving education.¹¹ One in general attributes all of the low achievement levels to the socio-economic background of the backward class to which that student belongs. It is observed that as one moves up the ladder of education the achievement level depends more on individual motivation and hard work. Hence giving priority in admission to students with low achievement scores must be regressive as we move up the level of education. This justifies the notion that backward class people with graduate degrees belong to the creamy layer. In fact equality of educational opportunities must be viewed as equality under similar situations. Preference to lower achievement score is justified only if one can justify that the lower score is due to a social circumstance beyond the individual's control due to backwardness of the class to which he or she belongs.

Equality of educational opportunities could be pursued in phases, as education is a sequential process. The following scheme seems to be needed:

- The state should provide necessary enabling environment so that all people have equal opportunities to pursue basic education

- of a uniform quality at the primary and secondary school level (universal school education);

- the state should enable the education system to provide sufficient opportunities for all students who wish to pursue education beyond the school level by enabling creation and maintenance of sufficient number of educational institutions at the collegiate level and above;¹²

- if the students belonging to lower socio-economic status continue to lag behind others in their achievement levels after completing school, the state should provide them supplemental support to receive compensatory education;

- the state should provide additional financial assistance to students from lower income households to pursue school, collegiate and postgraduate education;¹³

- The educational institutions may be allowed autonomy and be encouraged to follow an affirmative action programme consistent with their own goals and objectives, if necessary by giving state incentives for following affirmative action.

The issue of equality of educational opportunities is looked upon as having the same proportional representation in educational institutions as in the population. The choice of 15% reservation quota for SCs, 7.5% for STs was supposed to have been based on such a consideration. Even the recent reservation for the other backward castes (OBCs) also seemed to have been based on such a consideration. While the Mandal Commission stated that OBCs constitute 52% of the population the NSSO estimated it to be 36%. As the Supreme Court ruled that the total quota of reservations should not exceed 50%, the smaller of the two percentages (50-22.5=27.5% and 52%) was chosen for OBC quota. Thus, this number chosen for OBC quota is a clear case of arbitrariness not based on any convincing statistical evidence.

At different levels of education the proportion of the educationally eligible persons from a given caste or race or sex could be much different from the population proportion of that caste or race or sex.¹⁴ Hence we cannot have the same proportion as a norm to measure and monitor equal opportunities at all levels of education. In particular if the dropout rates are higher for reserved categories or for a particular race at lower levels of education, as is normally the case, keeping the same quotas at higher levels of education, as at lower levels, would distort the notion of equal opportunity and would instead give them more than an equal chance to get selected. When that is so it becomes very important to know what the extent of preferential benefit given to that class is compared to the equal opportunity. The state should examine the factors that contribute to differences in dropout rates and achievement scores between groups and rectify those differences at lower levels of education itself.

One of the solutions to this problem of providing equal opportunities lies in increasing the enrolment levels so that all those who pass the qualifying examination and wish to pursue higher studies have an opportunity to do so, and to provide them financial assistance.

Another approach suggested for providing equality of educational opportunities is that of affirmative action. Under affirmative action the criteria for rationing the limited number of admissions

need not be based only on merit and financial affordability but it could be based on a social obligation or of giving preference to members of a group or groups that had a history of discrimination or diversity considerations. Since any preference for one group means a discrimination against the other group it is necessary to make sure that the preference is given only to the extent of correcting for the lower achievement associated with socio-economic conditions which are not in the control of the student.

Comments on Some Education Policy Issues

One of the issues under debate is, after six decades of caste-based reservation for sc and srs, should that reservation policy be reviewed for continuation? The reason for this question is the assertion that the scs and srs have improved their socio-economic status and do not need such protection any more. One must distinguish between those scs and srs whose socio-economic status has improved and those whose status has not improved. There are reasons to believe that there is still a large fraction of sc and sr population with low socio-economic status. There are backward caste commission reports that had periodically evaluated the socio-economic status of scs, srs, and other backward castes. One must look at that evidence. It is reasonable to assume that the strong correlation between caste and socio-economic status that was present at the time of independence may have weakened somewhat over the past six decades. We do observe that economic backwardness continues to a certain degree as a result of inequality in wealth distribution. It can be said that backwardness is a multi-faceted phenomenon arising from inequalities in wealth, occupational access, discrimination in housing, employment, etc. Once those inequalities by caste are reduced one may

expect that there will be no correlation between backwardness and caste. One may see the essay "Segregationist" (Asimov 1982). The story is about a world consisting of robots, biological people, and people with artificial organs. When more and more people go for organ replacements the distinctions between the classes disappear. If that were the case there must either be a rider that the creamy layer of scs and srs must be excluded from the reservation policy or the caste-based reservation must be replaced by reservation based on socio-economic status.¹⁵

The next issue is whether the reservation policy should be extended to the obc's? The answer to this question depends on several things. First what are the other backward castes? Why are they called backward? Is it because they are educationally backward, or socially and economically backward like scs and srs? If they are educationally backward but are not backward economically and socially, is their educational backwardness due to their own choice of preferring agriculture or business over education in the past, or was it because they were discriminated?

The most important issue regarding more reservations is that it may create a reverse discrimination, thereby denying the right of equality of educational opportunities for those not covered by the reservation policy. As long as the total reservation is less than 50% the question of reverse discrimination does not arise. There are some southern states in India where the total reservation goes beyond 50%. In this case the answer to this question rests on the supply considerations. If all those whose scores are more than the cut-off for reserved categories can get admission in private educational institutions without having to pay more, then there will be no reverse discrimination at the system level, although

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one may perceive such a reverse discrimination at an institutional level. If the supply situation is such that there are some meritorious students who are denied admission both in private and public institutions there will be a clear perception of reverse discrimination. Such perception of reverse discrimination is more if those who get preferential admissions are from higher levels of socio-economic background. However, this perception of reverse discrimination may be reduced gradually when the private sector responds to the situation and comes up with more institutions of higher quality, and when the meritorious students with inadequate financial means get financial assistance.

There is a great deal of concern on the quality of education, in higher and professional education in particular, as a result of the reservation policy. Let us examine what the eco-behavioural approach has to suggest on this issue. As the eco-behavioural approach indicated, it is quite possible that the teachers would pitch their instruction to an average student in the class, and each student may target his or her performance relative to that

average. When there is reservation with lower cut-offs for admission of the reserved category students, these average norms could be lower. The higher the percentage of reservations the lower will be the targeted class average. If one wants to maintain the quality, some special efforts have to be made to see that the absolute passing standards are not aligned to expected class average performance, but rather to an absolute passing average. This requires that the reserved category students of lower achievement levels are given special instruction to catch up with the rest. This must be done at all lower levels so that the quality at higher levels is maintained.

The cut-offs used for admission and passing are not very sacrosanct. With any cut-off there is possibility of some errors of type I and type II, that of rejecting a good student and not rejecting a bad student. But when the cut-off is lowered for some and not for others the impact of type I and type II errors on the two groups is a bit more difficult to assess but it must be done to examine the impact of a reservation policy on quality.

NOTES

- 1 I would like recall here, however, a remark made by Keynes when Tinbergen told him that his econometric model had evidence in support of Keynes' suggestion that the minimum frictional value of interest rate was 2. Keynes remark was that he was glad that Tinbergen's econometric model could possibly be right with some positive probability as he got the right answer.
- 2 Karl A Fox introduced me to this topic through some of his own work done in mid-1980s (Fox 1990 and Schogen 1989).
- 3 It is a pity that the excellent faculty resources of a university are not being utilised to motivate the young minds in such formative years. In most universities in the US and the UK, university faculty teach undergraduate or degree classes.
- 4 The relative weights for different dimensions of educational outcomes could be different for different types of education. For instance, for science education academic achievement in quantitative skills may be much more important than verbal skills and the diversity of the students and teachers, while for a course on public policy the opposite might be the case.
- 5 It is unfortunate that most of the statistical specifications are usually based on the readily available data and ad hoc theorising. Very rarely does one consider detailed description of the underlying data-generating process, through a detailed process analytic approach such as the one implied by Barker's behaviour settings, and gets all the required data.
- 6 An interesting question we may pose is: which is a better concept of affirmative action? (i) providing even slightly better opportunities than at present for a very large number of backward caste people excluding the creamy layer through better schools, or (ii) providing large benefits through large quotas for a small number of backward caste people including the creamy layer at the collegiate level.
- 7 This has emerged as a new policy objective in recent years under globalisation as one can see from several policy papers coming from European Union, OECD, US, China, and India.
- 8 One may see *Selected Educational Statistics 2004-2005* prepared by the Union Ministry of Human Resource Development for statistical evidence in support of this observation.
- 9 One way to combine the concepts of affirmative action in the US and reservations in India is to regard Indian reservations as mandatory affirmative action through specific quotas.
- 10 This is reflected in the recommendations of an Expert Group on Structure, Scope, and Functions of an Equal Opportunities Commission submitted to the Government of India in February 2008.
- 11 Tilak (2002: 55-56).
- 12 Without this kind of state policy if the state is engaged in introducing reservation quota and forces it on educational institutions eroding their autonomy, it is equivalent to the state abrogating its responsibility and shifting the problem to the existing poorly funded educational system.
- 13 This should include compensation for taking the children away from income-earning occupations or expenditure substituting domestic activities. The legislation against child labour is meaningless without understanding the economic circumstances which force the low income poor families to keep their children away from school.
- 14 Here by the term eligible must be interpreted to mean passing the qualifying examination and not necessarily meeting a higher cut-off admission standard.
- 15 One of the reasons to choose caste as the basis for reservation policy at the time of independence is that caste of a student was an easy and unambiguous measure than the socio-economic status. On the creamy layer issue and some empirical evidence one may see Chaudhury (2004).

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