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In a country where the literacy rate is three in ten, it is often assumed that, economically, there is a surplus of education. This paper reviews the arguments. In sum the case of India reflects a circumstance in which the existence of unemployment has led to the unjustified assumption that external productivity due to education is low. The paper illustrates new ways to use equity in educational planning: in the distribution of per pupil expenditures, examination pass-rates, literacy, trade training and the availability of books. It also adds two new mechanisms for estimating the economic potential of educational investments: the amount of knowledge acquired in schools, and the degree of impact of school resources on academic achievement. From each of these sources the paper concludes that there is reason to question the widely held belief that additional investment in Indian education would be uneconomic.

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INTRODUCTION

1. University enrollment in India is three times that in Great Britain and about equal to that in Western Europe, excluding France (Psacharapoulos, 1973: Table H). When students leave, many are unemployed, and the number of these "educated unemployed" (secondary school matriculation or above) is increasing annually. In 1956, 27,000 university graduates and 218,000 secondary school graduates had registered their names as unemployed. By 1961, 56,000 and 534,000 were registered; and by 1966, 94,000 and 824,000 (Blaug, et. al., 1969; Table A.8). By 1972, the number of registered unemployed had climbed to 3.3 million (UNESCO, 1977; Annex 7). Moreover in urban areas an additional 30% were not working but did not register (Blaug, et. al., 1969; Table A.3).

2. Because of statistics like these many observers believe Indian education to be economically over-extended. Says Malenbaum: "The relatively high incidence of unemployment among the educated points up the economic waste involved in using scarce resources to educate and train young people..." 1957:146); Says Rao: "Continuing unemployment of the educated suggests that expenditure on education is not giving a positive return" (1966: 68). This leads those less empirically inclined toward anecdotes such as: "Peasants complain that a boy who completes high school would rather hang around unemployed in the city than work on the farm" (Economist, September 16, 1978). To some, this is more than uneconomic; it is dangerous. "The educated unemployed", say Kannappan and Uppal," being very vocal, can easily spread dissatisfaction and cynicism against the political and economic structure. They become easily prone to the revolutionary movements aiming at the destruction of the economic and political order, which cannot provide them with work" (1975: 236) 1/.

3. Yet if these were accurate, if schooling were uneconomic, then we would expect the enrollments and the willingness to withstand direct and opportunity costs to decline. But they have not. The enrollment ratio in primary school (between 1968-74) increased by 20%; in lower secondary schools by 25%; in upper secondary school by 30%; and in university and other post-secondary institutions by 77% (Naik 1975: Tables 1-3). The question is why there should be such persistent evidence of both individual and collective willingness to invest in education if the results of that investment are so negative.

Rate of Return Evidence

4. One reason why schooling continues to expand rapidly is because the rates of return, both private and social, continue to be large. These and their sources appear below (Tables 1a and 1b). The private rates of return for primary range from a low of 7% to a high of 25%; the average is 20. For lower and upper secondary, the range is from 10 to 19%, and for post-secondary, from nine to 25%. The most comprehensive figures are those of Psacharopoulos (1973). His are summaries of previous estimates. Most of his rates of return, whether individual or social, are above the target rate of return for Government of India (GOI) investments in industry (12%). Whether one accepts the low, the high, or the average figures, two tendencies appear evident: (i) the returns are much higher for university engineering, agriculture (and other specializations) than for general BA and BSc degrees;

and (ii) higher for primary than for secondary and higher for secondary than for general tertiary. Despite the most common impression that investment in formal education is uneconomic, the rates of return appear positive at all levels and for each unit of analysis. Whether the returns on educational investment are higher than on investments in physical capital is a separate question. But despite popular misgivings, these figures would indicate that investing in formal schooling in India is a reasonable choice.

5. The question is whether these figures are valid. There are basically three objections to them. Some argue that economic returns are due to more than schooling. This is true. Returns can be influenced by native intelligence, and by particularistic, i.e., innate not achieved, influences in the labor market. Those who have calculated these rates of return have tried to respond to this objection by adjusting these figures downward by a coefficient of between 40-50%. Furthermore, there is evidence from the US that earnings are not as heavily influenced by measured innate ability as originally thought (Jencks et. al., 1972; Griliches, 1970; Griliches and Mason, 1972; Hause, 1972); and that the influence of innate ability, because of low labor market mobility between jobs, may even be less in India than in the US (Blaug, 1969: 13) 2/.

6. Doubts may also arise because there are externalities to educational investments (both social and individual) which have not been calculated. This is true. Individuals benefit culturally and physically from increased access to health and welfare resources, and the society at large benefits because of the diminishing costs of diffusing information, the potential acceptance of family planning and other social changes. Sending individuals to school today affects the cognitive achievements of children and grandchildren. If inter-generational effects had been calculated, they would serve to increase the returns at no additional cost. These figures therefore are conservative.

7. The last objection is the most serious: do differences in earnings reflect differences in productivity? Over this, there has been much discussion. To respond we must ask whether there is any milieu in which an economic return is based upon a purely competitive market. In many countries, if not most, the distribution of capital and raw mterials is subsidized; and foreign exchange is restricted. Anyone who works with capital or raw materials is affected by these policies (Psacharopoulos, 1975). The marginal product of a graduate working in an automobile plant may depend as much on these "complementary" factors as on the relative scarcity of graduates. If we do not take educational rate of return figures into account when planning investments, then perhaps for the same reasons, we should ignore similar figures for other investments which include observed (as opposed to ideal) prices as a significant variable (Blaug, 1969: 12-15). Weaknesses inherent in rate of return data on education are similar to the weaknesses in rate of return data for other sectors; but other sectors do not exclude rates of return when engaged in planning.

8. There are ways to compensate for structural idiosyncracies in the labor market. One is by estimating the shadow price of disaggregated labor inputs. This technique was utilized in the Indian data reported by Gouden (1967), Blaug (1972), Pandit (1976), and Psacharopoulos (1973).

9. Another way to check on the validity of rate of return evidence is to investigate those areas of the economy where individuals tend to be under-reported in labor market surveys: small production units in urban areas and in agriculture. On neither is there much information available on educational costs; but in agriculture, educational attainment appears to play an important if not always predominant role in influencing the adoption of new practices and in determining agricultural productivity (Harker, 1973; Chaudhri, 1973 and Sidhu; 1974). Moreover, what appears true for Indian farmers is not inconsistent with the information on the educational effect on farmer productivity in Kenya, Nepal and elsewhere (Lockheed, Jamison and Lau, 1977; Wu, 1977).

10. From potentially under-reported sections of the urban sector there is also reason to suspect that education plays a major role in determining productivity. Recent evidence from Bombay (Table 2) indicates that after length of work experience and on-the-job training, education is the strongest determinant of earnings in the small enterprise sector of the urban economy, i.e., in firms with five employees or less. 3/ What these data from agriculture and the small enterprise sector suggest is the following: if it is true that individuals from these sectors are not proportionally represented in published education rate-of-return statistics, there is no good reason to conclude that representing them would significantly alter the results downward.

Educated Unemployment

11. It is safe to say that India, like most poor countries, has an unemployment problem. But the problem of educated unemployment is less serious than its problem of uneducated unemployment. 4/ The educated register at labor exchanges 17 times more frequently; nevertheless, their number and the proportion of them unemployed are smaller. Eighty percent of the secondary school graduates find employment "relatively" quickly. But after leaving their schools and colleges, 15-20% search for employment for periods up to 18 months (for college graduates - six months). 5/ On the other hand they eventually find it, at times where it is is least expected, in time to keep the economic returns high enough to more than justify their investment. Essentially the problems of "educated unemployment" is a misnomer. The unemployed who are educated are not unemployed because they are educated; they are unemployed because they are young. The problem cannot be characterized accurately as one of "unemployment". It is really a problem of "search time."

12. What allows the young to search as long as they do is the willingness of an extended family to support relatives during what is perceived, essentially, as a normal rite de pasage. This period of "search time" has been evident since 1947, and perhaps as early as 1918. For the last 20 years, proportionally, it has remained virtually constant (Blaug, 1972: 38); and during one period it may even have diminished. This is illustrated by Figure 1. Between 1953 and 1961, the percentage of the labor force which

was "educated" went up, but the percentage of the (urban) unemployed which was "educated" went down. The fact is that the amount of economic opportunity has increased at least as fast as has the new proportion of the younger population getting educated.

13. That Indian education is more economically solid than is commonly thought does not mean that the social effects of graduate "wait time" are acceptable. Nor does it mean that secondary and university graduates are finding the same economic niche in the economy that graduates found 10 or 20 years ago. But unlike wait time, this (certificate inflation) is true in all countries and there is a wide difference of opinion over whether it is "bad" or "good." A decline in the market value of a graduation certificate is considered by some to be a normal result of giving more children the opportunity to go to school. In no industrial country is the value of graduation from primary or secondary school identical to what it was two or three generations ago; and one should not expect the value of graduating from primary or secondary school to remain the same in India when similar changes are taking place in the numbers going to school. Thus changes in the kind of economic niches available after graduation can be considered a normal process concomitant with social change and with educational growth. Finally, it may not be fair to expect that graduates will end up performing the precise economic functions which they had anticipated. To one extent or another this, too, is true in countries other than India; and is debated as to whether it is "bad" or "good." If one assumes that the elasticity of skill transfer is zero, then the fact that graduates do what they do not anticipate would be cause for serious alarm. On the other hand, if one assumes that the elasticity in skill transfer is infinite, then settling into an economic role which was unpredicted, and using training in ways which were unanticipated, is entirely normal. The first assumption is concomitant with "manpower planning"; the second with "rate of return planning". Regardless of which assumption one chooses, what is evident in India is that (i) those with more education more easily find an economic niche and that (ii) the rewards for more education are positive. Furthermore, despite the fact that what ought to be the "correct" linkage between education and work will be debated for a long time to come, there is no evidence to indicate that these two positive rewards to educational investment will not continue.

14. Two estimates exist as to the percentage of India's economic growth attributable to its investment in education. Between 1940-60, Selowsky (1969: 463) suggests that it approximated 7-8%; between 1960-69 Psacharopoulos (1973: 119) argues that it approximated 34%. India's rate of economic growth (3-4% p.a.) certainly has not been high; but if Psacharopoulos' estimates are anywhere near correct for the decade of the 1960s, had India's investment in education been less, the rate of economic growth would have been significantly less.

<u>The Level of Investment (as it is): Sufficient?</u>

15. Even were one to accept the case that investment in Indian education is economic, still many would believe that the level of investment is sufficient as it is. This we will explore below.

Speculations on Comparative Trade Advantages

16. In the 1960s and 1970s, the U.S.A. had relatively more physical capital than other countries. It was, therefore, significant when Leontief (1954) discovered that the US did not seem to export goods and services which required capital intensity, but those which required (skilled) labor intensity. Today financial capital can flow with relative ease across international boundaries, and with relatively small differences in cost. Technical skills may not. It is no accident then that among 13 countries, the average amount of schooling completed among those in a given industry, predicts its relative advantage for export against the same product exported from elsewhere (Davis and Morrall, 1974). Nor is it an accident that among these 13 countries, India should be relatively advantaged in exporting products which require large amounts of unskilled labor, and at a disadvantage in exporting products which require large amounts of skilled labor. This is illustrated in Table 3. The correlation between skill level and export advantage is .65 for the US and .084 for India; for imports (.29 and .55), the positions are just the reverse.

17. Economically, this seems rational: high levels of skill are correlated with high levels of capital intensity. The perennial academic question is which follows which. The more immediate question is whether, in the long run, India's comparative position with respect to level of skills is acceptable, and given long-range ambitions for industrial competitiveness, whether she can afford to wait for an unambiguous answer to an academic question.

18. India now exports engineering goods, chemicals, pharmaceuticals and cosmetics and other manufactured goods (UNESCO 1977: Annex 5); and intends to export more. Nevertheless, with these products there is strong competition from Japan, the U.S.A. and from other industrial societies. The competition is due in part to the ability to develop and disseminate new innovations. Correlations between trade advantage and the ability to perform research and development in a given industry are between +.6 and +.7 (Davis and Morrall; 1974: 85).

19. The diffusion of research and innovation depends upon a large supply of human resources. If India's human resources were overly abundant in comparison to other countries, as is commonly thought, then these would emerge in international comparisons. But they do not.

20. The amount of physical capital per capita invested in India is 16% more than it is in South Korea; but the amount of education capital invested per capita is 84% less (Psacharopoulos, 1973). India invests 64% less per capita in education than does Ghana. In fact, even though many new schools and universities have been built, India invests only 6% in education of what it invests in physical capital per capita (Table 4).

21. This is reflected in the composition of the labor force. One hundred percent of Japan's labor force has a primary education or above; 83% of the Philippines' labor force; 55% of South Korea's labor force, and 10%

of India's. Only 0.6% of India's labor force has had post-secondary schooling. This is 90% less than the corresponding figure for the Philippines (Table 5). The proportion of professionals in India's labor force (1.7%) is about half the amount available in Malaysia (3.0%; Table 6). Thus the amount of skill and training available per capita in the Indian labor force, in comparative terms, is very low.

22. The fact that rates of return are consistently positive and particularly high for post-secondary agricultural and technical specializations, lends credence to making educational investments to achieve certain comparative long run trade advantages. A nation which aspires to become industrially competitive on an international standard over the coming three or four decades must be able to absorb technical innovation. It must have a depth of talent that can be relied upon, and to which the nation (or local industry) can turn for counsel. The most competitive nations will have their own sources of innovation. But whether a nation requires the minimum or the maximum range of economic competitiveness, acquiring a comparative advantage is a universal goal. This requires competitiveness in human capital; and though India has some of the most creative of scientific individuals, compared to many of its industrialized competitors (Table 5), it does not have enough.

Distribution of Education

23. There is no country in which all goods and services are distributed equally, in which some regions do not have more miles of highway, other regions more fruits and vegetables; there is no country without differences between urban, rural, seaport and mountain. But education is not like other goods and services. Equal access to it is a commitment of high priority. 6/ One reason for equal access is that it corresponds to what is now taken to be a universal notion of social justice. Equal opportunity in education is a "basic need." Another reason is to ensure that potential intellectual talent is not lost. These effects of equal access to schooling are difficult to calculate (Selowsky, 1978), but not unreasonable to assume. Thus, the maldistribution of education has both normative and economic consequences.

Enrollments

24. On an average, Indian primary school (gross) enrollments are high - 80.9% of the 6-11 age (GOI, 1977: 25). But this figure is misleading. First of all it includes many children who are over age 11. Because of the prevalence of over-age children, the state of Manipur reports that 152% of its age group (6-11) is enrolled in primary school. In Nagaland the reported figure is 133%; in Delhi it is 111%; in Goa 112%.

25. This 80.9% figure also masks the imbalance between grades. In some areas, 100% of the age group in fact may be in grade one. But only 25% will progress to grade VIII without either having to drop out or repeat (Naik, 1966). Thus the overall figure is inflated by the number of over-age students and unreflective of student wastage.

26. It may also be inflated in another way. Figures from the Ministry of Education are supplied by headmasters, who are not neutral sources. Governmental assistance and subsidies are frequently linked to enrollments. There are inevitable biases in data collected from officials who are responsible for the reputation of their institutions; but when economic incentives are involved, then figures must be treated with special care. One study on this subject was conducted on 1961 data by the Agricultural Economics Research Center (Delhi University). Investigators discovered that the Ministry of Education's enrollment figures on children age 0-14 were 20% higher than figures on the same age group derived from the census (Agricultural Economics Research Center, 1971: 6). In a later study, on 1971 data, the discrepancy was estimated to be twice as high, 41% (Karcher, 1976: 9). All agree, however, that official education enrollment statistics are overestimated.

27. Nevertheless even if one accepts official statistics on enrollment levels, the distribution of enrollment is hardly even. Females (age 6-11) are enrolled approximately one third less frequently than males. In one state (Arunachal Pradesh), only 38.5% of the girls in the relevant age group are enrolled in grades I-IV, only 6% in grades VI-VIII, and only 1.4% in grades IX-XI (GOI 1977: 24-26). Some states, such as Assam and Madhya Pradesh, report that more than one third of the age 6-11 children (male and female) and 65% of the children age 11-14 are not enrolled at all (Tables 7 and Tables 8).

28. If one divides the proportion of the national primary enrollment in a state by the proportion of the national relevant age group in that state, the resulting Representation Index (RI) can be taken as an indicator of over- or under-representation of that state's enrollment vis-a-vis the national norm. An RI of 1.0 would indicate a representation exactly in proportion to the state's population (see Annex I for details). A glance at these RI's is instructive. Some states, such as Bihar, Rajasthan and Madhya Pradesh, on the primary level, are under-represented by approximately 30% (RI = .726-.764); others, such as Delhi and Punjab are over-represented by 20% (RI = 1.228). These figures can be found in Table 7. 7/

29. The average Indian state has 49% of its boys and 25% of its girls (age 11-14) in secondary school, grades VI-VIII. But the distribution of these enrollments is more variable than in the lower grades. It ranges from 22% (boys and girls) in Rajasthan to 88% in Kerala. The pattern is continued at the upper secondary (pre-university) level, grades IX-XI, for ages 14-17. Andhra Pradesh has the lowest portion of children in school (10%); and Kerala (36%) and Delhi (67%) have the highest. The summary index of inequality, called a gini coeffcient, reflects this pattern. The gini coefficient can range from 0 to 1.0; the latter would represent complete inequality (see Annex 1). In India the enrollment gini coefficients rise by level of education. For primary education it is .1054; for lower secondary, .1902, and for upper secondary (pre-univesity), it is .1918 (Tables 7, 8 and 9). This indicates that although there have been significant increases in schooling in recent years, the availability of schooling still fluctuates from state to state, and the higher the level, the larger the fluctuation. 8/

Per Pupil Expenditure

30. How much is spent per student also varies. Gujarat spends Rp 17 per primary student; Madhya Pradesh 64, almost four times as much (Table 10). At the lower secondary level, West Bengal spends Rp 19; Nagaland spends 185, about 10 times as much (Table 11). At the upper secondary level, the spread continues to widen: from Rp 741 per student in Uttar Pradesh, to Rp 13,434 per student in Himachal Pradesh, 18 times more (Table 12).

31. These are reflected by India's per pupil expenditure inequality indices: At the primary level gini = .2130; at the lower secondary level gini = .3295, and at the upper secondary level gini = .3807. Thus, like enrollment, from primary to lower and upper secondary, the variance between the states becomes more marked, and the distribution of per pupil expenditures more inequitable.

Examination Success

32. Passing an examination is the single most universal measure of educational success. Regardless of the ambiguities in the minds of some observers as to their value, examinations and examination passes are an achievement of some esteem in the minds of educational consumers. How examination passes are distributed, therefore, is a question of importance.

33. Figures on the number of examination candidates could not be obtained. What have been obtained are figures on upper secondary examination passes and upper secondary student enrollments. These could be skewed by the high number of students who may move to an area (such as Delhi) to take an examination, or by the tendency in some states to set their definition of an examination "pass" at a lower level. Despite these likelihoods, the number who pass as a portion of enrollment is strongly correlated with other educational indicators of consequence (Table 19).

34. There is a wide dispersion in pass rates. In Manipur, the number of (pre-university) passes was only 1.4% of those enrolled; in Tripura, it was 51% (Table 13). There are many factors which could account for this, but knowing this alone is instructive. The distribution of passes at an important level of education is a fairly certain predictor of the amount of scientific and technical talent available locally. The fact that the distribution is so inequitable (gini = .4285) is good reason for further scrutiny.

Nonformal Education and Labor Productivity 9/

35. Nonformal education in India parallels the society itself - existing sytems are complex and profuse. But the variety is not the question. The question is whether the amount is enough. A recent government survey indicates that it is not (National Sample Survey, 1973). In terms of content, there are two basic categories of nonformal education: one which provides generalizable skills and one which provides skills relevant to a specific occupation. 10/ With respect to the latter, Mincer (1962) has argued that

in the U.S.A. on-the-job training is almost as large a human capital investment as formal schooling. This is relevant to India because skill level is generally more able to predict comparative export advantage than formal education (Davis and Morrall, 1974: 81). In assessing the social and private rates of return to industrial training in India, however, Blaug, et. al., argue (based on evidence of one factory) that the results of two years of on-the-job training are quite close to those for formal education alone (1969: 231).

36. Labor mobility between jobs in India is low. This contributes to the "wait time" before employment and may affect the amount of on-the-job training - without radically affecting wages. In a milieu of low mobility, employers, including the public sector, can recoup costs from "captive workers." This may mask the productivity of on-the-job training and perhaps explain its relative frequency when the economic returns to it appear relatively low - about 6-7% (Chakravarti, 1972). With respect to apprenticeship programs, a special category of on-the-job training, the average (social) rate of return is only moderate (9.6%). But this is due, in part, to the prevalence of automobile mechanics in the data. Other skill categories, such as machinist (15%), and refrigeration and air conditioning repair (25%), appear more economic as investments (Thakur, 1979).

37. Measuring amounts of worker-training is not a simple task. Much of it, even when formally organized, is hidden inside small workshops. And the bulk of it is not formally organized at all; the bulk of training is actually informal experience. The benefit of experience is not to be discounted, for experience explains more variance in earnings than any other predictor variable in small firm sector of the Bombay Labor Market Survey (Table 2); and has more impact on productivity than does a two year industrial (ITI) training course (Fuller 1976).

38. Occupational experience is impossible to substitute artificially. There are two methods available: organized institutional training and organized in-firm training. In the economics literature much controversy has surrounded discussions of the profitability of one versus the other in the past (Foster, 1965; Heyneman, 1979a); and there is no reason to expect that the debate will subside in the future. Despite the fact that vocational and technical schools are the most common educational response to training demand, the economics of the choice are often questionable.

39. A recent discussion by Fuller (1976) on this issue is enlightening. He analyzes the productivity of 474 turners, millers and grinders in a metal-cutting factory in South India. Though the educational level of workers has risen in recent years, they were not "over-educated." Workers with more formal education were far more likely to pick-up skills on their own and to achieve high rates of productivity. Schooling therefore, as human capital theory would suggest, is one of the most important prerequisites for on-the-job learning, even at "manual" levels of the occupational structure.

40. Fuller's results which command the most attention are those which compare productivity after training in the firm with productivity after a two-year course at one of the government-sponsored Industrial Training Institutes (ITIs). Productivity is strongly influenced by organized training in the firm but not as a result of ITI training - even when schooling, trade experience, and socio-economic status are held constant. According to Fuller, this is borne out in the comments by factory supervisors, 72% of whom say that those who receive in-firm training are more productive. 11/ The social rates of return for training turners at ITIs (5.9%) is unfavorable compared to training turners through apprenticeship programs (14.5%). The same is true for fitters: (7.9%) vs (11.3%). In general, the social rate of return to ITI training is low (7.8%) (Thakur, 1979).

41. This issue of high cost and high inefficiency of industrial school training is now new. In this case what it does is to lend a note of caution to the frequently made assumption that all nonformal training is therefore practical training. In India it is not. In fact it depends entirely upon what kind of nonformal training is contemplated. In the case of providing skills specific to an occupation, the lesson is that industrial school training frequently cannot transfer knowledge as efficiently as can firms which use that knowledge for a profit. Thus in terms of investment, the efficiency of nonformal skill-training institutions should be measured most carefully; and with caution.

Geographical Distribution of Worker Training

42. The amount of organized trade training for workers is currently spread unevenly. In itself this is not surprising. The issue is the extent of the disparity. It ranges from 163 per 100,000 in Delhi to .5 per 100,000 in Bihar (Table 14). The degree of overall disparity (gini = 6479) is higher on this than on any other measured educational indicator save one (Table 14).

43. The distribution of apprenticeship training is also important (Table 15). Apprenticeship training plays a key role in the Indian industrial economy (which is very old) as well as the Indian social structure (which is even older). The distribution of apprenticeship training - how much and who gets selected - is particularly significant in the case of India. The fact that it too is distributed unevenly (gini = .2837) and that the distribution of trade training and apprenticeship training should be so highly correlated [r = .43] (Table 18) is one indication why any plan to augment occupational skills should consider trade and apprenticeship training together.

Generalizable Skills

44. The single most generalizable skills are those of literacy and mathematical competency. If the primary school enrollment rate continues to climb, the young generation of Indians can be expected to have these skills by the year 2000. Yet this will still leave 211 million people without them over age 14, and most importantly, 100 million people in the work force without them who are now between the ages 15 and 35 (GOI, November 1977).

45. The proportion of the adult Indian population which can read and write is currently 29%. In Indonesia and Malaysia it is exactly double - 60%; in Singapore it is 75%; in Thailand, 82%; and in the Philippines, 87%. There has been much discussion of this problem in the past (Rao, 1966: 77; GOI, 1976/7: 149); and the failures of mass literacy campaigns tried elsewhere (UNESCO, 1976) have not gone unnoticed. But it has become increasingly evident that as India develops economically, the problems attendant with high levels of illiteracy are going to require serious, albeit pragmatic, attention.[12]

46. It would probably not be economic to teach all adults to read, write and improve their numerical skills. But for certain categories of adults it would be very definitely economic. The private economic rate of return for being literate vs. not being literate is about 27% (Pandit, 1976, Table 33). Moreover, for certain regions, investing in more literacy would very likely be wise for other than economic reasons. Directing the efforts towards young mothers should be high in priority because attitudes toward education (not necessarily the education itself) transfer across generations. As of now, 62% of India's female children do not attend primary school. Low female attendance still occurs when there is no lack of available places and no demonstrable need to work at home. Many females do not attend school because they are not permitted.

47. If mothers were allowed to attend a school, then it would be more likely that girls would attend school. Efforts to raise female attendance in primary schools should be accompanied by adult literacy efforts, and vice versa. The two should not be attempted in isolation.

48. Girls would also be more likely to accept or participate in economic change if their mothers had received training. Thus the argument for female adult training should not depend upon the individual's use of the training. The argument should be based on the utility of the training for the next generation.

49. Literacy and other generalizable skills for laborers and farmers are of priority too - regardless of how "menial" their occupations. The Indian economy is not like those nations in Africa where large-scale adult education had less historical and other environmental supports, and where the results have been uneconomic. Over the next several decades, the Indian economy will require increasing amounts of technical change; and technical change in turn, requires adaptability. What is at question is whether India can be expected to lead in the development of industrial innovation if, at the same time, two thirds of its work force remains illiterate; or whether India can efficiently diffuse new agricultural techniques when 60% of the population can read and write in one state and only 19% in another (Jammu & Kashmir) (see Table 20).

50. Equity, as Anderson and Bowman have suggested (1968), can indeed be contradictory to efficient growth; and has been explored in other contexts (Heyneman, 1975). The question raised here is not whether the two concepts

are contradictory, but whether the relationship is linear or curvilinear. If it is the latter, then it becomes a question of figuring out where the curve is, i.e., the point at which the effort to minimize inequality begins to be economic as well as normative. The most extreme case would be the point at which efficient growth could not occur without some redistribution. If it is true that there is a curve, then for the economy of India to progress rapidly, several regional educational disparities deserve amelioration. Literacy is one of them.

Printed Materials

51. Since choosing Hindi as the national language, books in science and many other fields have had to be translated from English. However necessary on political grounds, the decision has not been cost free. Not only did it come at a time when the minumum number of science books necessary for a secondary school or university library was exploding, but it came at a time when the number of literate consumers was far in excess of the amount of resources necessary to put any books, much less current books, into their hands. Between 1955 and 1968 the number of new book titles published in India declined by 39% (UNESCO, 1977: 105).

52. As in all countries, publishing capacity is spread unevenly. 13/ Bihar publishes 3.1 titles per 100,000 people; Punjab publishes 42 titles per 100,000 people. The gini coefficient for the nation as a whole (gini = .6679) indicates that this educational characteristic is more inequitably distributed than is any other of those measured (Table 22). No detailed information could be found on the amount of reading material in the schools themselves, but if one assumes that the demand is high in each state, then knowing where books are least likely to be published in relevant for predicting where the learning needs are most acute (Altbach, 1975). Knowing the per capita number of books published in a state is a solid predictor of other educational indicators of need, as follows: (a) how much the state can spend on its upper secondary students [$r = .80$ ($p < .001$)], (b) the proportion of upper secondary school enrollment which manages to pass examinations [$r = .80$ ($p < .001$)]; (c) the general level of literacy [$r = .50$ ($p < .01$)]; and (d) the amount of nonformal industrial training available [$r = .91$ ($p < .001$)] (see Tables 18 and 19).

Amount of Knowledge Indian Children Acquire

53. Two serious errors committed by educational planners are (i) to assume that to be "practical," content should be specific to an occupation (such as carpentry), and (ii) to ignore that the amount of knowledge obtained is an economic objective. The first problem will not be discussed. Explanations can be found elsewhere (Heyneman, 1978); and content discussions with respect to India will be held in reserve until after specific suggestions have been made as to level and target group. Perhaps it is sufficient to say this much: that one should have serious economic reservations over suggestions to "vocationalize" all of Indian secondary education in order to make it "practical." (UNESCO, 1977: paras 1.15 and 4.32).

54. For decades Indian educationalists have been calling for more quality (Naik, 1975). Yet despite a general feeling that students learn less than they do in wealthy countries (Huq, 1975:18), India has no national primary school achievement tests and therefore no way to compare what and how much its general school population is learning. Because of the International Assessment of Education Achievement (IEA) however, some large-scale data are available. The results are sobering.

55. Indian children spend more hours per day in school than do children in Europe, America or Japan (Inkeles, 1977: 167). But Indian children at the ten year old age level learn only 50% as much science and only 48% as much reading. This is true even when children learn to read in their native language; the learning gap between Indian children and children from more industrial societies is even larger in Hindi than it is in sience (Shukla, 1974: 239).

56. Two brief examples: an item on the IEA (native language) reading test described a volcano. Pupils were later asked to remember its location. Forty percent of the children in industrial societies (in their native languages) answered correctly. In Chile, only 25% could answer correctly; in Iran, only 20%. Indian children performed the worst of all - only 18% had the correct answer. On another item children were told that "Peter has a little dog. The dog is black with a white spot on his back and one white leg. The color of Peter's dog is mostly: black, brown, or grey?" In industrial societies only 10% missed this question: But in Chile, 26% and in India, 36% failed to read carefully enough. The median score for the reading comprehension was 26. Chile's score was 14. Iran's was 8. India's median performance was 5 - the lowest of all 15 countries (Inkeles, 1977: 158-159). 14/

57. In Japan, 72% of the children continue from primary to upper secondary school; in Great Britain 67% continue; in India 66% do not continue. Yet even though more highly selected, the gap in science knowlege acquired by Indian children is larger at the secondary level than it is at the primary level; and larger still at the upper than it is at the lower secondary level. In upper secondary level, Indian adolescents learn only 28% as much science and only 14% as much reading (Shukla, 1974: 238) as do children from the other IEA countries.

The Role of the School in Influencing Achievement

58. If it was the U.S.A. or the U.K. in question, then we might concur with the arguments of Coleman (1966) and Jencks et. al. (1972). Their results suggest that school variables are not the most likely sources of influence on academic achievement. But Indian schools are not like schools in industrial societies. The lower the wealth of a country, the more effect school investments have (Heyneman, 1976; 1979b). And because India is a poor country, Indian schools, school teachers, and school equipment have an impact typical of schools in poor countries. Sex and family economic status have only 10% the impact on ten year old Indian children's science and reading scores compared to the median for the other IEA countries (Tables 21). On the other

hand the impact of Indian school quality is three times more in science, and almost four times more in reading. This does not mean that any investment will be effective; or that the impact will be identical in all Indian environments. What it does suggest is that investments in such areas as better teachers, physical equipment, and learning materials, the basic components of school quality, can be expected to affect Indian chidren at a magnitude of three to four times greater than similar investments made in industrialized countries.

Investment in Indian Education: Uneconomic?

59. There is reason to question the widely held belief that new investments in Indian education would be uneconomic. Despite unprecedented growth, the rates of return (both social and private) remain strong; and are particularly strong in the one area of past Bank involvement: specialized higher education. Education continues to predict earnings (and productivity) in sections of the Indian economy frequently thought to be under-counted in rate of return analytic data. Educated unemployment, though serious, is basically confined to the young searching for their first positions; it is an old problem which, proportionally, does not seem to have increased over time, nor become so serious as to make educational investments negative. By most comparative measures, the depth of human capital in India's labor force is thus - well below the Philippines, South Korea, Japan and many other countries with whom India competes industrially. There is good evidence that investments in school quality can be expected to have more impact than would similar investments in industrialized societies, and because Indian school children learn only half as much (after more classroom time) as do children in industrialized societies, that investments in school quality are badly needed. There is reasonably secure evidence that investments in on-the-job skill training raise productivity. And lastly, there is reason to question the future prospects for economic efficiency when the distribution of basic education and other basic skills is so inequitable. These have all been discussed above. The question now is what educational investment might have the most impact.

Investments with the Most Impact

60. India possesses significant amounts of experience in educational planning and administration. It would not be easy for outside "experts" to make a contribution which could not be matched by national or state personnel. The bottleneck which prevents India from deepening its level of skills is not a scarcity of knowhow at the top; it appears to be a lack of financial resources.

61. Two avenues appear evident. Developing countries particularly benefit from assistance to those educational areas in which scarce capital resources have to be spent on importation: e.g. equipment in the highly specialized fields such as agricultural research, medical training, engineering. In India these would be both in the national interest and, if intelligently designed, good economic investments.

62. Up for consideration should be investments in printed materials. Having access to science books seems to be consistently correlated with high Indian student achievement in science (Heyneman, et. al., 1978). Yet on an average, only 12% of the Indian school classrooms have enough books to share. From a sample of school teacher applicants, only 5% could think of a children's magazine; none could name a publisher of children's literature, and only 2-3% bought a newspaper for home reading (Shukla, 1974: 240).

63. Despite new audio-electronic techniqes, the transfer of knowledge still depends upon reading; reading depends upon paper and the capability of meeting demands for printing. This is costly. Between 1972 and 1976, the amount of foreign exchange which India spent for importing paper quadrupled (Table 25). To feed its need for information, India today is spending about US$7.8 million per month. The rate of foreign expenditures for printing and book-binding machinery is less; but nevertheless, not at all inconsiderable (US$0.6 million per month). One task for outside assistance should be to relieve this burden.

64. A second avenue is to narrow down priorities by deciding first where investments are most needed geographically and then which are needed most. This approach would be justified when the impact of many scarce resources is inter-connected in causal terms. Communities with low portions of children in secondary school spend less money on those who are in school. In these areas there are fewer books; therefore the quality of schooling is lower. Because school quality makes a dramatic difference in India, the lack of it lowers learning and lowers the rate of exam passes. These, in turn, lower the local level of economic returns and productivity. This diminishes the funds available for providing the next generation of children with school places. These same geographical areas tend also to be these more constrained by illiteracy and relative scarcities of trade training. The areas most in need, relative to others, can be found in Table 24. By these indicators, the educational sector in Bihar deserves high priority. Relative to other states, it has a low portion of its children in school: it spends less on them; it has fewer books for them; and it has low rates of exam passing, literacy and training.

65. No "indicator" should be interpreted as being any more than that. On the other hand there is something to learn from them. From afar, they portray not solutions, but intelligent choices of direction.

Summary

66. The assumption that the economic returns to investment in Indian education are negative is open to question. In fact the opposite may be true. The belief that India's education is sufficient to meet the technological changes that will be coming between now and the year 2000 is also open to question. Up for consideration should be investments in basic education - in both expanding enrollments and improved quality; mathematics, writing, and other basic skills for adults; and specialized agricultural and technical skills at the post-secondary level. All appear to be good investments. If undertaken however they would meet other priorities too, were they to be directed specifically at those mileius where the need appears to be the greatest, and the degree of inequality the most pronounced.

Footnotes

1/ It is surprising how long this and other myths about the negative effects of too much education have persisted. Education is still thought to instill negative attitudes toward manual occupations - despite the fact that manual occupations are paid less and are held in less value by those who don't go to school. Education is still thought to produce a "ruling elite" which gives wrong advice - despite the fact that no evidence exists to indicate that the uneducated give better advice, or that any education system (in any country) has not been more narrow and more specialized at the top. Education is still thought to be "practical" if it trains for a specific occupation, and "theoretical" if it does not; "practical" and "theoretical" are still thought to be antithetical. Each of these myths is employed in discussions of Indian Education.

2/ Equal access to productivity through education should not be confused with the redistribution of income. In the U.S.A. it is argued (Jencks et. al., 1972) that equalizing use of schools by differing social groups would not be successful in redistributing income. In India the proportion of earnings explained by education is less than in the U.S.A.: therefore the chances for redistributing income by redistributing education are also less. Education alone, without equal corresponding alterations in taxation and employment practices cannot be expected to redistribute economic benefits efficiently (Kothari, 1970: 611). It can, however, be expected to influence access to those benefits.

3/ Preliminary results from the Bombay Labor Market Study RPO 67045, principal investigator: Dipak Mazumdar, International Bank for Reconstruction and Development, Washington D. C.

4/ By "educated" we mean those with secondary school or above.

5/ From G. B Pant University the length of unemployment is as follows: for a B. Vet - 5.7 months: for a B.Sc. Ag. - 2.6 months; for a B.Sc. Ag., with a speciality in Village Level Work, one week (Shortlidge, 1974: 5).

6/ Equal access does not necessarily imply equal results (Heyneman, 1978a).

7/ Ratios over 100% have not been calculated.

8/ One striking contrast to the expected pattern is the enrollment of scheduled castes. Since by definition they are considered to be underprivileged, one would expect them to be under-represented by some amount. That is not the case. There have been numerous efforts to help them in education and as a result in four states their enrollment in school is greater than in the population at large (Table 26).

9/ Education conducted in institutions which may lead into more specialized and demanding institutions is considered formal schooling; education in institutions or on-the-job which does not lead to more specialized and demanding training institutions is considered nonformal. Neither category refers to educational content. Since generalizable and occupation-specific skills can be transferred through either mechanism, the overlap in content is large.

10/ Blaug et al (1969: 226-232) argue that nonformal occupational skills can be broken down further into those provided on-the-job (when the traineee is still productive), off-the-job (when the trainee is not productive), and into three content areas which are specific to: (i) the job, (ii) the firm, and (iii) the occupation. We will not be this specific.

11/ A recent UNDP/ILO "evaluation" of a government-assisted advanced vocational training institute concludes that the training is "well conceived and maintains its usefulness to industry". This conclusion is reached on the grounds that the demand for places exceeds the supply by 300%. But the report gives no indication as to whether employers are willing to pay for the training costs. If they are not, then it is no surprise that the demand exceeds the supply.

12/ The rate of literacy loss among literacy trainees is 45 percent; among primary school leavers with six years of education it is six percent (Roy and Kapoor, 1975: 79).

13/ The per capita level of book publishing by state is not like per pupil expenditures or other distribution indicators; book publishing need not be allocated equally. But these intercorrelations imply that the level of book publishing is a reasonably good proxy for book availability. This justifies its use in a discussion of distribution.

14/ The correlation between amount learned in science and reading and GNP is +0.7 (Inkeles, 1977: 166).

Bibliography

Agarwal, S.P., Manpower Demand. Meerut, India: Meenakshi Prekashan, 1970.

Agricultural Economic Research Center, Primary Education in Rural India - Participation and Wastage. Delhi: Tata McGraw-Hill Publishing Co., 1971.

Altbach, P.G., "Problems of University Reform in India." Comparative Education Review, 16 (June 1972), pp. 251-266.

Albach, P.G. Publishing in India: An Analysis. Delhi: Oxford University Press, 1975.

Anderson, C.A., "The Adaptation of Education to a Mobile Society." Journal of Human Resources, II (Spring 1967), pp. 221-253.

Anderson, C.A., amd Bowman, M.J., "Theoretical Considerations in Educational Planning," in Mark Blaug (ed.) The Economics of Education Vol. I. Baltimore: Penguin Books (1968), pp. 351-383.

Anderson, D., and Leiserson, M.W., Rural Non-Farm Employment in Developing Countries. Washington, D.C.: (IBRD), September 1977 (Mimeographed).

Azad, Jaqdish Lal, Financing of Higher Education in India. New Delhi: Sterling Publishers, Ltd., 1975.

Baidya, B.G., "Pilot Survey in Nepal." World Bank/International Finance Corporation Office Memorandum, July 21, 1977.

Blaug, M., "Educated Unemployment in Asia: A Contrast Between India and the Philippines." The Philippine Economic Journal, XI (September 1972), pp. 33-55.

Blaug, M., Education and the Employment Problem in Developing Countries. Geneva: International Labor Office, 1973.

Blaug, M., Layard, R., and Woodhall, M., The Causes of Graduate Unemployment in India. London: Penguin Press, 1969.

Carnoy, M., "Rates of Return to Schooling in Latin America." Journal of Human Resources, II (Summer 1967), pp. 359-374.

Central Statistical Organization , Government of India, Statistical Abstract: India 1974. New Delhi: Government of India, 1974.

Chakravarti, A., "Social Profitability of Training Unskilled Workers in the Public Sector in India." Oxford Economic Papers, Vol. 24 (March 1972), pp. 111-123.

Chaudhri, D.P., "Rural and Agricultural Development - Some Empirical Results from Indian Agriculture." Education and Rural Development. Edited by P. Foster and J.R. Shelfield. London: Evans Brothers Ltd., 1974, pp. 372-386.

Coleman, James S., The Equality of Educational Opportunity. Washington, D.C.: US Government Printing Office, 1966.

Dave, R.H., and Hill, W.H., "Educational and Social Dynamics of the Examination System in India." Comparative Education Review, 18 (February 1974), pp. 24-39.

Davis, J.R., and Morrall, J.F. III, Evaluating Educational Investment, Lexington, Massachusetts: Lexington Books, 1974.

Economist, "Why Ashok Can't Read," (September 16, 1978).

Foster, Philp, "The Vocational School Fallacy in Development Planning," Education and Economic Development. Edited By C. A. Anderson and M. J. Bowman, Chicago: Aldine Publishing Company, 1965.

Fuller, W.P., "More Evidence Supporting the Demise of Pre-Employment Vocational Trade Training: A Case Study of a Factory in India." Comparative Education Review, 20 (February 1976), pp. 40-41.

Goel, S.C., Education and Economic Growth in India. Delhi: MacMillan Company of India, 1975.

Government of India, Ministry of Education and Social Welfare, Statistics and Information Division, Selected Educational Statistics, 1976-1977. New Delhi, 1977.

Government of India, Ministry of Education and Social Welfare, "Adult Education - A Policy Statement." New Delhi, November 1977 (Mimeographed).

Government of India, National Sample Survey, Survey at Employment and Unemployment - 27th round, 1972-1973, Report No. 255110.

Griliches, Z., "Notes on the Role of Education in Production Functions and Growth Accounting." Studies in Income and Wealth. Edited by W.L. Hansen. National Bureau of Economic Research, 1970.

Griliches, Z., and Mason, W.M., "Education, Income and Ability." Journal of Political Economy (May/June 1972, Part II).

Harberger, A.C., "Investment in Men Versus Investment in Machines: The Case in India." Education and Economic Development. Edited by C.A. Anderson and M.J. Bowman, Chicago: Aldine Publishing Co., 1965, pp. 11-50.

Harker, B.R., "The Contribution of Schooling to Agricultural Modernization: An Empirical Analysis." Education and Rural Development. Edited by P. Foster and J.R. Sheffield. London: Evans Brothers Ltd., 1974, pp. 350-371.

Hause, J.C., "Earnings Profile: Ability and Schooling." Journal of Political Economy (May/June 1972, Part II).

Heyneman, Stephen P., "Changes in Efficiency and in Equity Accruing from Government Involvement in Ugandan Primary Education." African Studies Review (April 1975).

Heyneman, Stephen P., "Influences on Academic Achievement in Uganda and in More Industrial Societies." Sociology of Education (July 1976).

Heyneman, Stephen P., Planning the Equality of Educational Opportunity Between Regions. Paris: International Institute of Educational Planning, 1978a.

Heyneman, Stephen P., Farrell, Joseph P., and Sepuveda-Stuardo, Manual A. Textbooks and Achievement: What We Know? Washington, D.C.: World Bank Staff Working Paper Number 298, October 1978b.

Heyneman, Stephen P. The Career Education Debate: Where the Differences Lie." Teachers College Record (May, 1979a).

Heyneman, Stephen P., "Why Impoverished Children Do Well in Ugandan Schools." Comparative Education (June, 1979b).

Heyneman, Stephen P., "Differences Between Developed and Developing Countries: A Comment on Simmons' and Alexander's "Determinants of School Achievement," Economic Development and Cultural Change (forthcoming, 1979).

Husain, Ishrat Z., "Returns to Education in India," pp. 141-156 in Singh, Baljit, Education As Investment, Meerat: Meenakshi Prakashan, 1967.

Huq, Muhammad, Education, Manpower and Development in South and Southeast Asia. New York: Praeqer Publishers 1975.

India Department of Commercial Intelligence and Statistics, Monthly Statistics of the Foreign Trade of India, March 1974. Calcutta: Government of India, 1974.

Indian Civil Service Registrar General and Census Commission for India. Census of India 1961. Vol. I, Part I-A(i).

Inkeles, A., "The International Evaluation of Educational Achievement." Proceedings of the National Academy of Education, 4 (1977), pp. 139-200.

Jencks, Christopher, and others, Inequality: A Reassessment of the Effect of Family and Schooling in America. New York: Basic Books, 1972.

Jolly, R., de Kadt, E., Singer, H., and Wilson, F., eds. Third World Employment. Middlesex, England: Penguin Books, Ltd., 1973.

Kannappan, S. and Uppal, J.S., "Unemployment in India," India's Economic Problems: An Analytical Approach. Edited by J.S. Uppal. New Delhi: Tata McGraw-Hill Publishing Company Ltd., 1975.

Karcher, Martin, "Elementary Education in India." Washington, D.C.: EDI, IBRD, September 1975 (Mimeographed).

Kizilbash, M., "The Employment of Returning US Educated Indians." Comparative Education Review, 8 (December 1964), pp. 320-326.

Leontief, Wassily W., "Domestic Production and Foreign Trade: The American Capital Position Re-examined," Economica Internazioninale (February 1954), pp. 3-32.

Lockheed, M., Jamison, D.T., and Lau, J.J., "Farmer Education and Farm Efficiency: A Review of the Literature." (Draft for Comment), prepared for the International Bank for Reconstruction and Development and the United States Agency for International Development, September 1977.

Lux, Donald G., "Technical Education in India." Comparative Education Review, 7 (February 1964), pp. 301-306.

Malenbaum, Wilfred, "Urban Unemployment in India," Pacific Affairs XXX (March, 1957), pp. 139-51.

Mehta, M.M., Human Resources Development Planning. Delhi: MacMillan Company of India, 1976.

Mincer, J., "On-the-Job Training: Costs, Returns, and Some Implications." Journal of Political Economy, 70 (October 1962).

Naik, J.P., "Educational Planning in India." Bulletin of the UNESCO Regional Office for Education for Asia, 16 (June 1975), pp. 1-19).

Naik, J.P., Elementary Education in India - The Unfinished Business. Bombay: Asia Publishing House, 1966..

Naik, J.P., Equality, Quality and Quantity. Bombay: Allied Publishers, 1975.

Nalla Gounden, A.M., "Investment in Education in India." Journal of Human Resources, II (Summer 1967), pp. 347-358.

Nautiyal, K.C., and Sharma, Y.D. "Towards Equalization of Educational Opportunities For Scheduled Castes and Scheduled Tribes." Delhi: National Council of Educational Research and Training, 1978 (mimeographed).

Pandit, H.N. Investment in Indian Education: Size, Sources, and Effectiveness, Paris: International Institute of Educational Planning, October 1976.

Peaslee, A.L., "Primary School Enrollments and Economic Growth." Comparative Education Review, XI (February 1967), pp. 57-67.

Planning Commission, Draft Five Year Plan, 1974-1979, Delhi: Government of India Planning Commission, 1974.

Psachropoulos, G., "The Macro-Planning of Education: A Clarification of Issues and a Look Into the Future." Comparative Education Review, 19 (June 1975), pp. 214-233.

Psacharopoulos, G., "Rates of Return to Investment in Education Around the World." Comparative Education Review, 16 (February 1972), pp. 54-67.

Psacharopoulos, G., "Substitution Assumptions Versus Empirical Evidence in Manpower Planning." De Economist 121, N.R. 6. (1973), pp. 609-625.

Psacharopoulos, G., and Hinchliffe, K., "Further Evidence on the Elasticity of Substitution Among Different Types of Educated Labor." Journal of Political Economy, 80 (July/August 1972), pp. 786-793.

Psacharopoulos, G., and Hinchliffe, K., Returns to Education - An International Comparison. San Francisco: Jossey-Bass, Inc., 1973.

Psacharopoulos, G., Earnings and Education in OECD Countries. Paris: Organizations for Economic Development and Cooperation, 1975.

Rao, V.K.R.V., Education and Human Resource Development, Bombay: Allied Publishers, 1966.

Rosenthal, D.B., "Educational Politics and Public Policymaking in Maharashtra, India." Comparative Education Review, 18 (February 1974), pp. 79-95.

Roy, Prodipto, and Kapoor, J.M. The Retention of Literacy Delhi: Macmillan Company of India Ltd., 1975.

Razin, A., "Economic Growth and Education: New Evidence." Economic Development and Cultural Change, 25 (January, 1977), pp. 317-324.

Selowsky, M., "Investment in Education in Developing Countries. A Critical Review of Some Issues." Cambridge, Massachusetts: Center for International Affairs, May 1973 (Mimeographed).

Selowsky, M., "On the Measurement of Education's Contribution to Growth." The Quarterly Journal of Economics, LXXXIII (August 1969), pp. 449-463.

Sen, A.K., "The Index of Human Resource Development." Economic of Education Volume II, Edited by M. Blaug. Middlesex, England: Penguin, 1969, pp. 67-75.

Seshadri, C. "Equality of Educational Opportunity - Some Issues in Indian Education" Comparative Education 12 (October, 1976) 219.30.

Shortlidge, Richard L. "The Labor Market for Agricultural Graduates in India: A Benefit-Cost Case Study of G. B. Pant University of Agriculture and Technology," occasional Paper No. 69, Department of Agricultural Economics, Cornell University Ithaca, New York, April, 1974.

Shortlidge, Richard L. "University Training for Gramsevaks in India: An Example of Recurrent Education in a Low Income Country," Economic Development and Cultural Change (October, 1975) pp 139-54.

Shukla, S., "Achievements of Indian Children in Mother Tongue (Hindi) and Science." Comparative Education Review, 18 (June 1974), pp. 237-247.

Sidhu, S.S., The Productive Value of Education and Agricultural Development, Paper No. 48, Universities Social Sciences Council Reference, Kampala, Makerere University, 1974.

Thakur, C.P. "Skill Generation and Labor Market in a Developing Economy, Economic Development and Cultural Change, 27 (January, 1979), pp. 243-56.

Thut, I.N., and Adams, D., Educational Patterns in Contemporary Societies. New York: McGraw-Hill, 1964.

Turnham, D., The Employment Problem in Less Developed Countries. Organization for Economic Cooperation and Development (OECD), 1971.

UNDP/ILO, Advanced Vocational Training Institute (ATI, Madras) Technical Evaluation of the Work of the Project, Geneva, 1974.

UNESCO "Science Education in the Asian Region," Bulletin of the UNESCO Regional Office for Education in Asia (June 1977) (India, pp. 36-47).

UNESCO, School Science Education in India, Bangkok: UNESCO Regional Office for Education in Asia, 1977.

UNESCO, The Experimental World Literacy Program: A Critical Assessment, Paris: UNESCO Press, 1976.

UNESCO, "India Education: A Desk Study Focused on Technical and Vocational Education," Paris: UNESCO (in draft), July 1977.

UNESCO, "Le Livre: Un Instrumen Principal de Promotion des Langues et Des Cultures." Direct, 4 (1977), pp. 24-28.

Wood, G., "Planning University Reform - An Indian Case Study." Comparative Education Review, 16 (June 1972), pp. 267-280.

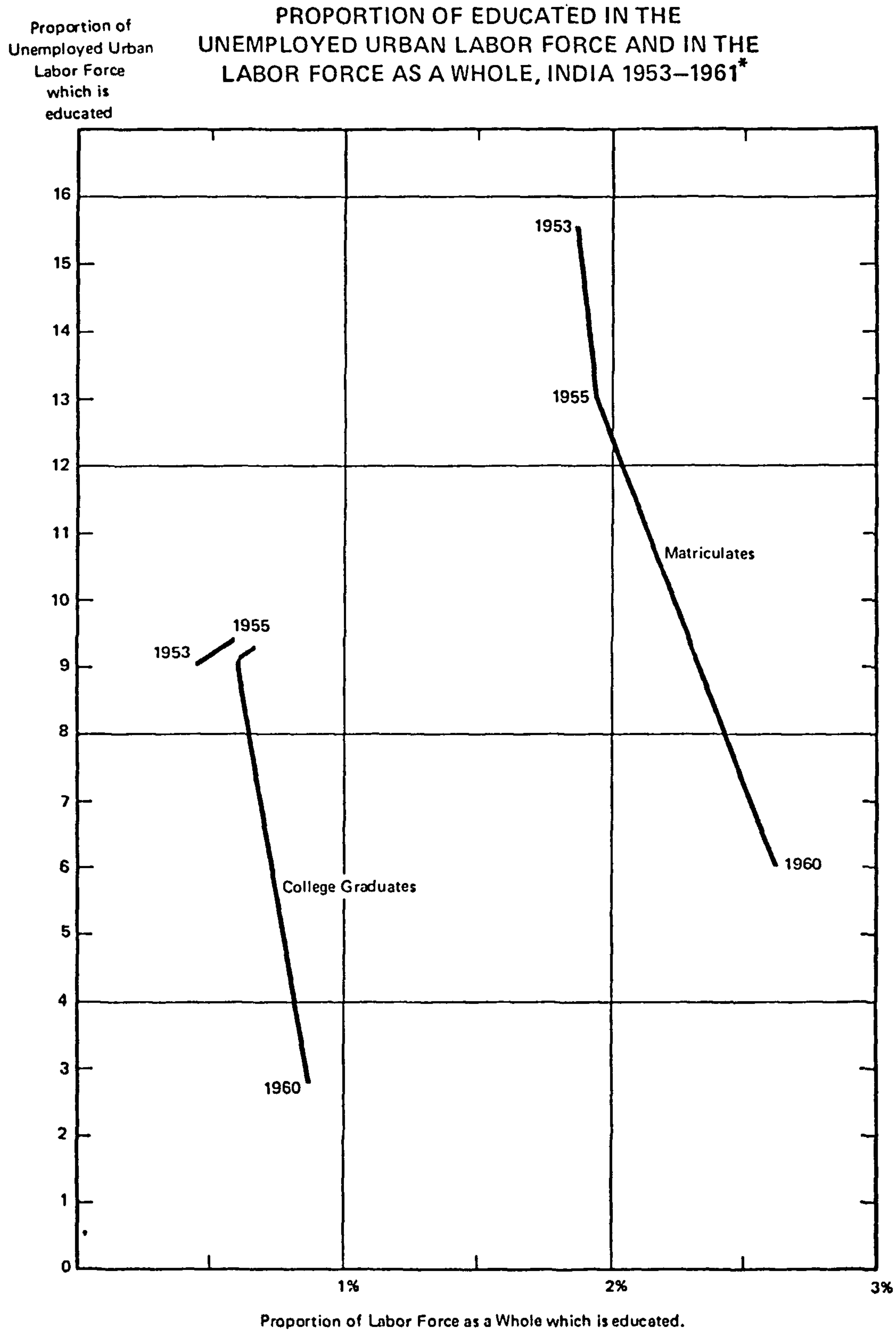
Woodhall, M., Cost-Benefit Analysis in Educational Planning, Paris: United Nations, 1970.

Wu, Craig G., "Education in Farm Production: The Case of Taiwan," American Journal of Agricultural Economics, 59 (Nov. 1977): pp. 699-709.

Zachariah, M., "Positive Disrimination in Education in India's Schedules Castes: A Review of the Problems, 1950-1970." Comparative Education Review, 16 (February 1972), pp. 16-29.

Figure 1

PROPORTION OF EDUCATED IN THE UNEMPLOYED URBAN LABOR FORCE AND IN THE LABOR FORCE AS A WHOLE, INDIA 1953–1961*



*Educated – secondary school and above.

World Bank – 18850

Table 1a: DIFFERENTIAL RATES OF RETURN TO INVESTMENT IN EDUCATION IN INDIA

Source	Social					Private				
	Primary	Middle School	Matriculation	College BA	College Engin.	Primary	Middle School	Matriculation	College BA	College Engin.
Blaug (1972)	13.7	12.4	9.1	7.4*		16.5	14.0	10.4	8.7*	
Psacharopoulos (1973)	20.2	16.8**		12.7*		24.7	19.2**		14.3*	
Harberger (1965)	-	10**		16.3*						
Nalla Gounden (1967)	16.8	11.8	10.2	7.0	9.8					
Kothari (1967 & 1970)	-	-	20	14	25.0				10.0	25.0
Husain (1967)	-	-	37.0***	4		-	-	48***	12.0	
Pandi (1976)	13.4	15.5	-	10.7		17.3	18.8	-	-	
Shortlidge (1974)	-	-	-	10.3****		-	-	-	16.2****	
Average	16.0	13.3	13.1	10.3	17.4	19.5	17.3	10.4	12.2	25.0

* Type of degree unspecified.
** Level of secondary unspecified.
*** Rate of total return, i.e. matriculation over zero years of schooling.
**** B.Sc. Ag. over matriculation.

Table 1b: RATE OF RETURN SOURCES

Authors	Harberger*	Nalla Gounden	Blaug	Psacharopoulos*	Kothari	Husain	Pandit	Shortlidge
Date Published	(1965)	(1967)	(1972)	(1973)	(1967 & 1970)	(1967)	(1976)	(1974)
Year of Data Source	1956	1960	1960	1960	-	1960	1964-5	1971
Sample Size	2,895	8,650	28,650	-	-	6,148	2,203	605
Data Source								
Census								
Sample of total population							All India	
Urban only	Hyderabad	X	X	X	Bombay			
Government pay scales								
Within only one industry or profession		X	X	X				
By individual subject								Tracer Study of G.B. Pant University Graduates
Shadow wages								
Nonformal economic sector								
Profitability Type								
Social	X	X	X	X	X	X	X	X
Private			X	X	X	X	X	X
Marginal	X	X	X	X				
Average	X	X	X				X	X
Present Values								
Sex								
Males separately	X	X	X	X				X
Females separately								
Males and Females							X	
Adjustments								
Regression controls and coefficient**		X	X	X		X	X	X
Private (post tax)			X	X		X	X	X
Unemployment			X	X		X	X	X
Wastage			X	X		X	X	X
Growth			X	X		X	-	-
Mortality			X	X		X	X	X

* Secondary source data.
** That part of the gross earnings differential attributed to education alone.

Table 2: PREDICTION OF EARNINGS IN THE SMALL ESTABLISHMENT SECTOR OF BOMBAY*
R2 = 0.391

Variable	Beta coefficient	F
Years in labor force	0.84952	129.744
Training period (on the job)	0.21961	83.535
Year in labor force2	0.50220	51.579
English language	0.07804	7.065
Education: Grade 14-16	0.18228	54.820
Composition of workers: male and in family - %	0.18049	41.337
Education: Grade 11-13	0.22230	44.513
Geographical origin of worker	0.06113	6.563
Education: Grade 8-10	0.09384	10.476
Education: Grade 5-7	0.08589	9.815
Composition of workers: female part-time (1971) - %	0.04338	3.371
Composition of workers: combined (1973 & 1974) - %	0.03944	2.824
Education: Grade 1-2	0.03633	2.325

* Source: Preliminary results from the Bombay Labor Market Study, Washington, D.C., World Bank Research Project RPO 67045.

Table 3: SKILL INDICES ASSOCIATED WITH THE EXPORTS AND IMPORTS OF THIRTEEN COUNTRIES*

Country	Export index	Import index
United States	0.654	0.294
Sweden	0.547	0.431
Germany	0.541	0.345
United Kingdom	0.484	0.370
Switzerland	0.473	0.432
Canada	0.467	0.512
Netherlands	0.418	0.448
France	0.370	0.467
Austria	0.338	0.441
Belgium	0.323	0.441
Italy	0.293	0.554
Japan	0.281	0.737
India	0.084	0.554

* Source: Davis and Morrall, 1974: Table 6-1.

Table 4: EDUCATIONAL AND PHYSICAL CAPITAL/MEMBER OF THE LABOR FORCE BY COUNTRY*

Country	Educational capital (US$)	Country	Physical capital (US$)	Educational capital as a % of physical capital Country	(%)
United States	12,296	United States	28,045	United States	44
New Zealand	5,745	New Zealand	17,270	South Korea	40
Great Britain	3,630	Great Britain	12,320	New Zealand	33
Israel	2,210	Israel	13,922	Great Britain	29
Chile	877	Brazil	5,331	Chile	20
Greece	423	Colombia	5,006	Kenya	17
Mexico	410	Chile	4,423	Uganda	16
South Korea	403	Mexico	4,040	Israel	16
Philippines	290	Greece	4,003	Ghana	15
Ghana	181	Philippines	3,446	Nigeria	13
Kenya	157	Ghana	1,236	Greece	11
Nigeria	88	Turkey	1,434	Mexico	10
Uganda	88	India	1,197	Philippines	8
India	66	South Korea	1,008	India	6
		Kenya	920		
		Nigeria	697		
		Uganda	539		

* Source: Psacharopoulos, 1973: Tables E.1 and E.2 and 6.4.

Table 5: EDUCATION ATTAINMENTS OF THE LABOR FORCE IN 1969, BY COUNTRY*

Country	Less than primary schooling	Primary schooling	Primary plus secondary schooling	Primary & secondary plus post-secondary schooling
United States	-	35.6	45.2	19.2
Canada	-	40.5	50.7	8.9
Great Britain	-	54.6	35.0	10.4
Norway	-	64.9	31.0	4.1
Greece	-	89.2	7.9	2.9
Japan	-	70.4	23.0	6.6
Israel	8.9	50.7	30.0	10.4
Colombia	12.7	64.7	20.3	2.2
Philippines	16.9	62.8	14.1	6.3
Turkey	19.3	62.3	14.3	4.1
Mexico	38.0	52.2	7.1	2.6
South Korea	44.9	39.3	13.4	2.4
Brazil	48.2	48.5	2.7	0.5
Uganda	66.5	30.9	2.5	0.1
Kenya	76.8	20.2	2.7	0.3
Ghana	81.6	16.5	1.5	0.3
Nigeria	90.0	8.5	1.3	0.2
India	90.0	7.3	2.2	0.6

* Source: Psacharopoulos, 1973: Table F.1.

Table 6: PERCENTAGE OF PROFESSIONAL WORKERS IN THE LABOR FORCE IN SELECTED ASIAN NATIONS*

Country	(%)
Japan	5.5
Philippines	3.3
Malaysia	3.0
India	1.7

* Source: Psacharopoulos, 1973: Table G.1.

Table 7: ENROLLMENT LEVEL I*
Grades 1-5

State	Representation Index	Proportion of age level population enrolled (%)
Bihar	0.726	59.1
Jammu & Kashmir	0.742	60.4
Rajasthan	0.742	60.4
Madhya Pradesh	0.764	62.2
Assam	0.803	65.4
Andhra Pradesh	0.871	70.9
Haryana	0.881	71.7
Karnataka	0.961	78.2
Orissa	0.968	78.8
Tripura	0.988	80.4
West Bengal	1.028	83.7
Uttar Pradesh	1.128	91.8
Gujarat	1.160	94.4
Himachal Pradesh	1.184	96.4
Maharashtra	1.204	98.0
Tamil Nadu**	1.228	101.5
Kerala**	1.228	105.9
Manipur**	1.228	152.7
Meghalaya**	1.228	117.5
Nagaland**	1.228	133.5
Punjab**	1.228	107.1
Delhi**	1.228	111.6
Goa, Daman & Diu**	1.228	112.5
India total Gini coefficient***	0.1054	80.9

* Source: Government of India, Ministry of Education & Social Welfare, 1977: 25.

** States with over 100% of their relevant age population enrolled in school were treated identically.

*** Union Territories with populations of under one half million were deleted from the calculations.

Table 8: ENROLLMENT LEVEL II*
Grades 6-8

State	Representation Index	Proportion of age level population enrolled (%)
Rajasthan	0.588	21.5
Orissa	0.608	22.2
Bihar	0.671	24.5
Andhra Pradesh	0.693	25.3
Madhya Pradesh	0.703	25.7
West Bengal	0.901	32.9
Tripura	0.936	34.2
Meghalaya	0.947	34.6
Uttar Pradesh	0.955	34.9
Assam	0.958	35.0
Haryana	1.095	40.0
Jammu & Kashmir	1.098	40.1
Gujarat	1.150	42.0
Karnataka	1.180	43.1
Maharashtra	1.185	43.3
Tamil Nadu	1.311	47.9
Punjab	1.393	50.9
Himachal Pradesh	1.434	52.4
Manipur	1.484	54.2
Goa, Daman & Diu	1.705	62.3
Nagaland	1.993	72.8
Delhi	2.417	88.3
Kerala	2.420	88.4
India total Gini coefficient**	0.1902	37.0

* Source: Government of India, Ministry of Education & Social Welfare, 1977: 25.

** Union Territories with populations of under one half million were deleted from the calculations.

Table 9: ENROLLMENT LEVEL III*
Grades 9-12

State	Representation Index	Proportion of age level population enrolled (%)
Andhra Pradesh	0.497	10.3
Madhya Pradesh	0.628	13.0
Haryana	0.652	13.5
Bihar	0.681	14.1
Orissa	0.686	14.2
Rajasthan	0.691	14.2
Tripura	0.811	16.8
West Bengal	0.831	17.2
Gujarat	1.029	21.3
Jammuu & Kashmir	1.072	22.2
Manipur	1.154	23.9
Assam	1.164	24.1
Uttar Pradesh	1.178	24.4
Maharashtra	1.222	25.3
Punjab	1.241	25.7
Karnataka	1.275	26.4
Himachal Pradesh	1.289	26.7
Meghalaya	1.314	27.2
Tamil Nadu	1.323	27.4
Nagaland	1.454	30.1
Goa, Daman & Diu	1.502	31.1
Kerala	1.734	35.9
Delhi	3.221	66.7
India total Gini coefficient**	0.1918	20.9

* Source: Government of India, Ministry of Education & Social Welfare, 1977: 25.

** Union Territories with populations of under one half million were deleted from the calculations.

Table 10: DISTRIBUTION OF EXPENDITURES ON PRIMARY PUPILS BY STATE (1969-70)*

State	Representation Index	Rupees/student
Gujarat	0.443	17
Karnataka	0.576	22
Uttar Pradesh	0.651	24
Bihar	0.694	26
Jammu & Kashmir	0.805	30
Maharashtra	0.830	31
Haryana	0.917	34
Andhra Pradesh	1.070	40
Kerala	1.148	43
Tamil Nadu	1.180	44
West Bengal	1.252	47
Orissa	1.319	50
Punjab	1.335	50
Assam	1.341	50
Madhya Pradesh	1.699	64
Himachal Pradesh	1.712	65
Delhi	1.715	65
Nagaland	1.843	69
Rajasthan	1.858	70
Tripura	1.923	72
Goa, Daman & Diu	2.025	76
Manipur	2.222	84
India total Gini coefficient**	0.2130	38

* Source: Central Statistical Organization, 1974: 519.

** Union Territories with populations of under one half million were deleted from the calculations.

Table 11: DISTRIBUTION OF EXPENDITURES ON LOWER SECONDARY PUPILS BY STATE (1969-70)*

State	Representation Index	Rupees/student
West Bengal	0.234	19
Uttar Pradesh	0.359	28
Haryana	0.579	46
Bihar	0.609	48
Andhra Pradesh	0.613	48
Punjab	0.645	51
Assam	0.750	59
Orissa	0.868	69
Jammu & Kashmir	0.934	74
Tamil Nadu	0.967	76
Madhya Pradesh	1.126	88
Goa, Daman & Diu	1.130	88
Kerala	1.131	89
Delhi	1.912	94
Rajasthan	1.234	98
Manipur	1.412	112
Tripura	1.743	138
Karnataka	1.783	141
Gujarat	1.853	147
Himachal Pradesh	1.863	148
Maharashtra	1.996	158
Nagaland	2.323	185
India total Gini coefficient**	0.3295	79

* Source: Central Statistical Organization, 1974: 519.

** Union Territories with populations of under one half million were deleted from the calculations.

Table 12: DISTRIBUTION OF EXPENDITURES
ON LOWER SECONDARY (PRE-UNIVERSITY) PUPILS BY STATE 1969-70)*

State	Representation Index	Rupees/student
Uttar Pradesh	0.329	741
Bihar	0.505	1,138
Manipur	0.904	2,036
Kerala	0.989	2,228
Karnataka	1.040	2,342
Assam	1.154	2,599
Andhra Pradesh	1.175	2,647
Orissa	1.375	3,097
Tamil Nadu	1.421	3,184
Jammu & Kashmir	1.563	3,521
Haryana	1.605	3,614
Goa, Daman & Diu	1.684	3,793
Punjab	1.721	3,877
Maharashtra	1.820	4,099
Gujarat	2.121	4,778
West Bengal	2.727	6,142
Himachal Pradesh	5.964	13,434
India total Gini coefficient**	0.3807	2,588

* Source: Central Statistical Organization, 1974: 519.

** Union Territories with populations of under one half million were deleted from the calculations.

Table 13: PROPORTION AND REPRESENTATION OF STUDENTS PASSING THEIR PRE-UNIVERSITY EXAMINATIONS BY STATE (1967-68)*

State	Representation Index	Number of passes as proportion of students (%)
Andhra Pradesh	0.008	0.1
Manipur	0.078	1.4
Assam	0.114	2.0
Kerala	0.139	2.4
Tamil Nadu	0.157	2.7
Bihar	0.189	3.3
Gujarat	0.206	3.5
Haryana	0.233	4.1
Jammu & Kashmir	2.244	5.5
Himachal Pradesh	0.315	5.5
West Bengal	0.328	5.7
Karnataka	0.425	7.4
Goa, Daman & Diu	1.270	22.1
Rajasthan	1.293	22.5
Maharashtra	1.641	28.6
Uttar Pradesh	1.842	32.1
Tripura	2.927	51.0
India total Gini coefficient**	0.4285	17.0

* The number of students enrolled at the pre-university level divided by the number of students passing their examinations at that level.

** Union Territories with populations of under one half million were deleted from the calculations.

Source: Central Statistical Organization, 1974: 519.

Table 14: DISTRIBUTION OF MALE WORKERS PER CAPITA UNDERGOING (NON-ENGINEERING) TRADE TRAINING BY STATE (1973)*

State	Representation Index	Number of trainnes / 100,000 people
Bihar	0.027	0.5
Rajasthan	0.0845	1.6
Tamil Nadu	0.117	2.2
Gujarat	0.152	2.8
West Bengal	0.177	3.3
Andhra Pradesh	0.307	5.7
Karnataka	0.326	6.1
Assam	0.343	6.4
Orissa	0.635	11.9
Maharashtra	0.905	17.0
Uttar Pradesh	1.139	21.3
Madhya Pradesh	1.341	25.2
Tripura	1.578	29.6
Manipur	1.592	29.8
Goa, Daman & Diu	2.054	38.5
Himachal Pradesh	3.394	63.6
Jammu & Kashmir	4.741	88.8
Haryana	6.850	128.3
Punjab	8.492	159.1
Delhi	8.718	163.3
India total Gini coefficient**	0.6479	18.1

* Central Statistical Organization, 1974: 378.

** Union Territories with populations of under one half million were deleted from the calculations.

Table 15: DISTRIBUTION OF PER CAPITA APPRENTICESHIP TRAINING BY STATE (1973)

State	Representation Index	Number of apprentices in training per 100,000 people
Jammu & Kashmir	0.157	16.5
Himachal Pradesh	0.226	23.7
Goa, Daman & Diu	0.344	36.1
Kerala	0.409	42.9
Assam	0.410	43.1
Rajasthan	0.429	45.0
Madhya Pradesh	0.545	57.2
Andhra Pradesh	0.648	68.0
Orissa	0.690	72.4
Uttar Pradesh	0.756	79.3
Bihar	0.777	81.6
Punjab	0.875	91.8
Gujarat	1.109	116.4
Haryana	1.283	134.7
Karnataka	1.346	141.3
Tamil Nadu	1.404	147.4
Maharashtra	1.608	168.8
West Bengal	1.905	200.0
Delhi	5.113	536.7
India total Gini coefficient**	0.2037	104.3

* Central Statistical Organization, 1974: 378.

** Union Territories with populations of under one half million were deleted from the calculations.

Table 16: DISTRIBUTION OF PER CAPITA UNDERGOING (ENGINEERING) TRADE TRAINING BY STATE (1973)*

State	Representation Index	Number of trainees per 100,000 people
Meghalaya	0.126	26.7
Tripura	0.346	73.2
Rajasthan	0.422	89.4
Nagaland	0.502	106.5
Goa, Daman & Diu	0.533	113.1
Assam	0.557	118.1
Orissa	0.608	128.9
West Bengal	0.652	138.3
Jammu & Kashmir	0.717	152.1
Gujarat	0.776	164.5
Bihar	0.851	180.3
Karnataka	0.858	181.9
Uttar Pradesh	0.871	185.2
Andhra Pradesh	0.885	188.1
Madhya Pradesh	1.004	212.8
Manipur	1.082	229.3
Himachal Pradesh	1.373	291.0
Maharashtra	1.387	294.0
Kerala	1.403	297.5
Tamil Nadu	1.440	305.2
Haryana	1.889	400.5
Punjab	2.220	470.6
Delhi	3.618	766.9
India total Gini coefficient**	0.2087	212.2

* Central Statistical Organization, 1974: 378.

** Union Territories with populations of under one half million were deleted from the calculations.

Table 17: DISTRIBUTION OF FEMALE WORKERS PER CAPITA UNDERGOING (NON-ENGINEERING) TRADE TRAINING BY STATE (1973)*

State	Representation Index	Number of trainees per 100,000 people
Uttar Pradesh	0.533	3.0
Tamil Nadu	0.735	4.1
Delhi	13.832	77.2
India total Gini coefficient**	0.4316	1.8

* Central Statistical Organization, 1974: 378.

** Union Territories with populations of under one half million were deleted from the calculations.

Table 18: TWENTY-THREE INDIAN STATES: CORRELATIONS AMONG VARIABLES RELATING TO NONFORMAL EDUCATION (N = 23)***

		Variable 1	2	3	4	5	6
1) Literacy rate	4	-	0.50*	0.50*	0.54**	0.35	0.50*
2) No. of printing presses/ per capita	2	-	-	0.16	0.26	( )	0.14
3) No. of books published/ per capita	3	-	-	-	0.71**	0.51	0.91**
4) No. of engineers in training/per capita	4	-	-	-	-	0.79**	0.79**
5) No. of non-engineering training/per capita	5	-	-	-	-	-	0.43
6) No. of apprenticeship training/per capita	7	-	-	-	-	-	-

* $p < 0.01$.

** $p < 0.001$.

*** Union Territories with populations of under one half million were deleted from the calculations.

( ) N = less than 5.

Table 19: TWENTY-THREE INDIAN STATES: CORRELATIONS AMONG EIGHT VARIABLES RELATING TO FORMAL EDUCATION (N = 23)**

		Variable							
		1	2	3	4	5	6		
1) Expenditure per primary student	2	-	0.23*	0.37*	0.25	0.35	0.43	0.26	0.20
2) Expenditure per lower secondary student	2	-	-	0.13	0.12	0.08	0.39	0.34	0.23
3) Expenditure per upper secondary student	3	-	-	-	0.87**	0.80**	0.09	0.40	0.69**
4) % passing pre-university exams	4	-	-	-	-	0.80**	0.24	0.49*	0.81**
5) No. of books published per capita	5	-	-	-	-	-	0.48*	0.56*	0.80**
6) Primary school enrollment ratio	6	-	-	-	-	-	-	0.66*	0.53*
7) Lower secondary enroll-ment ratio	7	-	-	-	-	-	-	-	0.84**
8) Upper secondary enroll-ment ratio	8	-	-	-	-	-	-	-	-

* $p < 0.01$.

** $p < 0.001$.

*** Union Territories with populations of under one half million were deleted from the calculations.

Table 20: DISTRIBUTION OF LITERACY BY STATES*

	% Literate Total	% Literate Males	% Literate Females
India	29.5	39.5	18.7
State			
Andhra Pradesh	24.6	33.2	15.8
Assam	28.7	37.2	19.3
Bihar	19.9	30.6	8.7
Gujarat	35.8	46.1	24.8
Haryana	26.9	37.3	14.9
Himachal Pradesh	32.0	43.2	20.2
Jammu & Kashmir	18.6	26.8	9.3
Karnataka	31.5	41.6	21.0
Kerala	60.4	66.6	54.3
Madhra Pradesh	22.1	32.7	10.9
Maharashtra	39.2	51.0	26.4
Manipur	32.9	46.0	19.5
Meghalaya	29.5	34.1	24.6
Nagaland	27.4	35.0	18.7
Orissa	26.2	38.3	13.9
Punjab	33.7	40.4	25.9
Rajasthan	19.1	28.7	8.4
Tamil Nadu	39.5	51.8	26.9
Tripura	31.0	40.2	21.2
Uttar Pradesh	21.7	31.5	10.6
West Bengal	33.2	42.8	22.4
Union Territory**			
Delhi	56.6	63.7	47.7
Goa, Daman & Diu	44.8	54.3	35.1

* Source: Central Statistical Organization, 1974.

** Union Territories with populations of under .5 million have been deleted.

Table 21: CONTRIBUTIONS TO THE VARIANCE IN LEARNING BY FOUR BLOCKS OF VARIABLES, IN INDIA AND IN OTHER IEA COUNTRIES*

	Science			Reading		
	Median for 19 nations A	India B	Fraction (B ÷ A) C	Median for 15 nations D	India E	Fraction (E ÷ D) F
10-year olds						
Sex and SES	14.9	1.3	(.08)	14.0	1. 6	(.11)
Curriculum track	0.4	0.1	(.25)	0.4	0.4	(1.0)
School influences	6.7	19.8	(3.0)	3.9	14.9	(3.8)
Attitudes	5.8	8.1	(1.4)	6.8	13.9	(2.4)

* Source: Shukla, 1974: Table 7 and Table 8.

Table 22: PER CAPITA NUMBER OF BOOKS PUBLISHED BY STATE (1971)*

State	Representation Index	Number of books / 100,000 people
Madhya Pradesh	0.088	1.7
Bihar	0.157	3.1
Karnataka	0.218	4.3
Himachal Pradesh	0.278	5.5
Andhra Pradesh	0.281	5.5
Uttar Pradesh	0.282	5.6
Tripura	0.424	8.4
Kerala	0.618	12.2
Rajasthan	0.711	14.0
West Bengal	0.711	14.0
Haryana	0.854	16.8
Gujarat	1.035	20.4
Punjab	1.063	21.0
Maharashtra	2.114	41.7
Goa, Daman & Diu	2.424	47.8
Nagaland	4.419	87.1
Manipur	4.744	352.2
Delhi	40.427	797.2
India total Gini coefficient**	0.6679	16.9

* Central Statistical Organization, 1974: 530.

** Union Territories with populations of under one half million were deleted from the calculations.

Table 23: PER CAPITA NUMBER OF PRINTING PRESSES BY STATE (1971)*

State	Representation Index	Number of printing presses / 100,000 people
Assam	0.035	1.3
Bihar	0.181	6.7
Himachal Pradesh	0.370	13.6
Madhya Pradesh	0.408	15.0
Nagaland	0.422	15.5
Jammu & Kashmir	0.513	18.8
Karnataka	0.587	21.6
Tripura	0.647	23.8
Manipur	0.888	32.6
Haryana	0.890.	32.7
Andhra Pradesh	0.969	35.6
Rajasthan	0.991	36.4
Uttar Pradesh	1.015	37.3
West Bengal	1.022	37.5
Delhi	1.065	39.1
Punjab	2.258	82.9
Goa, Daman & Diu	2.380	87.4
Maharashtra	2.673	98.2
India total Gini coefficient**	0.3719	29.5

* Central Statistical Organization, 1974: 530.

** Union Territories with populations of under one half million were deleted from the calculations.

Table 24· STATE RANKINGS IN PER CAPITA ABUNDANCE ON TEN INDICATORS OF FORMAL AND NON-FORMAL EDUCATION

Lower Secondary per student expenditures	Lower secondary % of age group enrolled	Upper secondary per student expenditures	Upper secondary % of age group enrolled	Upper secondary % of students passing exams	Per capita No. of books published	% of population which is literate	Per capita No. of male workers undergoing (non-engineering) trade training	Per capita No. of apprentices in training	Per capita No. of male workers undergoing (engineering) trade training	Summary of ten ranking indicators
1. West Bengal	Rajasthan	Uttar Pradesh	Andhra Pradesh	Andhra Pradesh	Madhya Pradesh	Jammu & Kashmir	Bihar	Jammu & Kashmir	Meghalaya	Bihar
2. Uttar Pradesh	Orissa	Bihar	Madhya Pradesh	Manipur	Bihar	Rajasthan	Rajasthan	Himachal Pradesh	Tripura	Arunachal Pradesh
3. Haryana	Bihar	Manipur	Haryana	Assam	Karnataka	Bihar	Tamil Nadu	Goa, Daman & Diu	Rajasthan	Andhra Pradesh
4. Bihar	Andhra Pradesh	Kerala	Bihar	Kerala	Himachal Pradesh	Uttar Pradesh	Gujarat	Kerala	Nagaland	Rajasthan
5. Andhra Pradesh	Madhya Pradesh	Karnataka	Orissa	Tamil Nadu	Andhra Pradesh	Madhya Pradesh	West Bengal	Assam	Goa, Daman & Diu	Orissa
6. Punjab	West Bengal	Assam	Rajastahan	Bihar	Uttar Pradesh	Andhra Pradesh	Andhra Pradesh	Rajasthan	Assam	Assam
7. Assam	Tripura	Andhra Pradesh	Tripura	Gujarat	Tripura	Orissa	Karnataka	Madhya Pradesh	Orissa	Madhya Pradesh
8. Orissa	Meghalaya	Orissa	West Bengal	Haryana	Kerala	Haryana	Assam	Andhra Pradesh	West Bengal	D&N Haveli
9. Jammu & Kashmir	Uttar Pradesh	Tamila Nadu	Gujarat	Jammu & Kashmir	Rajasthan	Nagaland	Orissa	Orissa	Jammu & Kashmir	Uttar Pradesh
10. Tamil Nadu	Assam	Jammu & Kashmir	Jammu & Kashmir	Himachal Pradesh	West Bengal	Assam	Maharashtra	Uttar Pradesh	Gujarat	Jammu & Kashmir
11. Madhya Pradesh	Haryana	Haryana	Manipur	West Bengal	Haryana	Meghalaya	Uttar Pradesh	Bihar	Bihar	West Bengal
12. Goa, Daman & Diu	Jammu & Kashmir	Goa, Daman & Diu	Assam	Karnataka	Gujarat	Tripura	Madhya Pradesh	Punjab	Karnataka	Meghalaya
13. Kerala	Gujarat	Punjab	Uttar Pradesh	Goa, Daman & Diu	Punjab	Karnataka	Tripura	Gujarat	Uttar Pradesh	Tripura
14. Delhi	Karnataka	Maharashtra	Maharashtra	Rajasthan	Maharashtra	Himachal Pradesh	Manipur	Haryana	Andhra Pradesh	Haryana
15. Rajasthan	Maharashtra	Gujarat	Punjab	Maharashtra	Goa, Daman & Diu	Manipur	Goa, Daman & Diu	Karnataka	Madhya Pradesh	Karnataka
16. Manipur	Tamil Nadu	West Bengal	Karnataka	Uttar Pradesh	Nagaland	West Bengal	Himachal Pradesh	Tamil Nadu	Manipur	Gujarat
17. Arunachal Pradesh	Punjab	Himachal Pradesh	Himachal Pradesh	Tripura	Manipur	Punjab	Jammu & Kashmir	Maharashtra	Himachal Pradesh	Manipur
18. Tripura	Himachal Pradesh		Meghalaya		Delhi	Gujarat	Haryana	West Bengal	Maharashtra	Tamil Nadu
19. Karnataka	Manipur		Tamil Nadu			Maharashtra	Punjab	Delhi	Kerala	Himachal Pradesh
20. Gujarat	Goa, Daman & Diu		Nagaland			Tamil Nadu	Delhi		Tamil Nadu	Goa, Daman & Diu
21. Himachal Pradesh	Nagaland		Goa, Daman & Diu			Goa, Daman & Diu			Haryana	Kerala
22. Maharashtra	Delhi		Kerala			Delhi			Punjab	Punjab
23. Nagaland	Kerala		Delhi			Kerala			Delhi	Maharashtra
										Nagaland
										Delhi

Table 25: INDIAN BALANCE OF TRADE IN TWO PRODUCTS NECESSARY FOR EDUCATIONAL INVESTMENT /a
(Rupees)

	April 1973 March 1974 (12 months)	April-October 1976 (6 months)
Paper, newsprint and paper pulp		
Amount imported	289,242,930	432,699,468
Amount exported	69,035,010	5,811,380
Net (Rupees)	220,207,920	426,888,088
(US$) /b	24,222,871	46,957,689
Printing and book binding machinery		
Amount imported	83,198,250	36,633,277
Amount exported	2,597,648	2,365,873
Net (Rupees)	80,600,602	33,267,404
(US$) /b	8,866,066	3,659,414

/a Source: India: Department of Commercial Intelligence and statistics. Monthly Statistics of the Foreign Trade of India, Calcutta: Controller of Publications, March 1974; and October 1976.

/b Rate: 1 Rs = .11 US¢.

Table 26: ENROLLMENT OF SCHEDULED CASTES BY STATE (1960-1961)*

	Selectivity index**	Proportion of castes to total pop. (%)	Proportion of castes to enrollment (%)
Rajasthan	.25	16.7	4.2
Punjab	.57	20.4	11.6
Mysore	.64	13.2	8.5
Bihar	.70	14.1	9.3
Uttar Pradesh	.67	20.9	14.0
Madhya Pradesh	.70	13.1	9.1
Madras	.85	18.0	15.3
West Bengal	.85	19.9	17.0
Andhra Pradesh	1.10	13.8	15.2
Gujarat	1.16	5.7	6.6
Kerala	1.21	8.4	10.2
Maharashtra	1.81	5.6	10.1

* Source: Zachariach, 1972: Table 1.

** The Selectivity Index does not compare state data with a national norm; it is a measure solely of the degree of under or over representation of a given group within that particular state.

*** Primary and lower secondary schools.

The Use of Representation Indices (RI) and Gini Coefficients in Monitoring Distributive Aspects

Representation Index

1. The RI indicates whether a given group or area is under or over-represented, and to what degree, with respect to the distribution of a scarce resource. For example, in education, a district can be under or over-represented in its particular share of school places compared to its proportion of the relevant school-going age group. In arithemetical terms, for any district which is a sub-sect of the whole set, usually a country.

(a) $$RI_i = \frac{e_i \div E}{P_i \div P}$$

where E is total, national enrollment,
P is total, national relevant age group population,
e_i is the number enrolled in a district,
p_i is the number in the relevant age group population in a district.

Or, in plain language, for each district:

$$RI = \frac{\text{Percent of scarce resource, e.g., enrollment}}{\text{Percent of distributional basis, e.g., population}}$$

Thus, for example, a district with 20% of primary school enrollment in the nation but 30% of the age group in the nation would have an RI of

$$\frac{20\%}{30\%} = 0.67$$

Indices over 1.0 indicate over-representation; below 1.0 indicates under-representation. With respect to school enrollments specifically, another way to define a district's RI is to divide its enrollment rate by the national enrollment rate. So, for example,

(b) $$RI_i = \frac{e_i \div p_i}{E \div P}$$

Or, again, in plain language:

$$RI_i = \frac{\text{Enrollment rate of district}}{\text{Enrollment rate of country}}$$

Either way ,the resulting RI values will be identical for any given district. The second method highlights how the RI, unlike the enrollment rate, is "relativized" to the national norm, thus enhancing its utility in making comparisons from one point in time to the next, and therefore in monitoring.

2. The RI has been used most frequently on enrollment distribution, but this is because that data is easily available. The principles are the same for any scarce resource or benefit. For purposes of planning physical expansion it would be preferable to use student spaces or classrooms., But in addition, the distribution of inputs such as textbooks, teachers, and financing can be analyzed this way.

3. The relative disadvantage of poorer areas with respect to the distribution of scarce goods or services, resources or benefits (such as enrollment), can be monitored by calculating the baseline RIs and the targeted, horizon year RIs for, say, the three poorest districts; then, these are monitored in the intervening years during the project "investment" and initial "operating" stages. Changes which will inevitably occur to the national average are automatically "controlled for". A rise in the RI of any of these initially poorest districts necessarily means an improvement in its position relative to the national average irrespective of a change in the latter.

Gini Coefficient

4. Whereas an RI is a measure of comparative disadvantage for group or area at a time, the Gini coefficient is a single statistic summarizing relative inequality across all groups or areas at once. It is commonly used by economists to measure inequality between income groups, but it is equally useful in portraying unequal distributions of other scarcities across a population.

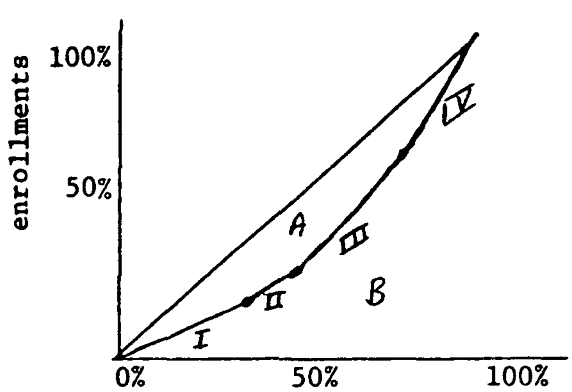
5. The simplest way to understand the Gini coefficient is to begin by plotting the shares of enrollment and population for four districts (to keep it simple) on a two-dimension space or "x, y" axis, as in the following table and graph.

Table 1

District	(a) Share of School-Age Population Percent Share	(b) Cumulated Percent	(c) Share of Enrollment Percent Share	(d) Cumulated Percent	(e) RI
I	40	40	20	20	0.5
II	10	50	10	30	1.0
III	25	75	30	60	1.2
IV	25	100	40	100	1.6
Total	100		100		

N.B. for convenience these provinces have been placed in desecending order of advantage - the most under-represented is first (I) Table I and (A) Table 2, etc.

Curve of Concentration



6. If one begins with the district with the lowest RI, and cumulatively plots enrollment share against population share, district by district one arrives at a so-called "Lorenz" curve of concentration bulging below the diagonal. (Were all districts to have exactly proportional representation, indicating absolute capacity, the plot would follow the diagonal precisely). The Gini coefficient (G), then, is equal to the shaded area, A, between the diagonal and the curve, as a percentage of the whole area of the right

triangle below the diagonal, or A + B. Thus $G = \frac{A}{A + B}$. The Gini coefficient can be computed by hand proceeding with the following steps, using the same district order, but expressing percents as decimals:*

Table 2

District	(f) Share of School-Age Population (same as col. (a))	(g) Sum of Consecutive Enrollments /1 (refer to col. (d))	Products of Two Previous Columns (f) (g)
A	0.40	0.20	0.080
B	0.10	0.50	0.050
C	0.25	0.90	0.225
D	0.25	1.60	0.400
Total			0.755

G = 1 - 0.755 = 0.245

/1 To arrive at the correct sums: Add the number in column B on this row to the number in column B in the row immediately above.

* When, as in most cass, a Bank staff user is confronted with dozens of districts, rather than carry out laborious hand calculations he may wish to use the SEQIN (Social Equity Indices System) program available on the Bank computer. SEQIN calculates both RIs and several other indices for each district, and the Gini coefficient. A User's Manual is available from extension 61694.

7. The range of possible Gini coefficients is from 0.0, representing absolute proportionality or equality, up to 1.0 representing complete monopoly or inequality. This is the hypothetical situation when one person monopolizes the entire supply of a scarcity. In the real world, however, a Gini coefficient on any major social service or economic good would only rarely go above 0.5.

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