EDUCATIONAL DATABASE FOR POLICY FORMULATION

Status Report

PART I

March 1985

राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

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E D U C A T I O N A L D A T A B A S E
F O R P O L I C Y F O R M U L A T I O N

Status Report

PART I

March 1985

NATIONAL COUNCIL OF EDUCATIONAL RESEARCH & TRAINING

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क्षक अनुसंधान और प्रशिक्षण परिषद्
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NCERT

Dr. A.K. Jalaluddin
Joint Director

No.F.1-1/84-JD
28 March 1985

Dear Shri Anand Sarup,

In pursuance of the decision of the Drafting Committee on the new Educational Policy taken in the meeting held on 25 February 1985 under your chairmanship, I analysed a large number of important documents and research studies to prepare a status paper on contemporary educational policy issues. I finally selected 18 documents, research papers and case studies for "listing areas of success and also the areas of failure, both from the point of view of coverage, drop-out and stagnation, quality and relevance to the productive functions and socio-economic relevance, indicating inter alia, the diagnosis of the present situation".

and

My critical analysis of the database/issues as reflected in the above papers, has been included under the title "An Analysis of the Trends in Education on the Basis of Selected Documents" for a ready reference. An attempt has also been made to identify the central issues and to put them in a broader framework of national development in the brief Introduction to the Status Report, Part-I. It is proposed to focus attention on the operational aspects of policy implementation in the second part of the Status Report.

I shall be grateful to receive your kind comments on the Status Report-Part I and also advice for compilation of the second part.

With kind regards,

Yours sincerely,

(A. K. Jalaluddin)

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INTRODUCTION

Unlike in many other developing countries, the educational database in India is quite rich. The demographic data and the data obtained through comprehensive All India Educational Surveys and sample surveys constitute the core of this database. The practice initiated by the government on maintaining a continuous dialogue with the educational community through the instrumentality of high level Commissions and Committees for articulating major policy issues provides the essential linkages between research and policy formulation. While this practice enabled the government to take a balanced view of the achievements and failures and to evolve a general consensus in favour of change during the last three decades, lack of sustained effort on the part of the implementing agencies in many cases undermined the initial commitments and the desired sense direction of change.

Besides the problem of maintaining continuity in educational reorganization through sustained administrative effort and resource support, the other major problem in educational policy formulation happens to be the lack of a general consensus as to what constitutes good educational practices and how to change the existing system of education to promote such practices. As a result, the structural reforms of the past could not give rise to new practices in education or its management.

Similarly, in the absence of any concerted effert to correlate the social, cultural, and economic dimensions of education with educational statistics, the actual significance of the latter in educational policy formulation remained marginal.

The lack of internal consistency between the educational data received through the three well-known sources: (i) Census, (ii) All India Educational Surveys, and (iii) Departmental reporting system has also considerably reduced the credibility of the departmental reporting system.

Since plan allocations of a state are linked with the enrolment and coverage under a given educational programme, there is an inbuilt mechanism in the reporting system to inflate achievement figures. Internationally, the Indian census figures, in relation to the enrolment and educational attainment of different age groups of the population, command more respect than the figures disseminated by the educational authority. In fact, the census reports happe to be the only source of literacy rates which is also a measure of the impact of primary education in the country. The comparative rate of growth of literacy rates of different countries are therefore taken as indices of the health of the education system of these countries. An analysis of the trend in the

literacy growth rate of all the developing countries of the World indicate that India alongwith Bhutan represent the lowest growth rates in the World. While South Asia as a whole happens to be an area of slow progress in education, the rate of development of education in Burma, Bangladesh, Pakistan and Nepal is much faster than in India. What is more alarming, while the female literacy rate in India is slightly higher than that of Bangladesh and Pakistan at present, within a period of fifteen years both these countries are expected to surpass India in the female literacy rate. In fact, if the rate of progress of education in India maintains the present pace, India will soon have the distinction of having an illiterate population larger than the total number of illiterates of all countries of the World put together. This will also likely to be true of the number of children who will be outside the school system.

The rate of growth of literacy and educational attainment during the period 1951 - 1981 show several interesting features. The period 1951-65 showed a much higher rate of growth in education than the period 1965-81, while the rate of participation of illiterate population in productive activities showed a much more favourable trend in the latter period. These

trends are indicative of the fact that with an increase in the effectiveness of the system of education, the economic return from education may be enhanced much more than what has been in the past.

But what had been more important during this period is the role played by education in this period in promoting the process of equalisation of opportunities of the weaker sections of society, their socialisation and modernisation of India. Inspite of the high rate of drop outs, the participation of the first generation learners is more than 60% at the primary level of education. Similarly, a high percentage of primary school teachers and rural level developmental workers are now found among the first generation of educated rural population. Unlike in many other developing countries, the percentage of women teachers at the elementary level is appreciably higher in India. While the representation of the scheduled castes and other backward communities in the higher levels of education and employment is still much lower than their proportion in the population, the rate of increase in their participation, by and large has remained appreciable for a considerable period.

It is well known that due to the urban and academic bias of formal education, the children of illiterate parents by and large show a lower level of achievement. Since their percentage had been

showing on increasing trend, there is a tendency to interpret this trend as a downward trend in the quality of education. Research data do support the fact that [it is] the inability of the existing system of school education to make education relevent in diversified ways to the children with mixed socio-economic background [which] is responsible for the misinterpretation of [the] recent developments in the field of education as an issue of quality versus quantity. The present middle class value orientation of the educational system is making it more valuerable to the increasing pressure from the growing middle class in favour of the aspirations of this section of society. As a result the children from the weaker sections have been left with the only option of either coping with the growing demands of the present educational norms or to leave it. It is but natural that the majority of them leave it at an early age.

The recent anti-reservation agitation is sympomatic of the fact that very little time is left with the government to come to grips with the issue of the social mobility of the weaker sections of society. The single channel of mobility as provided by the present structure of academic schooling is becoming more and more competetive and the traditional beneficieries are finding the present reservation policy as a threat to their interest due to [the] increased participation of the weaker sections in schools.

The situation demands immediate articulation of alternative channels of upward social mobility of all sections of society. Work oriented education and vocationalization of all levels of education, short cycle training courses linked with part time general education, and other similar alternatives seem(s) to be the only and widely tested avenues for upgradation of the level of education and social status of children and adults of the disadvantaged sections of society.

Diversification of education with provision for vertical and horizontal mobility of students ensures equity without [actually] the same kind of education obligatory for all children. The concept of quality of education gets a new significance when it is seen in the context of relevence and its friendliness to the learner. If the goal of good education is to make the learner capable of self-learning and adjusting with the changing environment, the objective of a meaningful educational reform is to make the system of education flexible and elastic enough to respond [itself] to the new demands and to adjust itself with the fast changing environment and technology of education.

The success of an exercise in educational policy formulation lies in how the issues related to the external efficiency of the system of education are effectively linked with those related to the internal efficiency of the system.

In the absence of an operational redesign of education several attempts were made in the past to improve the efficiency of an ineffective system by channalising additional resources through the existing delivery network rather than making the system more effective.

In the present status report, an attempt has been made to analyse the educational policy issues on the basis of case studies, research findings, reviews and evaluation reports relevent to the contemporary educational scene in India. Part I of the Report essentially highlights the external imperatives of a new educational policy. It is proposed to deal with the internal imperatives in Part II of the Report.

AN ANALYSIS OF TRENDS IN EDUCATION
ON THE BASIS OF SELECTED DOCUMENTS

Educational Development (1920-47)

The paper on Educational Development (1920-47) gives in brief the change in the role of the central and State Governments and also that of the local bodies in promoting different sectors of education in the above period 1920-47. This period also coincides with the mass movement for "national education", the objectives of which was to highlight complete Indian Control over Educational Policies and Administration and also bring the contents and methods of education in tune with the needs and tasks of the emerging Indian nation. A National System of Education, it was argued, would promote a national outlook, replace English by Indian languages as media of education, and generate educational programmes which were suited to the needs and aspirations of various sections of Indian society.

Under the Montford Reforms -- Government of India Act of 1919 - Education was made a provincial subject and the Centre ceased to play any important role in education. As a result of cessation of Central financial aids to education and measures which the Centre formerly adapted for making good the imbalances and inequalities by providing additional aids to backward provinces also ceased. Under the above act, Municipalities in urban areas and local bodies in rural areas were entrusted

with the responsibility of providing primary and elementary education. The rate of participation of children rose by 67% during the period 1921-22 to 1936-37 at the elementary level, by 107% at the secondary level and 90% at the undergraduate level. However, these increase in enrolment were confined only to small pockets in different provinces. Even in those days, the rate of drop-out from Class I to Class IV was 72% and the causes of wastage and stagnation were attributed to the poor social background of children and inept pedagogical methods as it is believed today. The liberal literary character of school education, its lack of vocational and technical content and its consequential unsuitability to rural life continued to attract severe criticism even during the pre-independence period. The service condition of secondary teachers was miserable and they had no security of tenure.

This period also witnessed social awakening which had powerful impact on women's education and education of the Muslim Community and scheduled castes.

This period is also remarkable for large scale non-official efforts to spread education in the urban, rural and even backward and tribal areas. It is interesting to note that even before the independence of India, the Hartog Committee urged "concentration on consolidation and improvement" instead of expansion of education for a long time to come on the misplaced argument that due to large scale expansion the quality of education would suffer.

Universal Primary Education and Literacy

An analysis of illiteracy and elementary education data have been presented through the following papers: (1) Letting Children Learn-India's Rough Passage Towards Universal Primary Education (J.P. Nayak); (2) Universalisation of elementary education (K.N. Hiriyanniah, NCERT); (3) Towards Universal Elementary Education - Promise and performance (John Kurien); and (4) Eradication of Illiteracy (NCERT).

These papers articulate the formidable difficulties and problems of failure in the process of achieving the target of universalisation of elementary education in the foreseeable future inview of the intimate relationship between poverty and illiteracy and illiterate environment and lower enrolment and retention.

While figures relating to number of schools both primary and middle, enrolment of children and the rate of drop-out are widely reported in many documents, these papers attempted to critically examine these data to arrive at their authentic interpretation from the point of view of analysing the real trends.

A significant percentage of children enrolled in standards I - V and also standards VI - VIII are under- and over-aged. An accurate estimation of the enrolment ratio of children in the age group 6-11 and 11-14 is therefore possible only when the enrolment figures as

obtained through the existing reporting system are corrected to the extent the under - and over-aged children are reflected in these data. The detail analysis of the procedure followed to arrive at the corrected percentage of enrolment is given in the paper by John Kurien. It will be seen that while the official enrolment ratio for standards I-V for 6-11 years in the year 1975-76 is 83.8% the refined enrolment ratio for the same group of children comes out to be 62.6%, a difference of more than 21%. Similarly the official enrolment ratio for standard VI - VIII for 11-14 years in the year 1975-76 is reported to be 36.7% and after refinement of these figures, the final figure comes to 21.7%.

Similarly, the trend in the population growth vis-a-vis the growth in enrolment and the consequent change in the enrolment ratio needs to be studied seriously in view of the possible concealment of a possible lower rate of expansion of primary school in relation to the growth rate of the child population in the relevant age group. The above analysis has shown that the increases in enrolment have fallen far behind the population growth during 1966-77. It is quite likely that this adverse trend has not yet been arrested due to reduced outlay on elementary education.

A detailed analysis of the procedure followed in spacing primary and middle schools in the rural areas on the basis of the data compiled under the Third and Fourth All-India Educational Surveys,

one arrives at the conclusion that the oft-repeated criterion of providing primary schooling facilities within a distance of one kilometer may not have much significance for large number of habitations which do not have a primary school within the habitation. According to the Third Survey (31.12.1973), of the 9, 53, 734 rural habitations identified in the Survey, 4, 22, 766 (44.33%) habitations had primary sections in the habitation of residence. During the Fourth Survey, (30.9.78) the percentage of habitations covered by a primary section within the habitation of residence rose to only 46.80%. As the rate of growth of primary schools in this period was much higher this slow increase in the coverage of a habitation by a primary section indicates a tendency to clustering primary schooling facilities in more populated habitations which can articulate a higher social demands for education. Absence of any educational activity within a habitation, the level of which happens to be primary or traditional household pathsala acts as a demotivating environment. A literate environment and all weather inter habitation communication facilities have been found to act as most favourable factors for the spread of education in the rural areas. Educational backwardness of a State are generally found to be deficient in these respects. In UP alone there are 14,009 habitations having population above 300 which do not have a primary school within them.

K.N. Hiriyanniah indicated that the repetition rate of children in the same class at the primary level is considerably more than the rate of dropout. A larger proportion of repeaters are generally found in class I as compared to the higher classes. Similarly, the percentage of repeaters in the total enrolment in the rural areas is more than in the urban areas. The widespread phenomenon of higher repetition rate indicates a higher motivation of children to learn, contrary to the widely held belief about lack of motivation among the disadvantaged section of society. This phenomenon also strongly suggests that the existing primary school has a greater potential to retain a larger number of children by making education more interesting and enjoyable to children. A modest attitudinal change in terms of preparedness on the part of the teacher to learn and to adopt simple but very effective techniques to promote individual and peer learning and an overall organisational and community support to the teacher may turn the table

The Third and Fourth surveys also provide for the first time a data based regarding the inadequateness of the infrastructure and inputs for expansion of primary education in the country. As given by K.N. Hiriyanniah, more than 40% schools do not have proper building and 8.58 per cent schools work in the open space.

While 95.3% primary schools are co-education, 85% of these schools do not have even modest toilet facilities for girls. 60% of the primary schools do not have adequate black-boards. The paper also reveals that it is only 37.6% schools which are covered under the incentive scheme of free text books and only 9.15% school children under the provision of medical check up.

Literacy figures given in the paper, Eradication of Illiteracy, also accompanies a table to show a comparative rate of growth of literacy in the countries of the South Asian Region. From the table it will be seen that the rate of literacy in the age group 15-19 of Indian population which is a measure of the impact of primary education, show a downward trend during the period 75-76. Similarly, it will be seen that India's growth rate of literacy in the population 15-19 and also 15 + is the lowest among the South Asian countries, except Bhutan. The Unesco projection of illiteracy rates in the above age groups indicate that both the Bangladesh and Pakistan which have had higher percentage of illiteracy compared to India in 1975 and will have a much lower percentage of illiterate population compared to India in 1990. By the end of the century, while India will have 37% of its population illiterate, Pakistan will have only 22.20 percent and Bangladesh 20.4 percent of their respective populations. Strangely enough, both Bangladesh and Pakistan will have a higher female literacy rate compared

to that of India at the turn of the century. It is also indicated in the figures that while India contributed 37% of the world illiterates in 1970, our contribution to the world illiteracy will be 54.8% in 2000 A.D.

An analysis of the different factors responsible for poor retention and low quality of primary education was given by J.P. Nayak. The paper has been recently reproduced in "Future" published by Unicef. In this paper it has been indicated how parents' literacy as also their access to the benefits of developmental programmes can create a social demand for education in the rural and remote areas particularly from the weaker sections of society. The paper also articulated the policy implications of the problems of failure in the universalisation of elementary education. The author has shown how complex are the problems of universalisation of primary education and what supreme effort is needed to achieve it. The essential components of this effort are:

- a relentless determination of the nation to achieve this goal which provides a basis of equality;
- creation of a strong social demand;
- reduction of mass poverty;
- development of large - scale programmes of non-formal means of education;
- qualitative improvement;
- adoption of common school system;

- reduction of imbalances of educational development between different social groups and regions;
- large-scale administrative decentralisation;
- considerable increase in financial outlays as well as their more effective utilisation;
- and an improved system of monitoring and control.

Kothari Commission Report and its Follow up

In the post independence period the educational database for the formulation of educational policy at the national level was provided by a number of commissions and committees set up by the Central Government. The Education Commission (1964-66) headed by Prof. D.S. Kothari, while recommending major structural reform of the system of education in India, also reviewed the progress in the field of education with a perspective of national development. The report of the Education Commission for all practical purposes may still be treated as the most comprehensive database for policy formulation. What is, therefore, needed now is to update this document on the basis of the experience of implementation of its major recommendations.

The National Educational Policy (1968), which was essentially based on the Report of the Kothari Commission, concretised the structural reform through the introduction of the 10 + 2 + 3 pattern of education throughout the country. Major exercises in curriculum reconstruction were initiated on the basis of this recommendations by the NCERT in 1975. While all the States have by now adopted the 10 year school framework, the situation regarding +2 and +3 stages of education is still highly confused. The case study regarding the status of implementation of 10+2+3 pattern of education by S.B. Gogate, included in this report raises several policy issues which needs immediate attention. One of

the major issues relates to the rationalisation of the support structure for the + 2 stage. This issue may be further reduced to the following questions:

1. Whether + 2 stage should be located in school, in colleges, or in both? The rationale for locating this stage under any or more of these alternatives also needs to be developed and supported by adequate data. This issue is also related to the establishment of an appropriate organisational structure responsible for providing technical and administrative support to this stage of education.
2. Should vocationalisation of higher secondary education be the responsibility of the above structure or a separate structure for vocational education discharge this responsibility?
3. Whether the vocational stream at the +2 stage needs to be reconsidered in a still broader framework of vocationalisation of all levels of education to give more respectability to vocational courses by creating options for vertical mobility of the products of vocational courses at the lower levels.

Several policy issues related to school management and curriculum transactions have also arisen as a result of a wide diversity in the implementation of the new pattern of education in different parts of the country. A summary on the weightage given to different subject areas of school curriculum has been included in the present report. It will be seen from this summary that the number of examination subjects at the middle level varies from 6 to 9 out of which 5 are compulsory academic subjects. The total number of subjects areas in different states at the secondary stage ranges between 7 and 9, out of which the number of examination subjects ranges between 5-9 and the number of non-examination subjects between 0 and 3. Out of the 5 compulsory subjects, English is getting higher weightage in terms of time allocation per week throughout the country. The second position is given to science and maths while the 3rd and 4th positions are occupied by the mother tongue and social sciences respectively. In contrast to this distribution, the maximum marks allotted to different subject areas in the public examinations shows a different pattern. An analysis of the present trend in the allocation of teaching and learning time to different subjects and its correlation with the examination norms leads one to a better appreciation of the need to arrive at a common scheme of studies applicable to all Boards of Education in the country. This is important from the point of view of ensuring mobility of students and teachers between the schools and colleges under different managements and also from the one state to the other.

There is a genuine dearth of research studies related to the achievement of Indian children for inter-state and international comparision. A study, titled, Achievement of Indian Children in Mother Tongue (Hindi) and Science, conducted by Snehlata Shukla (NCERT), as a part of a series of studies conducted during (1961-71) by the International Association for Evaluation of Educational Achievement happens to be the only study having policy implications. The sample of Indian students was limited to the six States where Hindi was the principal spoken language. The sample consisted of students of age 10+, roughly corresponding to standards IV-V and age 14+ corresponding to standards VIII-IX and standards in the last grade of secondary schools.

It will be seen in the paper the performance of the Indian children was much lower than the median of achievement of children from the developed countries. In the two tests used to assess reading comprehension and word knowledge, the achievement of Indian children were lowest among all the 14 countries which participated in the study. The achievement of Indian students in science was equally low compared to the achievements of children from other developed countries.

An Indian select sample of students taken from the elite Delhi schools showed a better achievements compared to the general Indian student sample, but somewhat lower than the median for developed countries.

This study highlights the centrality of the linguistic ability of the child in the mother tongue in the overall cognitive development of the child. One of the major reasons for lower achievement seem to be due to greater information load on the child which acts as a huddle in the development of the child in the absence of an adequate linguistic ability to take advantage of the growing information. This aspect of curriculum policy was studied under a project at the NCERT, Curriculum Load at the School Level - A Quick Appraisal, included in the Status Report Science Education.

In the Report of the Kothari Commission and also in the National Policy on Education (1968), Science Education and Research were given a place of high priority. On the basis of this Policy, Science and Mathematics have been made an integral part of general education till the end of the secondary school stage under the new 10 + 2 pattern of education in 1975. Around that period several countries in South and Southeast Asia also introduced Science and Mathematics as compulsory subjects upto the end of secondary stage under their revised educational policies. However, confronted with the practical problems of introducing science as "academic" courses in the absence of adequately trained teachers, laboratories and support materials, this policy suffered setbacks not only in other developing countries, but also in India.

Most of the educationally backward states in India are finding it extremely difficult to respond adequately to the new curriculum demands due to resource constraints. In order to assess the situation, the Government of India constituted a Review Committee under the Chairmanship of Shri Iswarbhai Patel. This Committee recommended differenciated science and mathematics courses at the secondary level on the basis of availability of laboratory facilities at the schools. While the Patel Committee did not specify any differenciated levels for the parallel courses, the school and University authorities for all practical purposes recognised the course which demanded more elaborate laboratory facilities as the higher course and treated the completion of that course as a prerequisite for admission of students in the Science stream at the higher secondary stage. Thus the reorganisation based on the above recommendation proved to be discriminatory in nature and went against the principles of science for all. In the face of severe criticism this provision has been discontinued by the Central Board of Secondary Education.

While this experimentation with "academic" courses were gaining momentum in the formal system of education at the secondary level, several centres of higher education and research and voluntary agencies experimented with new ideas in the field of science education among rural and underprivilged children at lower levels. The focus of these innovative projects was on the

development of scientific reasoning and temper through the practice of discovery and problems solving methods. The natural environment provided the learning situations and in-service training of teachers was taken as the instrumentality for the replication of these innovative practices. Almost simultaneously, the NCERT also brought out environment simple, low-cost science kits for the learning of "Science by doing" at the primary and middle levels. However, as the methods and materials for teaching and learning of science at the secondary level were still dominated by "academic" public examination, which did not make a distinction between the method of learning by doing and learning by memorising, most of the innovative projects introduced at the lower levels of education, by and large, did not carry conviction with the educational administration and the examining bodies. Several case studies of these experiences are given in the paper titled: Science, Technology and Education, Research in India by Kenneth King.

A major policy decision is called for at this crucial point of time regarding the future of science education in schools and its linkages with the changing environments, technology and vocational courses on the one hand, and higher education on the other. As majority of the students enrolled at the primary and middle levels

discontinue their studies either before reaching standards VIII and X, the question of streaming students to humanities, science, and commerce at the end of standard X should not unduly influence the issue of differentiation of education at the elementary stage on the basis of its relevence to the environment and aspiration of children in the catchment areas as it is today. In fact, the Kothari Commission did visualise the scope of vocationalisation of lower secondary education and other options. A greater emphasis of "learning by doing science" upto standard VII may be universally admitted by all schools irrespective of its local variations and vocationalisation of education at the elementary and lower secondary levels without creating much demand for fiscal resources. However, as it may not be possible for all the secondary schools to do equal justification to the discipline-wise oriented science courses due to resource constraints, the disciplinewise streaming of students must be considered for restoration at the end of class VIII as it existed before making science and mathematics compulsory at standards IX and X in 1975, with the added emphasis on vocational courses at the secondary level itself and provision of elective, general education courses based on science, mathematics, computer literacy etc. Involvement of scientific research

establishments, industries, universities, engineering colleges, social seience research institutes as back up institutions for renewal of school curriculum and technical support has been an important recent development in the Indian educational scene. This trend has been strengthened as a result of the introduction of the computer literacy and studies in schools (CLASS) Project in 1984 in 250 schools with the help of 42 Resource Centres. If micro computers are effectively used to demonstrate their application in learning by doing, this interactive method is likely to qualitatively influence the attitude of school teachers and school curriculum. It is therefore important to emphasise the policy on computer literacy as an innovation in school education for its qualitative orientation, rather than as an "add on" to the existing facilities or for teaching an additional subject "about computers". There is also growing potential for the use of micro computers in vocational studies, particularly in office management, word processing, inventory control, management information system, etc., as indicated in the computer base paper on Computer Literacy and Studies in Schools.

Broad Spectrum of Human Resource Development

While in the Kothari Commission the emphasis on work experience in schools was essentially based on the idea of linkage of manual and mental work and also for the promotion of work ethic, the present trend in the developing countries is directed towards seeking linkage between education and productive work, marketing, small business management, rural entrepreneurship on a large diversified intersectoral networking model with access to institutional credit. An analysis of various approaches followed in combining education and productive work in India would show that these approaches as in other countries could be categorised as follows:

a. Education programmes and productive work are parallel activities without having any co-relation.

b. Educational programmes are subordinate to productive work where educational programmes are introduced just to enable the learners to acquire certificates needed by the economy.

c. Production work is subordinate to academic curricula, where the aim of introducing production work is to illustrate or demonstrate a theoritical knowledge; and,

d. Academic curricula and production work are combined as a learning continuum with intimate correlation.

Since productive work broadly come under economic activities, a macro level policy framework for linking education and productive work should take note of the general problems of management of micro level issues related to demand and supply of goods, services and skilled manpower. The general policy trends in this direction are indicated in the paper: The Interaction Between Education and Productive Work, compiled by the International Bureau of Education.

The general trends in the field of Vocational Education in India is reflected in the report of the Committee constituted by the Government of Gujarat to go into the question of rationalising, restructuring vocational, educational, and training programmes. As it will be seen from this Report, the problems of failure in vocational education are characterised by the following factors:

1. Very little importance given to the vocationalisation of secondary education at national, regional and state levels;
2. Absence of a central funding system;
3. Out-dated and substandard forms and methods of vocational education were adopted;
4. Lack of opportunities for further and continuing education allowing vertical mobility of the products of vocational courses;

5. Inequality in educational opportunity in various forms, regional imbalance in the level of educational, social, and economic development, differences in the standard of education as reflected in different vocational courses; restricted choice of route or mode of attendance;
6. Almost non-existence of the kind of administrative set-up and educational leadership that was necessary to promote and develop vocational educational course; and
7. Widespread belief that vocational education was an inferior form of education, needed only for drop-outs, or the last choice of slow learners.

The Report also reveals that while there has been considerable expansion of the infrastructure of vocational education and training under different government departments, nearly 90% of the vocational education and training centres came into being through the initiative of autonomous bodies, voluntary and private agencies. The role of the State Government in promoting vocational education was therefore visualised both as a nodal facilitating authority through an appropriate grant-in-aid-scheme and also as a regulatory agency through the

instrumentality of recognition, certification and accreditation of courses. The report rightly raised the policy issues regarding financing of vocational education by the State Government and also through the direct involvement of the industries and other employer agencies. The possible strategies for the networking of vocational education and training centres under coordinated programmes and schemes, both in the public and private sectors, have also been indicated. However, the operational aspects of these strategies have remained by and large open-ended.

Social Dimension

"In so far as modernization is considered a desirable process and a goal to achieve, the relevent question to ask about education vis-a-vis modernization is : what kind of education and under what conditions will it generate and strengthen the process of modernization in a society"? asks M.S. Gore. In this status report, a major study reported by M.S. Gore has been included to focus attention on the issue of socialization.

The sample for the study was drawn from 8 different states was completed in 1967. According to the Report, the representation of the children who happened to belong to illiterate families is not more than 25% at the high school level, although such homes constituted nearly 80% of the countries population. Similarly, most students at the high school level are drawn from urban occupational groups and purely rural occupations are represented only to the extent of 21 to 35% of the high school students. However, in the rural areas at the primary stage the percentage of fathers with agriculture as their occupation is nearly 60% of the primary school child population. The Report also reveals that the overwhelming majority of the students to whom caste is applicable at all are drawn from non-scheduled and non-backward castes background.

The study also indicated that "if the data of fathers' education and fathers' occupation are taken together, it is clear that educated white collar sections of the society is represented among students of schools and colleges in proportions larger than its proportions in the general population". It is therefore implicit that the internal pressure in the school education is in favour of making education more relevant to white collar jobs which in other words make much of our education irrelevant to non-white collar groups in society. The fact that those who sent their children to secondary school and even those who sent their children to primary schools, largely aim to have them enter in white collar groups. This is also shown by other data of the study. The author concludes, "from the point of view of manpower planning, it need not be a misfortune if all parents do not aspire for white collar aspirations". However, the fact "that education fails to involve the interest of those who do not aspire for white collar jobs has serious implications for manpower planning." The data as obtained in the above study also show that caste is an important factor in the system of education not only in determining the chances of a child entering the system or a person entering teaching as a career at the primary level and also in the teacher's perception of student's ability in relation to his caste.

The above study not only highlights the importance of diversification of the course contents in order to make it more relevant to different occupational groups of society but also the need for using other instruments for the equalisation of educational opportunity for all sections of society, particularly those belonging to the low income groups. Diversification of course contents and vocationalisation of education safeguarding comparability of standards in terms of competencies at all levels may constitute the most radical element in the new educational policy framework. Unlike the present partial thrust on vocationalisation of education only at the higher secondary level, a new direction in productive work and training linked education at all levels of education may prove to be a more practical and effective move for the mobilization of unutilized youth power for accelerated economic and social development.

Instrumentality of Change

One of the major instruments in introducing new ideas, innovative methods of teaching and classroom practices is in-service teacher education. Many educational innovations in the past remained confined to pilot projects and discontinued at that level in the absence of any well-designed institutional mechanism for their replication.

The replication of any innovative teaching-learning method, material or media depends primarily on three factors:

- Physical facilities and resources;
- Human resources; and
- Organisational resources and linkages.

However, under the existing methods of educational planning, programming and budgeting, it is hardly possible to protect committed expenditure for wider diffusion of innovative practices and their institutionalisation. Consequently, there is no regular provision for in-service education of teachers in a scale which can bring about qualitative changes in education. The question of renewal of curriculum and restructuring of courses are also linked with the articulation of organisational reforms leading to participative norms.

Till now, the central support to school education is confined to few Central Schemes in selected areas like, population education, computer literacy, educational technology, adult and non-formal education, community singing, etc. The experience of implementation of the Central Schemes has been by and large positive and there is a genuine ground for widening the scope of the existing resource support network from the national level down to the district level with the help of the state level agencies and through creation of general awareness of such schemes and of popular demand for such programmes in the states.

While in the traditional programmes of in-service education of teachers, dissemination of knowledge regarding new contents is highlighted, there is a growing need to emphasise the new role of the teacher as a continuing source for curriculum renewal and school based decision-making, as indicated in the international trend in In-service Teacher Education (Bulletin of the International Bureau of Education). There is also a need to treat teachers also as the primary target group of new educational technology and programmes propagated through the mass media. Since the availability of television, video cassette players and microcomputers is likely to be confined only to a small number of schools for long time to come due to serious, resource constraits, the software of the new technology should be so designed that it become vehicles of powerful ideas

and simple techniques which would enhance the effectiveness of the teacher in the class room where the new hardware facilities are not likely to be available.

If in-service education of teachers is to be seriously considered as the instrument for the improvement of the quality of education under a broad policy framework there may be a need to make inservice programme like pre-service programmes mandatory with adequate steps to ensure that the employer will enable the teacher to participate in such programmes and will be prepared to make alternative arrangement for sharing his work load during the training period. There is also a need to make financial provision for inservice training programmes initially under suitable Central Schemes with a view to giving it an impetus and strong methodological support. The expansion of the scheme to cover all the districts within a reasonable period may be systematically planned through a process of networking on resource centres.

Educational Finance

A survey of the key issues for research and policy formulation in relation to educational financ has been covered by two papers : Educational Research at the World Bank by George Psacharopoulos, and Economics of Educational Finance by P.R. Panchamukhi.

In the World Bank paper, the question of efficiency in education has been resolved into two components; first, internal efficiency, referring to what takes place within schools, such as student repetition and dropout rates, the relative cost of alternative teaching methods, and the determinants of educational achievement : second, external efficiency, referring to what happens after a student leaves school, such as integration into outside world, especially the labour market. The two types of efficiency are linked when major policy issues like quantitative expansion of the educational system and improvement of the quality of education are to be treated as mutually inclusive. In both the papers, authors have suggested the possibility of raising a part of the educational cost from the users of services of the products of the system of education. The role of the private sector in promoting vocational education both through funding of training programmes and also by providing training facilities under attachment and apprenticeship programmes have been indicated as possible ways of augmenting education finance.

Some of the research findings as reported in the World Bank paper are as follows:

"A review of 18 statistical analyses of the association between the student achievement and the availability of textbooks in developing countries indicates that in 16 cases the effect of textbook availablity on achievement was positive and statistically significant. Also, in some cases, the influence of the

availability of books on achievement was stronger among students of low socioeconomic background.

"Similar results have been reported in a recent World Bank Study in the Phillipines. Following an educational loan of textbooks, two groups of students were compared a few years after the books had been distributed, one group had benefited from textbooks and one had not. The results indicated that the group that had been exposed to textbooks showed a remarkable increase in achievement over the control group".

The paper concluded, "And as among the many other educational inputs that have been researched in developing countries, the effect of textbook availability on achievement was found to be strongest among students from the poorest households".

A study which synthesized the results of over 30 data sets relating schooling to agricultural productivity concluded that on an average, farm productivity increases by about 9 percent as a result of a farmer having completed four years of primary education, rather than having no schooling whatsoever.

The paper also indicated that one of the prime indirect way in which education contributes to the economy is that it enhances the adoption and efficient use of new inputs. Thus schooling acts as a catalyst in behavioral change that is conducive to economic growth.

Regarding the demographic and household links of education, the study indicated that schooling serially affects demographic factors and through different channels, such as the impact of education on the demand for children, contraceptive use, and child-bearing potential of women.

In the case-study by Panchmukhi, the author indicated that while the formal source of educational expenditure are well documented, the unrecognised resource for education, which consists of resources within the institutions of the family, religious organisations, employing agencies (in the form of learning by doing or on-the-job training) defence services, etc. is likely to be significantly larger than the recognised resources in the formal framework. The author also pointed out the existing dichotomy between the providers of finances for education, spenders on education, supplier of education and beneficiary from education. According to the author, the low level of fees at the higher educational level indicates a high degree of subsidisation, particularly of the socio-economically advanced aspirants of education. This implies that the fee rate at the level of higher education, in particular, can be used not only as a source of finance but also as a useful instrument of enrolment allocation.

The author also studied the system of evolution of the system of financing education through capitation fees. According to Panchamukhi, the capitation fees linked with the system of subsidization for the underprevileged would amount to dual pricing of the education service. The principle of dual pricing, according to the author, can be justified on the ground of benefit principle and ability-to-pay principle. The trends in donations and endowments for education suggests that "the increasing degree of government intervention in the field of education has sapped the flow of the private donations". The author also studied the "parallel educational institutions" consisting of coaching classes and tution classes, etc., The preliminary study suggests that there is a system of differential pricing and a high degree of competition among these institutions. The high levels of fees have not detracted the flow of students to these classes. The author feels that a large-scale study of the finances and the growth of such parallel educational institutions may be helpful in understanding the factors behind the resistance to high fees in the formal system and other weaknesses in the formal system of education.

The study also brings to focus the duality in the institutional framework for regulating the plan and non-plan needs of educational institutions and the states on the basis of the recommendations of the planning commission and finance commission, respectively. The uncertainty involved in their non-plan allocation in the subsequent plan periods very often dissuades the state governments to accept innovative programmes under the plan allocations during a plan period. As a result, the institutionalisation of innovative practices in education through large scale diffusion never materialises in the states. According to the study, there is a co-relation between the financial soundness of an educational institution and the degree of autonomy enjoyed by it. There seems to be a similar correlation in the quality of education and the degree of decision making power as delegated to the head of the institution and the teacher. According to Panchamukhi; the serious financial crisis faced by the entire educational sector is due to the following paradomical situation:

- "The factors governing the expansion of the educational sector are not within the control of the policy makers. On the other hand, there are deliberate policies enunciated for expanding the educational sector. However, the factors governing the flow of funds both from the private and public sources seems to be under effective control. Such a differential behaviour

of the factors of sectoral expansion and of the financial flow seems to be the root cause of the financial crisis."

Operations Research

While question relating to the problems of failures in the implementation of a policy is easy to discern by the practising educators and educational administrators, whereas to suggest operational strategies to overcome the existing constraints of implementation calls for professional expertise which are till now external to the system of education. This is in view of the fact that large scale organisations are involved in the formal sector of the education and the existing practices in relation to planning, administration, teaching and learning represent a hierarchical and closed organisational environment. Any attempt to restructure this organisational design therefore needs to be articulated on all fronts. This is not an easy task. Very often, the strategy for introducing change in the vital activities related to education are sought to be introduced in isolation without a master conceptual framework. This results into unfinished pilot experiments and tokenism. This dilemma has been brought out in the form of the practical experience of a leading American management scientist Russel L. AcKoff (Management in education -- Some techniques and Systems).

Ackoff discusses the American Education scene in the early 70s when it was under severe attack of being 'ineffective' and 'inefficient' and 'irrelevant'. According to the author, most management scientists working in the field of education accept less important problems posed to them by educators rather than facing the fundamental educational problems. As a result, their efforts have by and large been directed at making an ineffective system operate more efficiently. To the management scientists efficiency, not effectiveness, has been at the focus. The paper identifies few general problems in the field of education which, the author believes, are not dealt with adequately by the management scientists. The first general premise of the paper is that the failure of present formal education can be recognised by comparing its effectiveness with informal education. Some of the examples cited by him are as follows:

Children learn their first language at home and on the streets more easily than they learn the second at school. Most adults forget much more of what they were taught in school than of what they learned out of it. Most of the knowledge that adults use at work and play they learned at work and play. This is even true for teachers: they learn more about the subjects they teach by teaching them than by being taught about them.

On the basis of the analysis of the status of education, the author arrives at the following important conclusions:

- The failure of formal education lies in its failure to deal with the right problems, not its failure to solve the problems with which it deals.
- Education is not carried out by a system but by an anti-system -- a deliberately non-interactive set of institutions, each of which is carved up into equally non-interactive components.
- Schools are committed to teaching, not learning, because teaching, unlike learning, can be industrialized and mechanised; it is easier to control, budget, schedule, observe and measure. Educators appear to want what they can measure rather than try to measure what they want.
- Teaching is an input to education, not an output, but our educational institutions act as though an ounce of teaching is worth a pound of learning. Nothing could be further from the truth.

Ackoff therefore feels that what the management scientist should ask first is "how can the educational process and the institutions in which it is embeded be redesigned so that they are focused on, and organised about, the learning, not the teaching, process?"

The second question is: how can we avoid organising education around rigidly scheduled, pre-selected, artificially quantized units of arbitrarily bounded subject matter, and, instead promote development of both a continuous desire to learn and an ability to do so?

The third and final question is: How can we design an educational system that individualizes each student, that preserves his sense of self, and that encourages creativity rather than conformity?

The author confesses that we do not know the answers to such basic educational questions nor there is a need to find any, if by "answer" we mean something that disposes of a question once for all. What solves an educational problem at one time at one place does not necessarily do so at others. Therefore, the author felt that what we need today is an educational system that, like the students in it, can learn and adapt quickly and efficiently.

The author extends this formulation by suggesting that any attempt to redesign education should be preceded by exercises for the conceptualisation of an idealized redesign of the system. Because idealisation focuses on long range objectives and ultimate values, agreement tends to emerge from apparently antagonistic participants in the system and others affected by its behaviour.

Most disagreements, according to the author, arises from consideration of means, not ends. Awareness of consensus on ends usually brings about cooperation with respect to means among those who would not otherwise be so inclined.

Ackoff adds,

> "No formulation of an ideal should be taken as final, as an absolute. It should be revised as we approach and get a view of it. But equipped with an explicit ideal, however tentative, we can begin to invent efficient and effective ways of making it real".

DOCUMENTS

AND

PAPERS

C O N T E N T S

EDUCATIONAL DEVELOPMENTS (1920-47)

(prepared by Indian Institute of Education, Pune)

What was the state of Indian education on the eve of the Montford Reforms which came into force in 1920-21? The total enrolment in primary schools' was only between 2 and 3 per cent of the population compared to 15 per cent in most advanced countries' (p. 2.2). Male literacy stood at 12.2 and female literacy at 1.8 per cent. Secondary education fared somewhat better. By 1920 many a taluka town could claim a high school (p. 2.2). The medium of education at the high school was English, Indian languages serving as media only at the primary and lower middle levels. Higher education was of the literary, liberal variety except for a few colleges teaching law, medicine and engineering.

The general policy of the government was to neglect primary and middle level education in favour of secondary and higher education. The primary role which the government assigned to the educational system was to train a sufficient number of Indian to man sub-ordinate posts in the administration and this policy was its inevitable result. The apathy of the colonial regime to the educational and cultural advancement of the people which expressed itself in the nigardly funding for education, the dire poverty of the mass of people and the social iniquities and inequalities which were inherent in a caste-based society account for the dismal state of Indian education in this period.

At the same time the educational system which introduced educated Indians to modern knowledge and thought, and liberal social philosophy had a regerative effect on Indian society and created in educated section an aspiration for political liberation as well as for social transformation. These aspirations set in motion certain trends in the educational fields. The Government of India Resolution of 1913 announced a more liberal grant-in-aid policy particularly for higher education and favoured the establishment of at least one university in each province. As a result of this new policy the number of universities in India rose from 5 to 12 in the period 1916-20. The Calcutta University Commission (1917-19) made several recommendations for improving the quality of higher and secondary education, provision of technological, vocational and professional education, and encouraging spread of education in socially backward sections like Muslims and women. The demand for free and compulsory primary education was initiated by Dadabhai Naoroji, Vithalbhai Patel and their efforts bore fruit in the form of the Bombay Primary Education (District Municipalities) Act of 1918 which introduced from and compulsory primary education in certain parts of the city of Bombay. The demand for extending regional languages as media to high school and collegiate education also gathered momentum in this period. Lastly, Indian aspirations for the spread of education as a means of national regeneration expressed themselves in the concept of 'national education' which meant not only that there should be complete

Indian control over educational policies and administration but also the objectives, contents and methods of education should be in tune with the needs and tasks of the emerging Indian nation. A national system of education, its was argued, would cultivate a national outlook, replace English by Indian languages as media of education and mount diverse educational programmes which were suited to the needs and aspirations of various sections of Indian society.

Under the Montford Reforms -- Government of India Act of 1919 -- Education was made a Provincial subject. Further, the Department of Education was included in the transferred departments which meant it was placed in charge of an Indian Minister who was appointed by the Governor from among the elected members of the provincial legislature. A number of consequences followed from this arrangement:

(1) The Centre ceased to play any role in education;

(2) The Provinces were cut off from the all-India educational information about the spread, improvements and innovative experimentation in education in other provinces. Educational thinking and policy in each province had to be developed in a state of isolation;

(3) Together with the cessation of Central financial aid to education and measures which the Centre formerly adopted for making good imbalances and inequalities by providing additional aid to backward Provinces also ceased;

(4) As all revenue-raising Departments were reserved and managed by Executive Councillors over whom the Provincial Legislature had no control, the Education Department was starved of funds and could do little for expanding or improving education.

A part of the new administrative arrangement are devolution of powers in respect of primary and elementary education to local bodies -- municipalities in urban areas and local board with school boards in rural areas. While this decentralisation did foster local initiative in expanding and improving primary education, it was used by Government to extend support and patronage to local vested interests as a counterweight to the growing tempo of national movement. As a consequence, the local bodies administering elementary education became fields for the exercise of personal factional power resulting in many mal-practices.

The period immediately following the end of World War I was one of great strees and strain. There was widespread economic distress owing to sharp price-rise, scarcity and the policy of retrenchment pursued by the governments. This period also witnessed the Khilafat agitation and the first wave of the non-cooperation movement of both of which boycott of official schools and colleges was an important programme. As a result, the movement for national education received considerable impetus and a number of national institutions, schools, colleges as well as universities, were established with thousands of students on their rolls. All these factors worked to retard expansion of education as far as the officials system was concerned. However with the withdrawal of the non-cooperation and beginning of economic recovery, there was a rapid expansion of education in the mid-twenties.

One must also note that with the heightened political and social awakening which characterised this period, new social segments entered the arena of education for personal or group advancement -- rural, middle-caste, land-owning section, the depressed classes, tribals, Muslims, women,etc. This resulted in educational expansion receiving a great stimulus. It must also be mentioned that as during the period of Dyarchy, the Congress was in the opposition. Education Ministeres generally lacked the political strength which is necessary for systematically planning for the expansion and improvement of education.

The sum total of the favourable and unfavourably factors noted above however affected a fairly rapid expansio n of education in the Dyarchical period (1920-21 to 1936-37). Enrolment* in primary schools increased from 6109.8 (1921-22) to 102243 (1936-37), that is by 67 per cent. There was even a more rapid expansion of secondary education. Enrolment in secondary schools rose from 1106.8 (1921-22) to 2287.9 (1936-37) registering an increase of 107 per cent. Similarly the number of students in Arts colleges rose from 45.4(1921-22) to 86.3 (1936-37) which is an increase of 90 per cent. Professional education expanded at a slower rate, enrolment in them rising 13.7 (1921-22) to 20.6 (1936-37), that is by 51 per cent.

* Enrolment figures in thousands

This expansion was not a smooth and steady process. The quinquennium 1927-32 was the period of the Great Depression as well as of the second wave of the non-cooperation movement and it consequently withessed a considerable setback to educational progress. (For instance, while enrolment primary schools during 1922-27 was 19.08 lakh, in 1927-32 it was only 11.14 lakh). The second point to note is that this expansion displays features which have persistently characterised Indian education in later years and have been carried over to post-Independence period as well. There was rapid increases of secondary and higher education relatively to primary education and of liberal literary education compared to professional and technological education.

This phenomenal educational expansion had a darker side to it. The effect to introduce free and compulsory primary education in which the Bombay and Madras presidencies and the Punjab took the lead did not cover any sizable chunk of school -going children. Only about 13,000 villages out of about 700,000 came under the Act; and the enrolment in them was of the order of 60 to 80 per cent. In the regular primary system about 65 to 70 per cent of the enrolled students attended school. Wastage and stagnation in primary education were just appalling. Out of every 100 boys enrolled in Class-I, only 28 could reach Class-IV.during the period 1932-37; and of these only 18 passed Class-IV. The corresponding figures for girls were 14 and 8.

An idea of the extent of the stagnation which then prevailed can be had from the fact that almost a quarter of the enrolment in primary schools in the twenties consisted of pupils of age between 10 and 20 years. The causes of wastage and stagnation were partly economic and partly to be found in poor and inept padagogical methods.

As noted above, the increase in enrolment in secondary education in the period 1921-22 to 1936-37 was higher than in other sectors -- more than 100 per cent. This was mainly due to the fact that middle social strata, particularly the upper section of peasantry and other rural population developed a keen urge for secondary, that is English education. Schools were organised in smaller towns and some of the bigger villages through local voluntary effort. For instance, it was in the late twenties that the Rayat Shikshan Sanstha strove to establish primary and secondary schools and hostels with only austerely bare facilities in Satara and adjoining districts in South Maharashtra. An important reform in high school education during this period was the change in the medium of instruction and examination from English to Indian languages. The excessive importance attached to English however continued partly because most secondary students aspired for collegiate education where English continued to be the medium of instruction and partly because knowledge of English was a passport to a white-collar job. The liberal literary character of secondary education, its lack of vocational and technical content and its consequential unsuitability to rural life continued to attract severe criticism. Some agricultural-bias schools

were started in response to this criticism and the subject of rural science was introduced in village schools in Punjab. These experiments were not successful. The prevailing secondary education did not lack defenders who pointed out that as high schools were preparing students for white-collar jobs to which they aspired they were in fact providing vocational education. One dark spot on the secondary education of this period was the miserable service conditions of secondary teachers whose salaries were low and who had no security of tenure.

The most notable developments in higher education in this period were: the incorporation of five new universities Delhi, Nagpur, Agra, Andhra and Annamalai -- the last two of which embodied the concept of a regional university which specially caters to the cultural and linguistic needs of a particular region; increasing assumption of the role of teaching and research by the universities in which Calcutta University provided a lead; the establishment of the Inter-University Board in 1925 which continues to this day in the form of the Association of Indian Universities.

The Calcutta University Commission had recommended among other things adoption of what recently has come to be called '10 + 2 + 3' pattern, a 10-year higher secondary course followed by a 2-year higher secondary course in an intermediate college, followed by a 3-year degree course. This proposal was given a trial rather half-heartedly in the U.P., Bihar and the Punjab but did not evoke much

response partly owing to financial reasons and partly because the degree course would have lengthened from four to five years. The financial considerations was that the universities would have lost the fee income from the Intermediate examination and colleges the fee income from the first two years of college which would be transferred, under the proposed arrangement to Intermediate colleges. The provinces which adopted the pattern did not extend the degree (post-Intermediate) course from two to three years.

The national and social awakening which pervades this period had a powerful impact on women's education. The All-India Women's Conference on Educational Reform held in 1927 at Pune voiced ugent demands about the education of girls and women. Indian ministers in charge of education extended a helping hand to the cause of women's education. Enrolment and institutions increased much more rapidly during 1922-27 than ever before, though wastage continued to hamper real growth. As usual, secondary and higher education registered advance at a greater pace than primary education. Middle class families were now anxious to provide education to their daughters for opening professional careers to them.

This period also witnessed social awakening in the Muslim community and an intensification of their sense of a distinct identity. One of the powerful factors which hampered spread of modern education in the Muslim community was their strong preference for traditional religion-based

education over the secular education provided by the official system. Their insistence on sending their children to Urdu schools irrespective of the linguistic region to which they belong was another inhibiting factor. Even then Muslim enrolment in the (official) educational system showed a slight edge over that of the general population. It was more than 24 per cent of the total enrolment. About 80 per cent of this was however in primary schools and beset with wastage and stagnation. The number of Muslim in secondary and higher education rapidly declined in comparison with non-Muslims. Muslims advanced a number of educational demands in the peridd like the demand for Urdu schools in non-Urdu areas; reservations among teachers and inspectors, free-ships and scholarships which were liberally met by the Government.

Special measures for promoting education in the Depressed Classes (Scheduled Caste) were also officially pursued in the period of Dyarchy. These included provision of freeships, scholarships, books, for opening 'special' that is separate schools, training of DC teachers to man these schools, and special inspecting staff. Gandhiji's Harijan movement, the independent movement for self - assertion led by Ambedkar, the pioneering work done by Christian missionaries and enlightened princely rulers like thos of Baroda and Kolhapur combined to give a powerful impetus to the education of Depressed Classes which, with the support extended by the special measures

referred to able, resulted in a significant increase in enrolment during this period. (Figures not given). However, much of this enrolment was at the primary stage, the percentage of girls was very less and wastage and stagnation continued to drag educational progress.

This period also witnessed non-official efforts to spread education in the tribal population of India which amounted to one-tenth of the entire non-Muslim population. In this area also Christian missionaries were the pioneers though in the thirties their educational efforts were supplemented by those of Indian social reformers inspired by Gandhiji in the form of schools and ashramashalas. As a result, schools and enrolment went on increasing in tribal areas though reliable consolidated data regarding tribal education became available only after 1937.

The educational advance of DC as well as the tribals resulted in the emergence of a new leadership among these social sections which functioned as an instrument for assertion of their new aspirations and self-identity.

It must be noted that the rapid educational expansion of the period which was progressively reaching out to disadvantaged social sections not unexpectedly attracted criticism in the name of quality of education. The Report of the Hartog Committee may be taken as representative of the conservative point of view which fixed its gaze on the negative features of the educational scene lime wastage,

stagnation, low quality of education, lack of good teachers etc. and prescribed in the words of the Report, "Concentration on consolidation and improvement" instead of expansion for a long time to come. The Report, one may say, was out of time with the developing Indian situation and the newly activated social forces which were shaping it.

letting children learn

india's rough passage towards universal primary education

Primary schooling is not just the first of successive levels of education, but rather the first in importance among pre-requisites for human and social development. All the same, not many developing countries have been able to move fast enough in this direction.

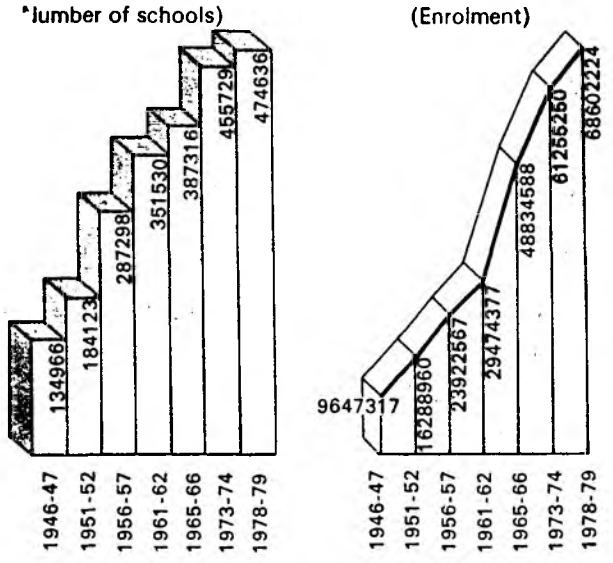
The pace and problems of making primary education accessible to all of India's children are analysed by J P NAIK. He also sees the aim as organically linked to adult education.

the national goal

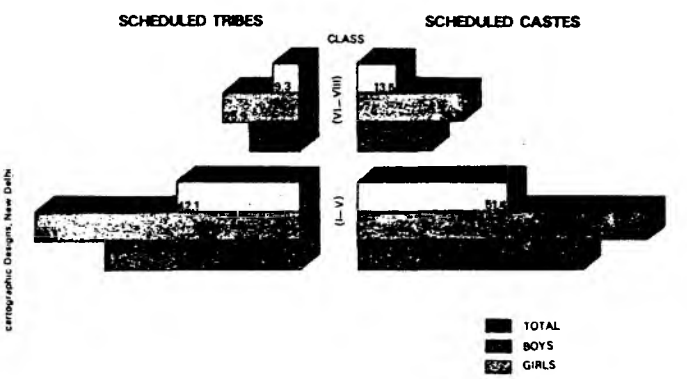
Among the Aryans who came to India, there was a tradition of giving a certain basic education to all boys and girls. Over the succeeding centuries, a hierarchical society developed in the country and this tradition was eclipsed. The situation deteriorated with the passage of time and, at the beginning of the 19th century, the spread of formal education including a knowledge of the three Rs became restricted to a small minority.

The surveys about the extent of the spread of primary education among the people, conducted by the government in different parts of the country, showed that the local communities generally organized schools on their own for the primary education of children; that such schools existed in almost all villages, the bigger villages and towns having several such institutions; that only a small proportion (one to five percent) of children in the age-group 5-15 attended schools; that such education was mostly availed of by boys; and that the percentage of literacy among adult males (inclusive of those who could only sign their names) was only about six. At that time, even the concept of universal education of all children was not socially accepted. And, in fact, the common belief was that primary education was meant only for the boys of the upper social castes or groups and that such education was unnecessary or even harmful for girls or for the children of the lower social groups and especially the 'untouchable' castes.

PRIMARY EDUCATION



ENROLMENT OF SCHEDULED CASTES AND SCHEDULED TRIBES
(Children at Elementary stage as proportion of their population 1977-78)
(In percentage)



an old dream

In such a situation, the first obvious step was to educate public and official opinion to accept universal primary education as a national goal. The lead in this was taken by the enlightened national leadership. Mahatma Jotiba Phule advocated the spread of education among all the people and especially among women and the untouchables (1851). Dadabhai Naoroji pleaded for the introduction of universal primary education before the First Indian Education Commission (1882). Gokhale first moved a resolution on the subject in the Central legislature (1910) and then introduced a Bill (1912) which was thrown out under pressure from the government. The province of Bombay was the first to pass an Act on the subject, known popularly as the Vithalbhai Patel Act (1918); and during the next decade or so, almost all Provinces passed similar legislation. The concept of universal primary education became an integral part of the national system of education which began to be discussed in earnest since 1906; and eventually Mahatma Gandhi put forward his scheme of basic education which would provide seven years of education woven round socially useful productive work and whose content would be approximately equal to the matriculation minus English.

restored hope

All these non-official efforts exerted considerable pressure on government. The latter tried to expand primary education as far as possible but refused to accept responsibility for providing universal education on administrative and financial grounds. But all such caution was set aside by the government of free India which included a special clause in the Constitution, adopted in 1950, to the effect that the State shall endeavour to provide, by 1960, free and compulsory education to all children till they complete the age of 14 years (Article 45). The efforts of national leaders spread over about one hundred years were thus crowned with the promise of success. And, universal primary education became a national goal within three years of the attainment of independence.

progress in practice

What attempts have been made to fulfil the directive c Article 45 of the Constitution during the past three de and how far have they succeeded in realizing this nat priority?

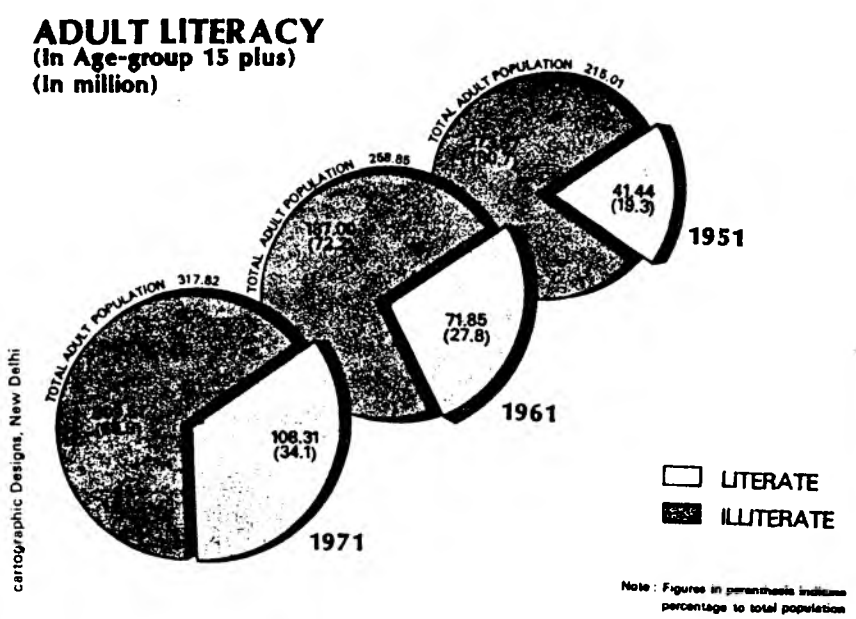
India began at a fairly low level of achievement in 194 spite of all the expansion of primary education achieve under the British rule during more than 130 years (18 1947) the picture of primary education at the dawn of independence was unsatisfactory. Thousands of village were without schools; only one child out of three in th age-group 6-11 and only one child out of eleven in the group 11-14 were enrolled in schools; the rates of was and stagnation were very high; and the quality of primi education left a good deal to be desired. This low starti point only implied that a well-planned, intensive, and sustained effort was needed to achieve the goal of universal primary education by 1960. It is a pity that th effort was not made and that, in the development of education in the post-Independence period, priority wa accorded to secondary and higher education and not to primary education.

more schools

It is not that India has not done anything whatsoever. Considerable resources were invested in expanding the facilities for primary education. For instance, the numb primary schools has increased from 209,671 in 1950-5 478249 by 1979-80 that of middle schools from 13, 59 114720 during the same period. It may be said that a primary school (classes I-V) is now available within eas walking distance from the home of about 95% of the children and that a middle school (classes VI-VIII) is similarly accessible to about two-thirds of the children. therefore comparatively easy now to provide adequate access to all children to both primary and middle schoo education.

slow enrolment

The attempts to secure universal enrolment have not h



an equal success. The total enrolments in primary education (classes I-V) have increased from 19.2 million or 42.6% of the child population in the age-group 6-11 in 1950-51 to 79 million or over 83% of the child population in 1979-80; and those in middle school education have increased from 3.1 million or 12.7% of the child population in the age-group 11-14 in 1950-51 to 19 million or about 40% of the child population in 1979-80. It has been estimated that about 80% of the children are enrolled in schools, generally between the ages of 5 and 8 and the 20% who never go to school include mostly girls and children of the poorest and the lowest social groups. This expansion of primary education is unprecedented in India's own educational history. And it is better than the progress shown by many other developing nations in the contemporary situation. All the same, this progress is far from adequate, especially in view of the growth of population; and at this rate, it may not be possible to enrol all children in primary schools even in another ten years. The task of enrolling additional children becomes exponentially difficult beyond an enrolment of 85% or so.

poor retention

Perhaps failure is the greatest in reaching universal retention or in ensuring that every child who is enrolled in schools is retained therein till he completes the primary course or reaches the age of 14. The rates of wastage were very high in 1947; and even now, they have been only marginally reduced: out of every one hundred children enrolled in class I, only about 50 reach class V and only about 25 reach class VIII. It is mainly because of this large wastage that primary education makes so small a contribution to literacy which has increased only from 14 to 36% and unless effective steps are taken to reduce this wastage, the directive of Article 45 of the Constitution may not be fulfilled before the end of the century.

low quality

Attempts to improve the quality of primary education have probably been the least effective. There has been some success in raising the remuneration and professional competence of primary teachers, in improving curricula, textbooks, and supervision, and in providing amenities such as free books and school lunches to a proportion of the children enrolled. But, by and large, the primary school of today is a very humble institution, often ill-equipped and ill-housed, largely unrelated to its local environment, and generally of such low standards that it fails to attract and retain a large proportion of children. The needed qualitative improvement of primary education is probably the greatest challenge of all and the most difficult problem to be solved to realize the national objective.

In the paragraphs that follow, we discuss why India failed to solve these problems satisfactorily during the past 30 years and what measures can be taken to solve them and to fulfil the Constitutional directive on primary education in, say, about ten years from now.

social demand

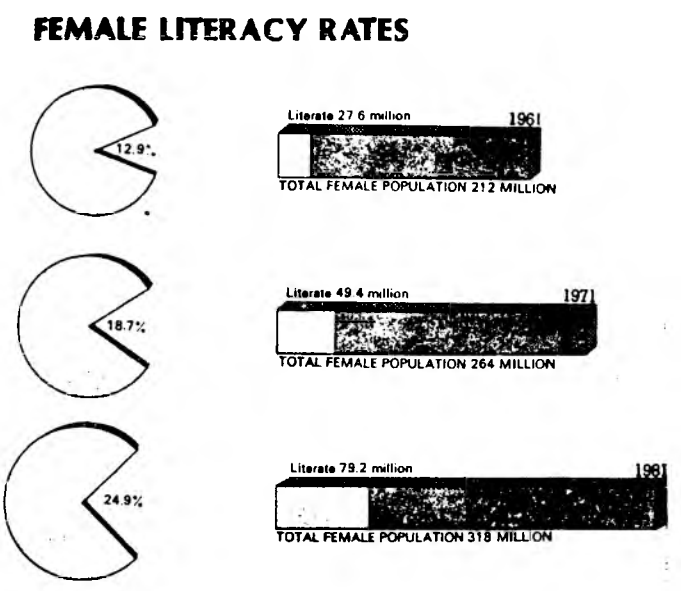
One reason, and probably the overriding reason, which hampers the progress of primary education is the absence of strong social demand for it among the people, especially among the poor people and the weaker sections of the society. Being uneducated and illiterate, they do not see any advantage in being literate or attending school—an attitude which is strengthened by the general irrelevance of the school programme to its environment or to the future life of the children. In fact, many of them regard education as an undesirable activity which alienates children without fitting them for an alternative and improved way of life. They are therefore uninterested in the local primary school and have little contact with it. They do not care whether or not the teacher attends the school and much less whether or not he teaches. They are not particular about sending their children to school and in fact may even object to the education of girls. But when they are too young to be of use (generally between the ages of 5 and 8), they do not object to the teacher taking them to school instead of playing in the streets : this is a mutually convenient arrangement and helps the teacher to hold on to his job and provides the parent with a free-of-charge baby-sitting institution. But as soon as the children grow up and begin to work or be useful, they withdraw them from the school. The teacher does not mind because he can easily replace them with other young children. But it is this withdrawal that is responsible for the frighteningly large rate of wastage which has shown but a very small decrease over the past thirty years.

parent's interest

Similarly, these parents do not often provide the children with the needed books and other educational equipment (very often, they are too poor to do so). They do not or cannot take an interest in their studies, and are also incapable of providing that encouragement and guidance which children badly need from their parents. Consequently, their children do not get the best out of the school even for the short time that they are there: they learn little and, often forget very soon what little they have learnt. If all these formidable hurdles in the progress of universal primary education are to be overcome, there is no alternative but to create a strong social demand for education among the people.

parents' literacy

How is this demand to be generated? Perhaps the most potent tool is adult education including the liquidation of mass illiteracy. Even today, one finds that the education of the parents (especially of the mother) makes a tremendous difference to the future education of children. A literate parent generally sends his children to school, provides them with the needed books and equipment, takes an interest in their studies, and retains them at school as long as possible. It would therefore be quite correct to say that the education of the parent generates the strongest social demand for primary education and becomes the best insurance for the education of children. If this is true, it follows that we must organize the campaign for universal primary education side by side with an equal or even stronger campaign for adult education. This was what the socialist countries did with good result. In India, a great mistake has been that the programme of adult education was altogether ignored with disastrous consequences for the progress of primary education. Lately, financial resources for a major attack on the problem of adult illiteracy side by



side with an intensive drive to spread the primary education are provided.

adult responsibility

Another instrument, though not so powerful as the liquidation of adult illiteracy, is the education of the parent with regard to his responsibilities towards the child and in particular about his duty to give him at least the basic primary education which is needed in the modern world. This can be done through enrolment drives which should be organized annually for about three months in the beginning of the school year. Every official and non-official agency should be used in these drives to talk to parents to hold a house-to-house census of all children of school age, to enrol non-attending children, and generally to create an atmosophere supportive to the spread of primary education. It is not that such drives have not been organized but the efforts have been sporadic and discontinuous and have depended more on the interest of individual officers or ministers rather than formed part of a national policy to be sustained in all parts of the country continuously. By and large, we have made the primary teachers themselves responsible for enrolment without much outside assistance or supervision so that they have generally tended to do the least that is needed under the law and bogus enrolments have tended to predominate. A better planned and sustained system of annual enrolment drives using, not only the primary teachers, but also all other relevant agencies, both official and non-official, will go a long way in helping a quick spread of primary education. As resistance to education of girls is a definite component of the traditional culture of several social groups, a deliberate effort to overcome it and to impress the significance of the education of girls on the minds of such social groups should be an important element of these campaigns for parental education.

relevant learning

A third and an even more important means of creating a genuine social demand for education among the poo the deprived people is to tune primary education to t life and needs. The inability to sell education to them only partially due to their ignorance: it is even more the fact that this education is not really saleable. Wh are trying to do is to spread our education, based essentially on western, middle-class, and urban conc and values to a traditional, poor, and rural society. W we really need therefore is a transformation in the character of this education, its adjustment to local environment, and its attunement to the life of the pe to be educated—to their needs and aspirations. This major academic challenge to which the educated community—itself alienated from the people—has pa little attention. It is to this challenge that we have no address ourselves.

barrier of poverty

Another potent reason for the failure to spread prima education is poverty: most of the non-attending childr and those who are dropped or pushed out mostly co from the poor people who live below the poverty line Poverty has been a handicap for the spread of educat and not only in India, but everywhere. If the removal poverty were that simple, one should recommend it a tool for the universalizing primary education. But the problem of poverty is more intractable than that of ignorance. We must therefore evolve techniques whe primary education can become universal in spite of p and, in fact, can even be used as an instrument to re poverty itself. In other words, the attacks on poverty a ignorance have to be made concurrently and the latte to be used to strengthen the former. This problem ha received little attention so far, mainly because nationa plans have not yet accorded that priority to the improvement of the standards of living of the poor an rural people which it deserves. It is high time that we accorded this priority and took the essential social an economic measures that would help the spread of education.

work and study

In addition, we must also give some thought to two major programmes. The first is to evolve techniques which will enable children from poor families to work and learn. In the present system, it is very unfortunate that work and education are incompatible with and inimical to each other. A child must either work or attend school (which generally insists on full-time attendance)—it cannot do both. Consequently, it is only the children of well-to-do parents (who can afford to feed, clothe, equip, and send their children to school) that receive primary education which is denied to the child from poor families who must work in order to survive. A way out of this situation is to provide part-time education at convenient hours so that children can work and also learn. The present rule usually is that children must attend either on a full-time basis or not at all. Instead, we should adopt a new policy which will say that every child must attend school from the age of six to the age of 14, on a full-time basis if (and when) possible and on a part-time basis if (and when) necessary.

Of course, the adoption of this policy will have to be accompanied by making large-scale arrangements for the conduct of part-time primary education and middle schools to which all children who are required to work will have easy access. Such a programme can prove to be the most effective check to prevent premature withdrawals or to bring down the existing high rates of wastage.

learning by doing

Would such part-time education not be a poor substitute for full-time education? It need not be so. Work has to be an integral part of education and consequently, even children from well-to-do families must be required to spend adequate time in work-experience and engage themselves in socially useful productive work. On the other hand, these children who work and have that experience already need to concentrate on liberal education. The gap in the time spent in formal education by the two groups of children need not therefore be very wide: and if proper teaching methods are employed it is possible to bring up the attainments of part-time students almost to the same level as the rest of full-time students.

The second programme to reduce the handicap of poverty is to provide free books and equipment, free clothes and free lunches to children who need them. These programmes have been initiated; and steps must now be taken to provide the needed resources and to expand them to cover all needy children. Wherever possible and necessary, some individual attention and personal tuition should also be provided to children from unsatisfactory home backgrounds to enable them to catch up with other students.

non-formal programmes

A large number of academic problems will have to be tackled in the process of making primary education universal. These are extremely important and rank next only to the socio-economic issues raised above. Perhaps the most important of these is that of education in a non-formal setting.

The spread of primary education, especially to the poor is adversely affected by our almost exclusive reliance on the formal education system which insists on a single-point entry (in class I at about the age of 5 or 6), sequential annual promotions, almost exclusive use of fulltime professional teachers and absolute conformity with full-time attendance. All these rigid features have to go and a new elastic educational structure must be created with high emphasis on non-formal means of education if primary education is to become universal in the near future. This will need the implementation of several major reforms.

(a) The insistence on the single-point entry in class I at about the age of 5 or 6 should go. A large proportion of children do not enter the school system in this way and there should be adequate provision for it through additional entry points. For instance, grown-up children in the age-group 9-11 or 11-14 (or even 14-17) who have not been to school at all and who desire to study should be free to join special part-time classes organized for them and complete the studies in classes I-V at their own pace. Similarly, those children who have completed class V (either on a full-time or on a part-time basis) should also be able to study in part-time special classes and complete the studies for classes VI-VIII at their own pace.

(b) The system of dividing the formal school into fixed grades (I to VIII) and to arrange annual promotions from one grade to the next has a certain utility and may continue where necessary. But it is not a very good system, from the academic point of view, even for full-time education. It is not at all suitable for part-time students who are keen to maximize their learning in the shortest time. The ungraded system should therefore be adopted even in the full-time formal schools. It is of course a must for all part-time classes on non-formal patterns of education.

(c) This system of annual promotions is based on the concept of keeping the time (i.e., one year) constant for all children to master a prescribed unit of studies. As abilities of children differ, their attainments during this constant period of one year vary considerably. We accept these variations and grade students, some of whom get a first class and others fail. But let us not forget that this is not the only basis for organizing primary education. We can also organize it on the basis that a minimum achievement is kept constant for all children and the time they take is allowed to vary. In this system, known as mastery learning, the entire course of primary education is divided into a few sequential units and every student is expected to master one unit before he passes on to the next. What then happens is that all students achieve a minimum standard, some in a short time and others in a longer one. The adoption of this method will obviously make primary education more effective and useful.

(d) As stated, the present exclusive emphasis on full-time education has to go and programmes of part-time education have to be developed in a big way if children who are compelled to work on economic grounds are to receive education (and such children are about 50-70% of the total).

(e) Similarly, we have to give up our exclusive dependence on full-time professional teachers and learn to use all the

teaching resources in the community in order to reduce costs and to increase effectiveness of instruction. The primary schools should therefore freely use local talented persons to teach even in the formal schools on a part-time basis (e.g. for subjects such as productive work or music). The use of such persons in non-formal programmes is an absolute necessity.

If these changes are made, we shall be creating another channel of education—the non-formal channel which will be a viable alternative to the formal channel which alone exists at present. In this alternative non-formal channel, the classes should be small in size (15 to 20 students), should ensure that the number of working days is increased to about 300 a year by cutting down on holidays, should supply free books and equipment, and should use the ungraded system and mastery learning methods to ensure good progress on the part of each student. This will also reduce the academic gap between full-time and part-time education to a considerable extent.

The utilization of the existing system of primary education is mostly restricted to the children from well-to-do homes because of our almost exclusive dependence on formal modes of education. The development of non-formal means of education, more than any other single factor, will help us to correct this imbalance and to extend primary education to all those poor and underprivileged groups which are now denied access to it.

room for reform

Improvement of standards and increasing the relevance of primary education is yet another major academic problem which has to be tackled on a priority basis. In this context also, several major reforms are called for.

Curricula need revision. Emphasis has to be on the teaching of language and mathematics. Science with reference to local environment counter-acting superstitious beliefs and creating a rational outlook needs to be highlighted. Participation in socially useful productive work should be obligatory. There should be adequate emphasis on physical education, sports and games as well as on the fine arts and cultural activities. The existing curricula have only one overriding objective, viz., to prepare the student for admission to a secondary school. While this objective is valid, the other more important objectives are: to introduce the child to the best elements of human culture; to create a desire for learning and to enable him to learn further by himself; and to prepare him for his future work and life so that his education becomes relevant and useful even when he does not go to a secondary school. Adequate attention given to these objectives will greatly change the nature of the existing curricula and make them more meaningful and attractive to the vast bulk of the children who will not and cannot proceed to secondary education. They will not also create a problem for these children who do want to go to a secondary school because their needs can be easily taken care of either by some adjustment in the curricula for secondary schools or by providing suitable bridging courses.

Text-books and other educational materials needed for primary schools will have to be greatly improved. In particular, there is a need for a variety of materials useful for different environments. The costs of these materials will have to be kept down and, as said earlier, they will h be given free to all needy students.

Methods of teaching and evaluation will have to be g altered. New and more dynamic methods of teaching will de-emphasize rote-learning and encourage activ independent thinking, planning and execution of proje and problem-solving will have to be adopted.

Quality of professional teachers will have to be impro and they should be enabled to teach side by side with selected members of the local community.

Supervision of primary schools will have to be consid improved, especially by bringing the schools closer to local community and through the development of sch complexes recommended by the Education Commissio (1964-66).

Single-teacher schools will continue to exist and des greater attention than now. Their numbers should be reduced to the extent possible. But where they have t exist, they should be improved through suitable acade programmes and the participation of part-time and voluntary teachers from the local community.

Extra-curricular activities and provision of suitable bu and equipment are largely neglected at present. In fac about 95% of the existing expenditure on primary edu is spent only on teachers' salaries. In a good system, t expenditure on items other than teachers' salaries sh be about 30%. This implies, not only an increase in to outlay, but also the development of such programmes free supplies of books, provision of school lunches, be attention to buildings and equipment, and a more imaginative programme of curricular activities.

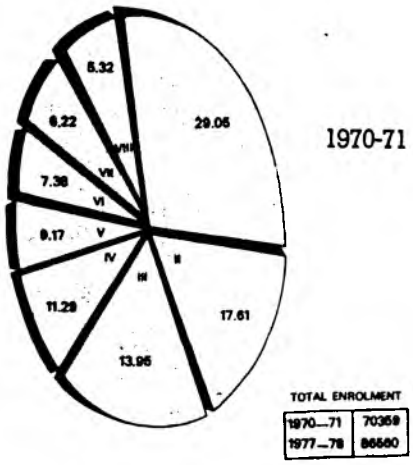
A question of quality

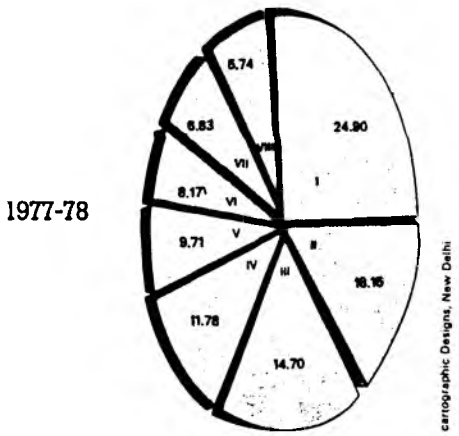
Quality of primary education is closely related to its expansion. If the quality of education is not good, it wil sell and it will not be possible to make it universal. Eve one could do so, the spread of the education of poor qu will be undesirable and counter-productive. On the oth hand, good quality primary education will be able to att and hold students better and thereby assist materially i universalizing it. The significance of these academic problems (which have been largely neglected so far) ca therefore be over-emphasised.

common school system

In connection with the improvement of standards in primary education, mention needs to be made of the common school system. At present, our educational sy is really a dual system consisting of a small core of fee charging private schools which maintain good standard (these are availed of by the powerful, rich and well-to-d social groups) and a large periphery of free but substan public schools (these only are available to the masses). leads to a very undersirable segregation between the children of the haves and the have-nots. What is worse the powerful social groups lose all interest in the free government schools which really are meant for "other people's children". A major reform of primary educatio would therefore be to remove this dualism. All primary schools, whether public or private, should be made free

CLASS-WISE COMPOSITION OF ENROLMENT
(At elementary stage)
(Percentage)





access to every primary school should be open to all children who live in its neighbourhood, irrespective of social class or economic status. This concept of neighbourhood school advocated by the Education Commission (1964-66) will bring together the children of the haves and the have-nots together under a common school system and thereby help in creating a cohesive and egalitarian society. What is equally important, it will help to improve standards of primary education all round in a short time.

In making primary education universal, several administrative and financial issues need close attention. The more important of these are briefly noted below.

access to administration

— The administration of primary education should be as close to the people as possible. In other words, it is the local community that can best administer its primary schools. Steps would therefore have to be taken to associate the local community with the administration of primary education in an effective manner. This will bring the primary school and community together in a programme of mutual service and support.

education and equity

The provision of primary education is generally unequal between different communities and this trend becomes even stronger when local communities are allowed to administer primary education. What generally happens is that poorer local communities (which need better and more education) are generally unable to provide it and a wide gap develops between the extent and the quality of primary education in poor local communities and the rich ones. These inequalities affect all other levels of administration also and similar inequalities are found between districts, between towns and cities, between urban and rural areas, and also between the richer and more advanced States and the poorer and more backward areas. What is needed is a conscious and sustained effort to reduce such regional imbalances through an appropriate system of grant-in-aid from the districts to the local communities, from the States to the districts (or major towns and cities), and from the Centre to the States.

— There are also imbalances between different social groups just as they exist between different regions. It is therefore necessary to strive to reduce these also and make special efforts for the education of girls, scheduled castes and tribes, and other backward communities.

— There is considerable waste and ineffectiveness in existing expenditure on primary education. This will have to be examined in depth and appropriate action taken by the Central and State governments.

— Every attempt should be made to encourage experimentation and innovation.

— The unit costs in primary education will have to be reduced so that it becomes financially feasible to provide universal education; and the total allocation to primary education will have to be substantially increased and saved from the temptation to divert them to other sectors.

— Better and prompt methods of monitoring progress of primary education will have to be devised.

policy for action

The preceding discussion shows how complex the problem of universal primary education is and what supreme efforts are needed to provide it. The essential components of this effort are: a relentless determination of the nation to achieve this goal which provides a basis of equality; creation of a strong social demand; reduction of mass poverty; development of large-scale programmes of non-formal means of education; qualitative improvement; adoption of the common school system; reduction of imbalances of educational development between different social groups and regions; large-scale administrative

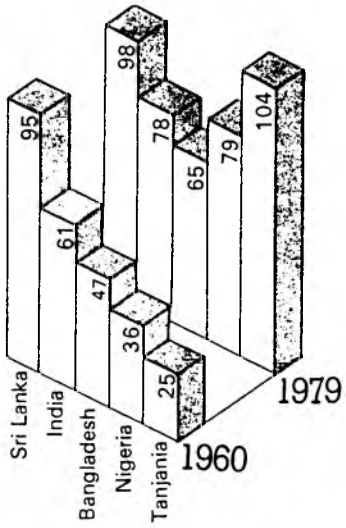
decentralization; considerable increase in financial outlays as well as their more effective utilization; and an improved system of monitoring and control.

While each one of these components has a place of its own, the most significant of them all is the first, viz, a relentless national commitment to provide universal primary education. This was seen at its best in the pre-independence national leadership. During the past thirty years one has seen the weakening and dilution of this commitment, in spite of all the brave words to the contrary, in the strengthening of the power-base of the upper and middle classes who have used the State to further their own ends and to perpetuate their own privileged position. The needed commitment therefore just does not exist and no one knows when the ruling classes of India will keep their sacred promise to the people and meet this essential basic need for universal primary education. This commitment may come either by a revitalization of the class leadership or through the development of a new leadership from among the masses themselves, probably the latter. And until the leadership develops, this major national programme will have to wait for fulfilment.

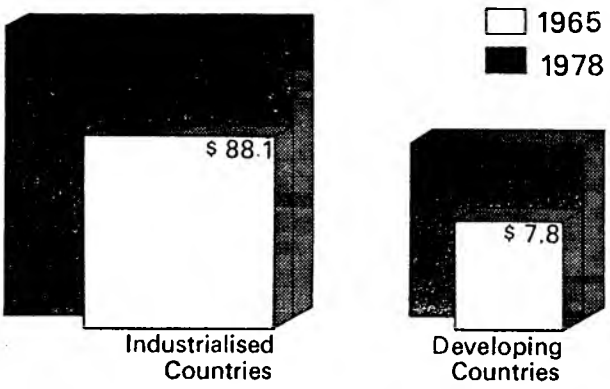
Educationist and social thinker, the late J P NAIK wrote this article towards the end of the 1970s. Its topicality remains. The statistics needed minor updating. Professor Naik's work is being continued by, among others, the Indian Institute of Education, Pune 411029, India.

The expression "Primary education" denotes education of children in the age-group of 6-14 or in grades I-VII or I-VIII, depending upon the prevailing pattern in each State of India.

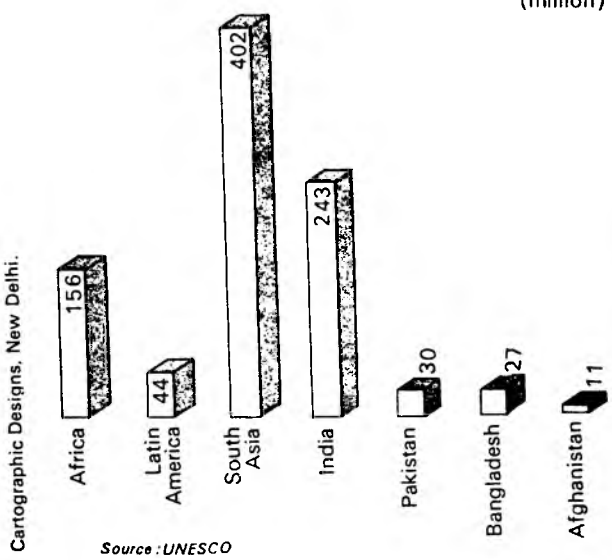
NUMBER OF STUDENTS AS PERCENTAGE OF AGE GROUP
(Primary school)



PUBLIC SPENDING ON EDUCATION
(billion)



NUMBER OF ILLITERATES OVER 15 YEARS, 1980
(million)



Extent of Stagnation and Drop-out at the Elementary Stage

Carefully conducted sample studies have helped in determining the extent of stagnation and drop-out at the elementary stage. A Study* conducted in 13 States on a highly restricted sample in 1976 revealed that the rate of stagnation and drop-out was higher in rural schools than in urban schools. The data were collected from the sampled schools for five years from 1971-72 to 1975-76 in respect of boys, girls and children belonging to Scheduled Castes and Scheduled Tribes. In States where primary education consisted of classes I-V(Andhra Pradesh, Bihar, Madhya Pradesh, Orissa, Punjab, Tamil Nadu, and Uttar Pradesh) the rate of stagnation and drop-out was 52 per cent in rural schools as compared to 27.8 per cent in urban schools. A difference was observable in the case of boys, girls and children belonging to Scheduled Castes. In rural schools, the percentage of stagnation and drop-out in respect of these groups was 43.3, 65.6 and 61.6 while for urban schools these percentages were 32.2, 22.3 and 34.2 respectively. However, in the case of Scheduled Tribes the rate of overall wastage was found to be lower in rural schools(21.4) as compared to urban schools(85.0 per cent).

The study also revealed that repetition rate was considerably more than that of drop-out in the case of schools having classes I-V. A large proportion of repeaters were in class I as compared to higher classes. While there were more repeaters in rural areas, the number of drop-outs was higher in urban areas.

In States where primary stage consisted of classes I-IV (Assam, Gujarat, Karnataka, Kerala, Maharashtra, and West Bengal) stagnation and drop-out rates were found to be higher in rural schools than that in urban schools. For the cohort year 1971-72, the overall stagnation and drop-out rate was 44.0 per cent, 50.6 per cent in rural schools and 36.3 per cent in urban schools. In the case of girls, the stagnation and drop-out rate were 48.1 per cent(total), 52.0 per cent in rural and 44.1 per cent in urban areas. In case of boys, stagnation and drop-out was 41.2 per cent, 49.7

* "Stagnation and Drop-out at Primary stage - A Sample Survey", National Council of Educational Research and Training, New Delhi; 1981.

per cent in rural schools and 30.5 per cent in urban schools. In States where primary stage consisted of classes I-V, the rate of repeaters in rural schools was found to be quite high in class I among all categories of pupils - boys, girls, Scheduled Castes and Scheduled Tribes - and between classes III and IV the rate was lower.

Another study * conducted in two blocks each in four districts(Gonda, Hamirpur, Sitapur and Pithoragarh) in Uttar Pradesh revealed that 62 per cent of the pupils enrolled in class I leave schools before they complete class V and of those enrolled in class VI, 18 per cent drop-out before they complete class VIII. The situation was found to be more or less similar in the case of schools in rural and urban areas. It was noticed that on an average 15 per cent of the enrolled children drop-out every year in different classes. Drop-out among girls was higher than among boys, 22 per cent of girls in the school going age were drop-outs from schools as against 12 per cent boys in the same age group.

The rates of drop-out were found to be highest in classes I and II; 30 per cent children in the rural schools and 25 per cent in urban schools dropped out in classes I and II. Children in the ages of 10, 11 and 12 years constituted the largest proportion of drop-outs both among boys and girls and in rural and urban areas. The study also revealed that the phenomenon of drop-out takes place most often when the child reaches an age when he or she could be of some help in household chores of some productive activity. It was found that in rural areas Scheduled Castes/Tribes families had higher number of drop-outs as compared to muslims and upper caste Hindu families. Muslim families in urban areas, however, had the highest number of drop-outs.

The study has also examined the effect of certain household factors such as demographic structure and education in the family on drop-out and the level of impact of the conditions of schools on the phenomenon of drop-out. It was observed that larger families had lower drop-out rates than was the case in smaller families. Families with higher dependency ratio had lower drop-out rates. Retention of children was found to be influeneed by

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* Problems of Non-enrolment, Non-attendance and Drop-outs in School: Study in Uttar Pradesh, GirilInstitute of Developmental Studies , Lucknow, 1982

the educational background of family members, particularly in rural areas. Drop-outs constituted only two per cent of the school going age population in the case of families with a graduate, four per cent in the case of those with a matriculate and nine per cent in the case of those with primary education as the highest education in the family. Families with persons having lower educational levels or illiterates had ten per cent of their children as drop-outs from school.

Among the school characteristics the number of pupils per teacher and availability of building, play ground and library were consistently related with drop-out. The drop-out rates were found to be less in schools with lesser number of pupils per teacher, good buildings, play ground and library facilities. The drop-out rate was also found to be lower in the case of schools with a local headmaster than schools with a person from outside the village as headmaster of the school.

The problem of wastage and non-participation due to inequality of opportunity in primary education in rural areas in Andhra Pradesh was examined in a Study* conducted during 1981-82. The study was restricted to four districts (Kurnool, Guntur, Mahbubnagar and Medak). In Guntur districts, stagnation was higher among girls than among boys. Stagnation was highest in class I as compared to all other classes. The drop-out rates were higher than those of stagnation in Kurnool while in Guntur the incidence of drop-outs was less than stagnation for all classes. Drop out rates were found to be higher for girls than for boys in all classes. The rate of drop-out was generally higher in first two classes as compared to drop-outs in other classes.

In Mahbubnagar and Medak districts, educational wastage at primary stage was of the order of 92 per cent. The average percentages of stagnation for boys and girls at the primary stage in Mahbubnagar district were 45.40 and 47.06 respectively. The average percentages of stagnation for boys and girls at primary stage in Medak district were found to be 67.12 and 72.57 respectively. It was found that while the percentages of stagnation for Scheduled Castes boys and girls in Mahbubnagar district were 39.38 and 44.61 respectively, the corresponding percentages for Medak district were 70.08 and 66.58 respectively.

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* Wastage, Stagnation and Inequality of Opportunity in Rural Primary Education : A Case Study of Andhra Pradesh, Administrative Staff College of India, Hyderabad, 1982.

The study had also attempted to investigate the factors responsible for widespread occurance of wastage. One of the factors, the effect of which was studied, was the quality of education defined in terms of school facilities, residence of teachers and the life. The results of the study did not indicate any strong association between quality of school and wastage in education.

In another Study" carried out in 1981 in Tumkur district in Karnataka, one of the aspects investigated was the extent of drop-out at the elemntary stage of education. Attempts were also made to identify the factors responsible for the incidence of drop-out. The study revealed that drop-out rate was highest in class I. Drop-out rate among girls was higher than that of boys, Drop out rate in illiterate families was found to be thrice that in literate families. Households of family size 5-8 in Scheduled Caste/Tribe and other caste communities had the maximum number of drop-outs. Important reasons for drop-out phenomenon included, assistance in household work, tending cattles, looking after younger siblings and working on daily wages.

All studies on stagnation and drop-out have indicated that the holding power of elementary schools in the country is very low. Repetition of classes by children indicates that on an average a child uses more years than the prescribed [illegible] years of primary education. Most of those who drop-out after class I or II relapse into illiteracy and add to the growing number of illiterates.

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* " A Study of Universald Primary Education - Tumkur District, Karnataka", Institute for Social and Economic Change, Bangalore, 1981.

TYPE OF SCHOOLS IN THIRD AND FOURTH SURVEYS

AREA TYPE	Percentage of Schools in Third Surveys				Percentage of Schools in Fourth Surveys			
	Boys	Girls	Co-Edun.	Total	Boys	Girls	Co-Edun.	Total
RURAL	6.74	3.49	89.77	100.00	3.90	2.71	93.39	100.00
URBAN	13.42	10.43	76.15	100.00	9.04	8.79	82.17	100.00
TOTAL	7.35	4.12	88.53	100.00	4.37	3.26	92.31	100.00

Infrastructure and Inputs

A school implies a proper school building with adequate black-boards, adequate furniture for pupils and teachers, necessary audio and visual aids, library with adequate and useful books and other suitable accessories. However, what is in practice is just provision of school without proper facilities in the school which is not attractive enough to bring children and enthuse them to stay in the school and learn. The Fourth All India Educational Survey has revealed that only 46.95% primary schools have good buildings while another 12.95% have partly pukka buildings. The remaining 40.10% schools do not have proper buildings and 8.58% schools are working in open space and 0.12% schools in tents. Of the total primary schools majority of the schools did not have adequate accommodation and the total number of additional rooms required was 7,58,017 which ranged between one to five rooms in them. In another 5,770 primary schools the additional number of rooms needed was more than five per school.

Another important aspect in the school is toilet in sophisticated terms and lavatory in common usage which is found in just 14.81% schools. As 92.3 per cent of the primzry schools are co-educational this item in the school premises is a must. It is the rural schools which suffer most in all these aspects and it was found that just 10.84% primary schools in rural areas had this facility in them as against 54.59% urban schools.

The basic minimum need in a primary school is a black-board, at least one in each classroom. But it is disheartening to note that just 60.28% primary schools had adequate black-boards in them. Again the disparity in rural and urban schools in possessing this facility was striking in that 78.05% urban schools had adequate blackboards as against 58.50% rural schools thus reflecting inadequacy of this item in more than 40% rural schools.

Both from the hygienic and weather point of view furniture is a must. It is found that 34.13% primary schools do not have mat or furniture while in another 46.45% schools whatever is available is just not adequate for all children. Only 19.42% schools have adequate mats and furniture. As against just 17.30% rural schools with adequate furniture in rural areas, around 40.63 per cent ~~40.63%~~, urban schools have adequate furniture reflecting the condition in rural schools.

Though primary stage is too early for children for effective use of library facilities, library with suitable books appropriate to the age can surely develop in children

reading habits. But this facility is lacking in more than 70% primary schools, with only 29.49% having this facility. It is needless to point out the rural/urban disparity since just 28.02% rural schools have this facility against 44.25% urban schools. Further larger proportion of rural schools (44.73%) have fewer books, 50 or less, while 35.86% urban schools have more than 200 books.

During the Fourth Five Year Plan a scheme of book banks had been initiated to enable them to use the text books during their study in each class and return the same to the book bank so that all could have the benefit of school textbook banks. But it is observed that 40.01% schools had this facility as against more than 50% schools having this facility at higher stages and at higher secondary stage as many as 82.78% schools had them.

Incentive Schemes

Programmes of mid-day meals, free uniform, free textbooks and attendance scholarships to girls were introduced to bring more children to the school and retain them. Any amount of incentive will not help as long as their motivation among parents and interest amongst children is lacking. Even the problem is too huge and the resources available are too meagre. It is observed that even the transportation and distribution of the material for mid-day meal is a problem. Only 26.71% primary schools are covered under the scheme but even in these schools not all children are covered. An almost equal proportion of schools in rural and urban areas are

covered under this scheme. Around 37.56% schools are covered under free textbooks and 12.62% schools under free uniform. Attendance scholarships for girls was available in 13.15% schools. However, in all these cases not all students are covered in these schools.

Medical check-up in schools particularly in rural areas is a necessity since many parents have complained that they cannot send their children to school due to poor health. Only 9.15% school have provision for medical check-up which is in just 7.68% rural schools and 33.91% urban schools.

Teacher

A qualified and competent teacher can overcome most of the shortcomings like good textbooks and other audio-visual aids. Around 34.75% primary schools are single teacher schools. It is observed that out of 15,99,182 teachers teaching in primary schools, 4,19,683 (26.24%) are under qualified with middle pass or below and around 13.32% of the total teachers are untrained. Majority of the teachers, 65.20% , who are just matriculates or equivalent do not have sufficient exposure to the modern techniques of teaching and learning and hence continue in the same old traditional way of teaching.

Women teachers constitute 27.5% of the teaching force and about 86.33% are trained but most of them are reluctant to go and work in rural areas since there are no minimum facilities in rural areas. In fact non-availability of women teachers in rural areas is among the major reasons for many girls not coming to school.

Enrolment The entire process of planning in Elementary Education is measured by the number of children enrolled and retained in the schools. Gauged by this yardstick the planning exercise is a disaster since our enrolment target at the elementary stage is no where near the achievement in the immediate future. But our educational planners do not seem to have learnt anything from the past failures in fixing the physical targets. According to the Fourth All India Educational Survey the gross enrolment ratio in Classes I-V was 81.65% for the age group 6 to below 11 (as on 30.9.1978) and 37.94% for Classes VI to VIII for the age group 11 to below 14. Still for the year 1984-85 these figures are estimated at 91% and 51% for the corresponding stages although we are no where near these additional enrolment growth after the Third Five Year Plan. In any case all the above figures include the children below and above the corresponding age groups and quite a large number of children in the age group 11 to below 14 are in classes I-V as against VI-VIII.

Age Specific In reality, only 64.13% children in the age group 6 to below 11, 41.92% children in the age group 6 to below 14 and just 56.10% children in the age group 6 to below 14 were in schools at various stages at the time of the Fourth Survey. But when these figures are split into rural and urban and boys and girls the position is rather gloomy. Suffice it to say that in the age group 6 to below 11 about 51.27% (47.41%), 11 to below 14, 29.37% (37.70%) and age group 6 to below 14, 43.38% (39.19%) girls were in schools with

figures in brackets indicating the enrolment of girls in schools corresponding to the respective age group. This indicates still the task ahead for achieving universalisation of even primary education let alone the elementary education. While slightly less than 50% girls in the age group 6 to below 11 including less than 50% girls in the age group from rural areas are still to be enrolled, in the age group 11 to below 14 slightly more than 70% girls with more than 75% girls within the age-group from rural areas alone constitute the non-enrolled group. Further although the Sixth Five Year Plan envisaged just 3 million students in part-time and non-formal education the Seventh Five Year Plan has an ambitious target of 40 million which is rather unrealistic and a far cry.

Inspection and Supervision The most neglected part in the area of school education is inspection and supervision. While the schooling facilities have expanded manifold inspection and supervision has not kept pace with this expansion. With the result the number of primary schools to be inspected by an inspector is 100 or more in an year. With his activities covering visits and inspections, travelling, receiving visitors, attending meeting and conferences, office work and other activities he has can hardly full justice to his main job. The activity profile of the school inspector, as revealed by Third All India Educational Survey (1973) indicates that only between 13-39% of his time is devoted for visits and supervision. This has resulted in several primary schools in remote rural areas which did not have the benefit of administrative ...

and academic guidance for even upto six or seven years. The teacher force is expanding with more than 2 million teachers at primary stage alone of whom around 65 are just matriculates. While there has been continuous and fast changes in modern techniques of teaching learning prodess the vast number of primary school teachers who are not highly qualified and do not have the benefit of these latest developments. There is no possibility of exposing this large number of teachers to inservice training programmes within a short duration. Hence the only source of their getting the much needed academic guidance is the inspector. Hence, this area requires immediate attention to increase the number of inspection and supervisory staff so that they can have a manageable proportion of schools to cover, say between 35-40 an year.

TOWARDS UNIVERSAL ELEMENTARY EDUCATION
PROMISE AND PERFORMANCE

JOHN KURIEN

The most conspicuous failure of the Indian educational system has been the inability after three decades to implement the directive of Article 45 of the Constitution which had recommended that by 1960 the State provide free and compulsory education for all children until they complete the age of fourteen years. In retrospect the target date was far too ambitious. For even if it were possible to have mobilised the maximum possible capital and ~~human~~ human resources, ten years was too short a period for any regime to have achieved universal elementary education considering that at the onset of undependence schooling facilities were extremely limited, and that the vast majority of children did not attend school.

Official Enrolment Data

The final (not estimated) and the latest elementary educational data that is available is for 1975-76. The figures show an enrolment of 656.6 lakhs in Standards I-V as being 83.8 per cent of the corresponding age-group 6-11 years, and 160.2 lakhs in Standards VI-VIII as being 36.7 per cent for the corresponding age-group 11-14 years. These represent a considerable rise in enrolment from 1950 where the total number of children in Standards I-V were 191.5 lakhs and 43.1 per cent of the age-group 6-11 years, and 31.2 lakhs in Standards VI-VIII and 12.9 per cent of the corresponding age-group 11-14 years.

Corrections Required in the Official Enrolment Statistics

For the lay reader and even many in the field of education, these enrolment ratios quoted in the Ministry of Education annual year-

Source. Political and Economic Weekly 3rd Oct 1981.

enrolment ratio

books are taken at face value as meaning what they imply. For example, the enrolment ratio of 83.8 per cent in the age group 6-11 years in Standards I-V for 1975-76 is commonly understood as taken to mean that only 16.2 per cent of about 13 million children are not enrolled in the primary stage of instruction. These enrolment ratios are misleading and need to be refined.

In our elementary schools children of varying ages are to be found in the same class. In Standard III, for instance, where all students should be around 8 years old, in 1970-71 there were more than 25 lakhs of children who were 7 years or younger and more than 4 lakhs of children who were 12 years or older! This heterogenity in the age-group in each class is due to a variety of reasons including premature or late enrolments in Standard I, failure and repetition of classes. The official enrolment ratios mislead, by comparing all the students who are in Standards I-V including those below 6 years, and those 11 years and above with the total number of children in India in the age-group 6-11 years. The same holds true for the official enrolment ratio fo the age-group 11-14 years in Standards VI-VIII, which compares all the children enrolled in these classes including those below 11 years and those 14 years and above, with the total number of children in the age-group 11-14 years. And in so doing, those unaware of the above and below age enrolments get an inflated picture of our achievements in enrolling children in our elementary schools, and a corresponding optimistic but deflated understimate of the number of children who are not attending school.

To find the appropriate indicator of our achievements in enrolling children in our elementary classes and to estimate accurately the number of children outside school, requires refining the official enrolment data. It requires, for instance, comparing only those students in Standards I-VIII in the age-group 6-14 years with all children in the same age-group. In calculating this refined enrolment ratio all those students below 6 years, and those 14 years and above enrolled in Standards I-VIII will be excluded from the total gross enrolment.

A precise calculation cannot however be done for the latest enrolment statistics (1975-76). The Ministry of Education in their attempt to clear their backlog of unpublished data have discontinued publishing enrolments in elementary classes by specific age-groups since 1971. It is however possible to provide an estimate for Standards I-V on the basis of the trends in the period 1950-51 -- 1970-71 for which the pertinent statistics are available. During this period, the percentage of students enrolled in Classes I-V who were below 6 years and 11 years and above, to the total enrolment in Classes I-V remained fairly constant. It had generally declined in the last decade ranging from at its highest 25.4 per cent to 21.9 per cent at its lowest.

Using the methods of least squares, it is estimated that 21.2 per cent of students who are enrolled in Classes I-V in 1975-76 are below 6 years of 11 years and above. When this is discounted in calculating the refined enrolment ratio, only 66.0 per cent of the children in the age-group 6-11 years are enrolled in schools. This is considerably lower than the official enrolment ratio of 83.8 per cent.

Unlike the statistics for primary education, the Ministry of Education in its annual publications has only provided age-breakdowns for Standards VI-VIII between 1965-66 and 1970-71. In its publication, The Indian Year Book of Education 1964, the NCERT has provided the relevant figures between 1950-51 and 1960-61. During this perod, the percentage of students outside the age-group 11-14 years had been extremely high, remained fairly constant, and declined marginally from 42.1 to 40.3 per cent. Using the method of least squares, it is estimated that in 1975-76, 39.2 per cent of the total enrolment in Standards VI-VIII was outside the age-group 11-14 years. When this is discounted in computing the refined enrolment ratio, only 22.3 per cent of children in the age-group 11-14 years are enrolled in Standards VI-VIII in 1975-76, which is considerably lower than the corresponding official enrolment ratio of 36.7 per cent.

In almost all official publications ~~including the Draft Five Year Plans~~ 1978-83, it is the misleading and uncorrected official enrolment ratios which are accepted and published.

The Corrected Enrolment Ratios: Official and Actual Educational Progress.

When the corrections for the underage and overage elements are made for enrolments in Standards I-VIII, and the latest and accurate projections are utilised, the differences between the refin enrolment and official enrolment figures reflecting real and officia educational progress are striking (Table 2.2).

As the differences between the official enrolment ratios (Cols. 2,4 and 6) and the refined enrolment ratios(Cols.3,5 and 7)

TABLE 2.2

OFFICIAL AND ACTUAL EDUCATIONAL PROGRESS: OFFICIAL AND REFINED ELEMENTARY EDUCATIONAL RATIOS For 1950-51 and 1975-76

Year	Official Enrolment Ratio for Standards I-V for 6-11Yrs.	Refined Enrolment Ratio for Standards I-V for 6-11 Yrs.	Official Enrolment Ratio for Standards VI-VIII for 11-14 Years	Refined Enrolment Ratio for Standards VI-VIII for 11-14 Years	Official Enrolment Ratio for Standards I-VIII for 6-14 Years	Refined Enrolme Ratio fo Standard I-VIII for 6-14 Years
1.	2.	3.	4.	5.	6.	7.
1950-51	43.1	32.7	12.9	7.0	32.5	28.1
1975-76	83.8	62.6	36.7	21.7	67.0	54.7

Source: Child population estimates used in calculating refined enrolment ratios for 1950-51 are taken from Age Tables 1957 Census and for 1975-76, New Expert Committee Population Projection Report, 1977-78.

indicate, the disparities between what the public is led to believe have been the advances made in elementary education, and actual progress, are striking. Between 1950 and 1975, the Official Version indicates that in Standards I-V, the advance has been from 43.1 per cent to 83.8 per cent of the age-group 6-11 years while in actual fact it has been more modest from 32.7 per cent to 62.6 per cent. In Standards VI-VIII, enrolment had been only 7.0 per cent and increased to 21.7 per cent of the age-group 11-14 years between 1950-75, while officially it has advanced from 12.9 to 36.7 per cent. For the entire range of elementary education, Standards I-VIII, enrolment has increased from 28.1 per cent to 54.7 per cent of the age-group 6-14 years. The corresponding official ratios for 1950-51 and 1975-76 are 32.5 per cent and 67.0 per cent.

Population Growth and Educational Progress

The fact that student enrolment in Standards I-VIII is provided in official statistics only in gross figures and enrolment ratios, and that errors have been committed, reflected in recent understimates of the child population in the age-group 6-14 years, has been instrumental in concealing an important but adverse trend. For though the rate of growth of enrolment in post-independent India has been larger than the rate of growth of population, in sheer numbers the increase in population in the age-group 6-14 years during 1966-67 and 1975-76 has far outstripped the increase in enrolment in Standards I-VIII of the same age-group (Table 2.3).

As Table 2.3 indicates, the gains during the period 1950-1965 havebeen wiped out by the low increase in enrolment between 1966-75 in the age-group 6-14 years in Standards I-VIII(Cols. 4 and 5).

But this reality that the population growth in the post-independence period has far outstripped the increases in enrolment is concelated in the official statistics which only provide gross enrolment (Cols. 2 and 5). The official enrolment statistics either show that enrolments increased vis-a-vis the growth in population, especially in comparision to Ministry of Education estimates of the population, or de-emphasise the extent to which increases in enrolment have fallen far behind population growth during 1966-1975. Clearly this adverse trend has important implications for getting target dates for universalising elementary education, ~~which will be discussed later.~~

TABLE 2.2

ENROLMENT IN STANDARDS I-VIII AND POPULATION ESTIMATES 1950-75

Year/Period	Total Enrolment in Standards I-VIII (Lakhs)	Ministry of Education Estimates of Child Population in Age-group 6-14 Years (Lakhs)	Students in Age-Group 6-14 Years in Standards I-VIII (Lakhs)	Latest Census Estimates Population in Age-Groups 6-14 Years (Lakhs)
1.	2.	3.	4.	5.
1950-51	222.7	686.3	193.3	687.4
1966.67	634.6	1028.4	545.3	1026.6
1970-71	703.6	1124.5	603.6	1136.4
1975-76	816.8	1220.1	699.0(Est.)	1277.9
Increase Between 1950-1966	411.9	342.1	352.0	339.2
Increase between 1966-1975	182.2	191.7	153.7(Est.)	251.3
Increase between 1950-1975	594.1	533.8	505.7(Est.)	590.5

CONCLUSION

It will be impossible to achieve universal elementary education for many decades to come. Certainly, it will be impossible in this century. There is no way out: neither revamping the entire educational structure, nor spending the entire educational budget on elementary education, nor a radical restructuring of the political system or any version of a cultural or total revolution will ensure universal elementary education in the coming decades. The following aggguments ~~--some of which have already been stated --~~ are presented in support of this pessimistic conclusion:

i. Between 1950-1976, despite tremendous financial outlays and efforts, it has been possible only to enrol 54.7 per cent of the population in the age-group 6-14 years in Standards I-VIII.

ii. The highest annual increases in enrolment during this period, in the late fifties and early sixties, at no time amounted to even 75 per cent of the annual enrolment required in the future to realise universal elementary education by 1990. While these early efforts in enrolment barely kept up with the increase in population, it has now diminished to such an extent that increases in population have galloped ahead of enrolment.

iii. The early dramatic rises in enrolment in the late fifties and sixties may have been a result of the phenomenal growth in schooling facilities which were limited in colonial India. However, any increase in facilities in the near future will not have a similar impact on enrolments. In 1973-74, more than 90 per cent of the population was served by a primary section or school within a walking distance of 1 kilometre. Similarly

~~84 per cent of the rural~~

87 per cent of the rural population in the same year was served by a middle section school within a walking distance of 5 kilometres.

iv. The recent slow annual growth in enrolment will not be able to register any sustained dramatic increases because the vast majority of the non-enrolled children are either girls or belong to the most disadvantaged social groups including scheduled castes, tribes, landless agricultural labourers, urban slum-dwellers, etc.

v. Dropout which is really the most significant problem affecting Indian elementary education has remained virtually unchanged during the post-independence period, and as the 1977 Working Group observed, has 'become quite intractable'. This is a phenomenon almost exclusively limited to the socially and economically disadvantaged groups in India.

vi. One may add that whatever the enrolment may be by the end of the century, actual attendance which is the crux of the matter will be far short of the official enrolment statistics. The proportion of those attending has even dropped in some states during 1960-1970.

Is Universal Primary Education Possible?

Where does one proceed from here despite the melancholic conclusion that universal elementary education is an utopian dream and may be possible only well into the next century? It may perhaps be more realistic to examine as to whether it is possible to enrol at least all the children in the primary school age-group to enrol at least all the children in the primary school age-group 6-11 years in Standards I-V, by 1990. One would have to conclude

that any optimism

that any optimism even on this score is unwarranted.

i. Despite the fact that at present nearly every child in India has access to a primary school or section, in 1975-76 less thar two-third of the children in the age-group 6-11 years were enrolled in school. This has meant that since 1950-51, it has only been possible to double the proportion of the children in age group 6-11 years enrolled in school.

ii. To achieve universal primary education by 1990, the annual rate of increase in enrolment will have to increase dramatically to an extent that has not been possible in the post-independence period. The sharp increase in annual primary enrolment in the fifties has slowed down in the late sixties and seventies, failing to keep up with the increase in the child population. What is now required to achieve universal primary education by 1990 is the almost impossible task of doubling the annual increase in enrolment that has been possible in the last decade.

iv. Dropout, as mentioned before, is the single most important reason for such poor enrolment. It should be noted that the rate of dropout in India is highest in the primary stage of instruction. ~~The Draft Five Year Plan 1978-83 has estimated it to be about 60 per cent between Standards I-V.~~ Moreover, the dropout rates are highest among the disadvantaged groups such as girls, scheduled castes and tribes, migrant and agricultural labourers, slum dwellers, etc.

All these factors point to the inescapable conclusion that even universal primary education by the end of this century will be an impossible task. It is premature to talk of the possibility of universal elementary education in the next decade, when universal primary education will prove to be beyond our most determined efforts in the remaining decades of this century. For the central issue is, that while it is relatively easy to provide schooling facilities, the more difficult problem is to ensure that children enrol, and attend school regularly for a few years.

THE ERADICATION OF ILLITERACY

The progress achieved in literacy has been substantial since 1951. However, it continues to be inadequate in relation to the size and growth of population. The percentage of literates to total population has improved from 16.67 in 1951 to 36.23 in 1981(Table 1). It increased from 24.95 to 46.74

Table I

Progress of literacy (1951-1981)

Census Year	Percentage of literates to the total Polulation		
	Persons	Males	Females
1951	16.67	24.95	7.93
1961	24.02	34.44	12.95
1971	29.46	39.45	18.69
1981*	36.23	46.74	24.88

* Excludes Assam
Source - Census of India 1981.

in the case of males while it increased from 7.93 to 24.88 in the case of females

While the literacy rate has slowly improved, the actual number of illiterates has been increasing due to the rising population and the backlog of adult illiteracy. The decadal growth rate of population which was around 21.5 per cent during 1951-61 increased to about 25 per cent during 1971-81. While the increase in population during the periods 1961-71 and 1971-81 were 109 million and 137 million respectively, the number of literates during the same periods increased only by 56 million and 86 million respectively.

...2

Within the pace of progress India has achieved in literacy, the literacy rate varies widely between males and females. The literacy rate for females (24.88 per cent) continues to lag behind that for males (46.74 percent). A wide disparity exists between the literacy rates of scheduled castes and tribes on the one hand and the rest of the population on the other (Table 2 & 3). While the literacy rate for the total population was 36.23 per cent it was only 21.38 in the case of scheduled castes and 16.35 in the case of scheduled tribes. Disparity also exists between urban areas and the rural interior, the literacy rates in rural area being much lower than that in urban areas.

Table 2

Literacy rates among Scheduled Castes in 1981

Area	Percentage of literates to the total Scheduled Castes population		
	Total	Male	Female
Rural	18.48	27.91	8.45
Urban	36.60	47.54	24.34
Rural+Urban(total)	21.38	31.12	10.93

Table 3

Literacy rates among Scheduled Tribes 1981

Area	Percentage of literates to the total Scheduled Tribes population		
	Total	Male	Female
Rural	14.92	22.94	6.81
Urban	37.93	47.60	27.32
Rural+Urban(Total)	16.35	24.52	8.04

The percentages of literates in different States and Union Territories also differ widely.

....3/-

Table 4

State/Union Territories arranged in the order of literacy ranking in 1981 census and comparision with 1971 census

S.No.	State/Union Territory	Literacy rate 1981	Literacy rate 1971	Ranking in 1971	Percentage increase of literacy
1.	2.	3.	4.	5.	6.
1.	Kerala	69.17	60.42	2	14.48
2.	Chandigarh	64.68	61.56	1	5.07
3.	Delhi	61.06	55.61	3	9.80
4.	Mizoram	59.50	53.79	4	10.90
5.	Goa,Daman & Diu	55.86	44.75	6	24.83
6.	Lakshadweep	54.72	43.66	7	25.33
7.	Pondicherry	54.23	46.02	5	17.84
8.	Andaman and Nicobar Islands	51.27	43.59	8	17.62
9.	Maharashtra	47.37	39.18	10	20.90
10.	Tamil Nadu	45.78	39.46	9	16.02
11.	Gujarat	43.75	35.79	11	22.24
12.	Manipur	41.99	32.91	14	27.59
13.	Nagaland	41.99	27.40	19	53.25
14.	Himachal Pradesh	41.94	31.96	15	31.23
15.	Tripura	41.58	30.98	17	34.22
16.	West Bengal	40.88	33.20	13	23.13
17.	Punjab	40.74	33.67	12	21.00
18.	Karnataka	38.41	31.52	16	21.86
19.	Haryana	35.84	26.89	20	33.28
20.	Orissa	34.12	26.18	21	30.33
21.	Sikkim	33.83	17.74	27	90.70
22.	Meghalaya	33.22	29.49	18	12.65
23.	Andhra Pradesh	29.94	24.57	22	21.86
24.	Madhya Pradesh	27.82	22.14	23	25.65
25.	Uttar Pradesh	27.38	21.70	24	26.18
26.	Dadra & Nagar Haveli	26.60	14.97	28	77.69
27.	Bihar	26.01	19.94	25	30.44
28.	Rajasthan	24.05	19.07	26	26.11
29.	Arunachal Pradesh	20.09	11.29	29	77.95

Kerala has the highest literacy rate(69.17 per cent) and Rajasthan (24.05 per cent) the lowest in 1981. Among the Union Territories, Chandigarh (64.68 per cent) has the highest literacy rate and Arunachal Pradesh (20.09 per cent) the lowest.

In the case of female literacy also there exists significant variation among States/UTs.

...4/-

Table 5

States and Union Territories in order of female literacy

Sr. No.	State/Union Territory	Percent female literates 1981	Percentage increase of fem. literacy 1971-1981
1.	2.	3.	4.
FEMALE LITERACY 50% AND ABOVE			
1.	Kerala	64.48	18.73
2.	Chandigarh	59.30	9.11
3.	Mizoram	52.57	12.55
4.	Delhi	52.56	10.07
FEMALE LITERACY 25%-50%			
5.	Goa, Daman & Diu	46.78	33.31
6.	Pondicherry	44.30	27.96
7.	Lakshadweep	44.21	44.67
8.	Andaman and Nicobar Islands	41.85	34.52
9.	Maharashtra	35.08	32.73
10.	Punjab	34.14	31.81
11.	Tamil Nadu	34.12	27.03
12.	Nagaland	33.72	80.80
13.	Gujrat	32.31	30.55
14.	Tripura	31.60	49.13
15.	Himachal Pradesh	31.39	55.17
16.	Manipur	30.69	57.14
17.	West Bengal	30.33	35.28
18.	Meghalaya	29.28	19.22
19.	Karnataka	27.83	32.71
FEMALE LITERACY LESS THAN 25%			
20.	Haryana	22.23	49.29
21.	Orissa	21.11	51.65
22.	Sikkim	22.07	147.98
23.	Andhra Pradesh	20.52	30.25
24.	Dadra & Nagar Haveli	16.75	113.65
25.	Madhya Pradesh	15.54	42.31
26.	Uttar Pradesh	14.42	36.68
27.	Bihar	13.58	55.73
28.	Rajasthan	11.32	33.81
29.	Arunachal Pradesh	11.02	197.04

* Excludes Assam and Jammu and Kashmir

It is highest in Kerala (64.48 per cent) and lowest in Rajasthan (11.32 per cent). Amongst the Union Territories, it is highest in Chandigarh (59.30 per cent) and lowest in Arunachal Pradesh (11.02 per cent). Female literacy is above 50 percent in one state

and three Union Territories, between 25 and 50 percent in 11 States and four Union Territories and less than 25 per cent in eight states and two union Territories.

In the case of adult literacy (age group 15 +), the literacy has increased from 19.30 in 1951 to 40.76 in 1981. However, the number of illiterates increased from 173 million in 1951 to 245 million in 1981. (Table 6)

Table 6

Adult Literacy (1951-1981)
(Age group 15 plus, in million)

Year	Total adult population	Literate adults	illiterate adults	Percentage Literate	percentage illiterate
1951	215	42	173	19.30	80.70
1961	258	71	187	27.80	72.20
1971	317	108	209	34.20	65.80
1981	414	169	245	40.76	59.24

The inter-state variation in adult literacy is also wide. Kerala has the highest adult literacy (78 percent)against Rajasthan's 28 per cent, This variation is more sharpely reflected in the case of female literacy.

Though there is substantial increase in the adult literacy rates in both rural and urban areas, the adult literacy rate in rural areas continue to be mush lower than that in urban area(Table 7)

Table 7

Adult literacy rate (1971 - 1981)

Area	1971			1981		
	Persons	Males	Females	Persons	Males	Females
Rural	26.98	40.51	12.88	32.70	47.27	17.57
Urban	60.28	72.42	45.42	65.13	76.36	51.88
Rural Urban (Total)	34.04	47.69	19.32	40.76	54.84	25.68

At present India has the largest illiterate population. According to an U.N. report on Estimates and Projections of illiteracy in the age group 15-19 India contributed as much as 26.4(37%) million illiterates out of a total illiterate population of 71.4 million excluding China, D.P.R. Korea and Vietnam in the world during 1970. During the same period for the age group 15 and above it was 208 millions in India. For the age group 15-19 by 2000 A.D. it is estimated that the world illiterate population would be 76.4 millions, excluding China, D.P.R.Korea and Vietnam, of which India's contribution alone would be 41.9(54.8%) millions and for age 15 and above India would contribute 286 millions. The situations is alarming and explosive and calls for serious introspection in our approach into our planning.

ILLITERATES IN THE AGE GROUP 15-19 AND 15+ (PERCENTAGE)

		1970	1975	1980	1985	1990	1995	2000
More Developed	T	0.7(2.5)	0.7	0.6(1.8)	0.6	0.6(1.5)	0.6	0.6
ons	M	0.7(1.9)	0.7	0.6(1.2)	0.6	0.6(1.0)	0.6	0.6
	F	0.8(3.1)	0.7	0.7(2.3)	0.6	0.6(1.9)	0.6	0.6
Developed	T	41.1(56.8)	33.7	30.9(47.7)	27.1	24.0(39.1)	21.7	19.4
ons	M	30.7(45.3)	25.6	23.5(37.2)	20.8	18.8(30.1)	17.3	15.9
	F	51.7(68.4)	42.1	38.6(58.3)	33.6	29.4(48.3)	26.3	23.1
Regions	T	26.7(32.5)	22.8	21.8(28.9)	20.1	18.4(25.7)	16.8	15.4
	M	20.0(26.6)	17.4	16.6(23.0)	15.5	14.4(20.1)	13.4	12.6
	F	33.7(38.1)	28.4	27.3(34.7)	24.9)	22.6(31.2)	20.4	18.4
AN REGION								
adesh	T	58.0(71.2)	51.8	37.6(58.6)	30.9	26.9(46.5)	23.4	20.4
	M	33.5(53.1)	24.5	13.0(36.5)	9.0	6.7(23.6)	5.1	4.0
	F.	84.0(90.8)	81.0	63.7(82.3)	54.1	48.1(70.9)	42.8	37.8
an	T	97.0	88.1	86.3	82.0	76.2	69.0	60.8
	M	94.3	79.5	76.2	69.9	61.2	51.7	41.4
	F	99.9	97.3	97.1	95.0	91.6	86.7	80.7
	T	49.8(66.6)	42.4	42.6(59.7)	40.9	39.5(54.0)	38.2	37.0
	M	37.4(53.2)	34.9	36.0(48.7)	35.8	35.3(45.6)	34.8	34.3
	F	63.0(81.1)	50.6	49.7(71.6)	46.5	44.1(63.1)	41.9	39.8
	T	80.8(88.0)	71.0	66.8(82.7)	59.7	56.0(73.9)	50.3	45.9
	M	68.3(78.2)	51.9	44.9(67.6)	34.3	27.8(52.6)	22.4	18.3
	F	93.7(97.5)	91.0	89.6(97.4)	86.3	83.0(95.0)	79.0	74.2
ean	T	61.1(76.6)	52.9	50.4(67.5)	41.8	33.9(55.0)	27.4	22.2
	M	35.0(59.9)	24.0	23.0(45.6)	17.6	15.2(33.0)	13.1	11.2
	F	89.1(94.9)	83.9	79.8(90.9)	67.6	53.8(78.4)	42.6	34.0
anka	T	12.1(22.6)	14.2					
	M	10.3(14.1)	12.3					
	F	14.0(32.1)	16.2					

Figures within parentheses indicate age-group 15+

Indian Institute of Education, Pune

Educational Reform in India Project

Abstract of Case-study

Title: Implementation of 10+2+3 pattern in Andhra, Gujrath, Karnataka and Maharashtra with special reference to +2 level

Case-study No. 10

Case Study writer: Dr. S. B. Gogate.

As is now well known, though the 10+2+3 pattern was directly or indirectly suggested by almost all the educational commissions appointed in this country since 1917, it was because of the recommendations of the Kothari Commission, and also due to its inclusion in the National Policy of Education, 1968 that the new pattern was taken up as an innovation at the national level. In spite of the recommendations of a few more committees at the national level, no serious thought was given to it till 12 May 1975 when the Prime Minister advised the Chief Ministers and Education Ministers of various states to introduce the pattern.

The position as it exists today is that Uttar Pradesh, Bihar, Punjab, Rajasthan, Jammu and Kashmir and Madhya Pradesh have adopted 10+2 but not +3. They have introduced the first or the general degree course of +2 years and an honours course of +3 years. Thus the pattern followed in these states is 10+2+2 and 10+2+3. In other states, by and large, the pattern of education is 10+2+3.

Whenever a structural change is to be introduced in the pattern of education, following factors are generally involved.

(i) The psychological reactions of people. Generally people are opposed to any major change.

(ii) The cost involved in implementing the change.

(iii) Availability of teachers and other resources necessary for change.

(iv) Training of teachers for this change.

(v) Orientation of govt. officials entrusted with the change and that of managements of private institutions.

Whenever change takes place at all levels of education, viz the primary, secondary and collegiate, it takes between 15 to 20 years to see the change through. In the implementation of the 10+2+3 pattern almost all levels of education were affected. States which already had a 10 year SSC programme did not necessarily have the 2 year intermediate course while many states had the 11 year SSC course. As such, states which had 10 year SSC courses had to modify their post-SSC courses, while states having 11 year SSC course had to modify even the SSC Courses. These changes meant many academic and administrative adjustments and these had their price. Kothari Commission aimed at something uniform all over the country. A careful look at in different states reveals that almost every state has its own variety of 10+2+3 though numerically it may be the same anywhere.

The 10+2+3 pattern of school and college education purported to achieve the following :

(i) Opportunity to modernise and strengthen school and college curricula

(ii) A broadly uniform pattern all over the country

(iii) Opportunity and means to introduce appropriate vocationalisation at +2 stage

(iv) Availability of more knowledgeable and mature students to the Universities

(v) Reduce pressure of admissions on universities and other centres of higher education

(vi) Raise the general standard and quality of education at all levels of education.

The researcher visited the states under study, contacted officials and others involved at +2 and has concluded as follows :

Andhra Pradesh : Even prior to the recommendations of the Kothari Commission, Andhra Govt. introduced the 10+2+3 pattern of education in 1969. In fact leaders of Andhra Pradesh claim that Kothari Commission borrowed their structure of education. After the introduction of +2 stage, these classes were either located in schools or in colleges or in independent institutions named as Junior colleges. Examination at the end of +2 is conducted by the "Andhra Pradesh Board of Intermediate Education". Govt. of Andhra Pradesh pays 100 percent grant to Junior colleges towards teachers' salaries and a non-salary grant of

Rs. 7500 - Rs. 10,000 per year to each college. To enable the private colleges to meet educational non-salary expenditure, the state government allows private colleges to charge double the fees and allows them to retain half the fees for non-salary expenditure. It is alleged that private junior colleges incur quite a good deal of inadmissible expenditure from this accumulation of fees. As govt. institutions are limited and as there is a greater demand for admissions, students have no choice but to go to private colleges by paying double the fees. This is particularly true of urban institutions.

In AP, the SSC Board and the Intermediate Board control SSC(X) and +2 examinations, universities control degree colleges while the Director of Education and the Director of Higher Education control school education and education at +2 level, respectively. There is no coordination between these bodies which many times leads to utter confusion.

Students of AP find it difficult to migrate outside the state as examinations at X, XI and XII are not held equivalent by outside Boards and Universities. There appeared to be a lot of heart-burning among Andhra officials about this.

Some officials opined that resource constraint is the major problem for +2. As such quality of education suffers. They also defended the institution of independent junior colleges by saying that +2 examination is a qualifying

examination and it has a distinct role. As such it has to be given an independent status. They also opined that to provide vocational education to a large number of students is impossible and beyond the state's finances.

As some Junior colleges are attached to colleges, there is a constant demand from teachers of junior colleges for Rs. 700-1600 scale, the one the UGC has sanctioned to teachers of Senior colleges. A.P. Govt. had to yield a lot to these and similar demands. There has been no provision for training teachers of junior colleges, nor is there a provision for supplying any instructional material.

Gujrat State : The 10+2+3 pattern was introduced in Gujrat in 1976. At that time there had been many multi-purpose schools teaching higher secondary courses. These multi-purpose schools continued till 1982. +2 courses are exclusively attached to high schools. +2 examination is controlled by a Board of Higher Secondary Education (HSC) Board. Initially Gujrat Govt. made some efforts to orient teachers to new courses. Govt. also published instructional material for teachers. It however appears that this enthusiam is now absent. Due to lower salaries, qualified teachers (M.A., M. Sc., etc.) are not attracted towards teaching. As such B. Sc. B. Eds. and B. Com. B. Eds. had to be allowed to teach after some orientation. That has brought down the standard of HSC Examination. The grant in aid +2 is 100 percent on salary, 20 percent on non-salary expenditure and Rs. 20,000/- per unit to Science

Unit at the time of opening the Unit. Kothari Commission had recommended 2 language papers and 4 optional papers at XI and XII. Gujrat HSC Board has made a lot of confusion about this. Thus an Arts student has to give examination worth 800 marks, Science 1000 at XI and 800 at XII and a student doing vocational courses has to do an exam. worth 1200 marks. Gujrat govt. has appointed a high powar committee to go into the problems of +2 education. Gujrat Govt. had thought, in the beginning, that by attaching +2 classes exclusively to schools, the quality of school education would improve. This did not happen. In fact, officials of the Gujrat government are worried about the deteriorating standard of the SSC(X) examination. Paucity of good teachers and lack of facilities in rural schools appear to be the causes of deteriorating standard of X and XII examinations.

Karnataka : Karnataka state introduced 10+2+3 pattern in 1971. +2 Examination is controlled by a Board of Pre-University Examination. Karnataka has also established a Directorate of PU Education. As in Andhra, +2 classes in Karnataka are located either in Higher Secondary Schools or in Colleges or in independent Junior Colleges. Controlling authorities for these institutions are different. In 1977 Karnataka Govt. established a separate Directorate of vocational education. This directorate independently conducts PUC(+2) Examinations of these who offer vocational subjects at +2. Managements, heads of schools and teachers organisations have demanded that there should

be a single administrative machinery for +2 classes.

Govt. pays 100 percent grant on salaries of teachers to private institutions at +2 and 5 percent for maintenance. Govt. allows private institutions to charge more fees and recover funds for non-salary expenditure. The position of +2 has been far from satisfactory due to faulty location of +2 classes, duplicity in administration and lack of effective academic control. Some also feel that as there are no serious examinations upto X, and mass copying at X, standard of courses beyond X is bound to be poor. What was expected by the Kothari Commission could not be achieved at all.

Govt. of Karnataka appointed a Committee under the chairmanship of Dr. D. V. Urse to go into the conditions of +2 education. The report of this committee is before the State Govt. for its consideration.

Karnataka State has done quite a good deal of work in vocational education at +2 level.

Maharashtra : The new pattern was introduced in this state in 1975. Initially classes of XI were attached to schools only. In 1976 when XII was introduced for the first time, classes of XII were mainly attached to colleges though 10 percent classes were also attached to schools where there were no colleges. 1977-78, XI and XII were designed as Junior Colleges on the lines of Andhra Pradesh and Karnataka. However, there are no independent junior colleges in Maharashtra. Govt. pays

100% grant on teachers salaries and upto 12% grant on non-salry items. Initially Govt. paid Rs. 7500/- to schools which had started XI Science. Similarly govt. paid Rs. 2,000/- each to every school starting XI and XII for the development of library. In the absence of any meaningful vocational education all those who pass X go in for XI and XII if they have to take further education. Even then, around 30% of those who pass X join junior diploma courses in teaching, engineering, etc. or take employment. Girls in rural area get married and drop out.

Maharashtra Govt. has made it obligatory for schools and colleges to get all posts and all appointments approved by the Senior Auditor of the Govt. The procedure of approval is a lengthy one. Institutions are, therefore, required to face many controls for academic matters, administrative matters and finances. The non-teaching staff in schools and colleges has come to a point of breaking because of all this. There is no autonomy left.

Initially some efforts were made to orient teachers to +2. These were not seriously pursued. Similarly no efforts were made to provide instructional materials to teachers. As most of the Junior Colleges classes are attached to colleges, teachers of Junior Colleges have been demanding the scale of Rs. 700-1600 granted to Sr. College Teachers. Recently some Universities in Maharashtra have instituted DHE (Diploma in Higher Education) which is held equivalent to B. Ed by govt.

The researcher is of the opinion that Maharashtra Govt. Introduced +2 courses without any preparation and did not do anything seriously for training of teachers even after the inception of these courses.

Vocational Education :

The position of vocational education at +2 stage in states included in the study is as under :

Andhra Pradesh : +2 classes were introduced in the state in 1969-70. Vocationalisation was introduced in 1979-80. In that year these were taught in 22 institutions. In 1983, the number of such institutions was 97, with 1376 students (out of 1.86 lakhs i.e. less than 1%). Courses offered are in the areas of (a) Agriculture and Animal Husbandry (b) Home Science (c) Commerce and Business Management (d) Engineering and Technology and (e) Health and Para Medical Courses.

Number of students offering vocational courses is declining in the state. This was lowest in 1982-83. This was due to :

(a) Lack of vocational guidance

(b) Lack of facilities for apprenticeship

(c) No recognition to these courses for employment

(d) Non-availability of trained teachers

(e) Inadequate facilities for self-employment.

During the year 1983-84 the State Government tried to improve the situation by taking the following measures.

(a) The existing courses were stremlined and consolidated.

(b) Courses were made more attractive

(c) Adequate preparation was undertaken to introduce courses in 1984-85.

(d) Colleges to whom courses were sanctioned earlier were permitted to start the courses.

Gujrat : +2 classes were introduced in June 1977. However multipurpose schools established as a result of Mudliar Commission Report continued. Multi-purpose subjects were accomodated in the new pattern. Children with these subjects at X have a choice to join Arts, Science or Commerce streams. Vocational courses were introduced in the state in June 1982. 80 multi-purpose schools which had the infrastructure for vocational courses (workshops, laboratories, etc.) were chosen for vocational courses. Vocational courses in the state have been screened by the NCERT Team and modified courses would come into operation from June 1984. Instructional material has been prepared for these courses. Number of students offering these courses is 3,500 out of 2,00,000 i.e. 1.75%. Gujrat State officials feel that our society, particularly the rural society, is a traditional society. Vocations and skills filter down in families from generation to generation. Kothari Commission did not consider this social aspect of vocational education. Instead, it depended upon the historical and philosophical background of basic education.

As basic education failed, vocational education also has failed.

Moreover growth rate of industries and employability did not come up as was expected and as such vocational education failed. The other reasons why vocational education had failed were as follows: (a) Students had no opportunity of further education in vocational subjects (b) Middle-level students found the syllabi very heavy (c) Qualified teachers were not available (d) Government policy about vocational education was not clear (e) Problem of placement of children who had offered vocational courses was not solved; syllabi were not enough for self-employment, and (f) while students offering Arts/Commerce Courses have 800 marks worth courses, students offering vocational courses have a load of 1,200 marks. This acted as a deterrent to offer vocational courses.

Karnataka : The State Government accepted the scheme of vocationalisation at +2 stage in 1977. This was the first state in the country to appoint a full scale Directorate of Vocational Education. Vocational education was introduced in four major areas, namely, Agriculture, Commerce, Technical and Public Health. Students offering vocational subjects had to spend 66% of instructional time in vocational subjects. During the year 1982-83 the enrolment in vocational subjects was 3,621 students offering 178 courses taught in 99 institutions. Main problems experienced in vocational education are as follows :

(a) Non-employability of students (b) Lack of gurantee of employment to teachers leading to unstable staff (c) No orientation/training to teachers (d) No opportunity of higher education in vocational subjects (e) Vocational subjects have failed to bring about any social transformation (f) Shortage of finance prohibits expansion of vocational education.

In spite of the difficulties mentioned above it must be admitted that Karnataka tried it best to introduce vocational education at +2 level and has done better in the job than many other states, including Maharashtra.

Maharashtra : Though +2 classes were introduced in the state in June 1975, vocational courses in five groups, viz. technical, agricultural, commerce, catering and food technology, and fisheries were introduced much later. The number of students offering vocational courses is around 20,000 which is about 5 percent of the total number of students at +2.

The state did not introduce vocational education as envisaged by the Kothari Commission or by the NCERT, but introduced 'Vocationalised Education' which implied meaningful blending of both education and training. It was a type of pre-vocational education which was expected to increase the employability of students. The State Govt. considered it necessary to start bifocal vocational courses. The students offarred vocational subject in lieu of one language and one optional subject. The state did

not accept the terminal nature of such courses. Students offering vocational course devote a maximum of 30% of their instructional time to vocational courses. In the case of students offering engineering and agricultural vocational courses, weightage of marks is given at the time of admission to diploma and degree courses. In no other state such a weightage is given. /

Conclusion : Education at +2 stage in these states will not improve unless the state governments do the following :

(a) Take a final decision about the location of +2 classes. They should be either in schools or in colleges or in independent junior colleges.

(b) There should be only one controlling authority for +2 courses.

(c) Efforts must be made to train teachers of +2 classes, to provide them instructional materials and arrange for their inservice training in content and methodology.

(d) At least 70% of teaching-learning time must be spent on vocational subjects where vocational stream is introduced. This education must be meaningful and effective.

(e) State Govts must introduce many more diplomas in various subjects for those who pass XII and do not want to pursue further traditional education.

(f) The problem of service conditions of teachers of XI and XII must be settled once for all. That would bring peace to +2 education./

WEIGHTAGE GIVEN TO DIFFERENT AREAS OF SCHOOL CURRICULUM IN VARIOUS STATES

Summary of findings and discussion

(a) Class VI

1. The duration of a school day in different states ranges between 5 hours and 6.75 hours with an average of 5.92 hours, while the duration of recess period ranges between 20 minutes and 80 minutes with an average of 41 minutes. The actual instructional time ranges between 4.50 hours and 6.25 hours with an average of 5.28 hours.

2. The total number of curriculum areas in different states ranges between seven and ten, out of which the number of examination subjects ranges between six and nine.

3. In terms of time allocation per week, the five compulsory academic subjects, namely, Mother Tongue, English, Mathematics, Science and Social Science are given more weightage in comparison to optional ~~a~~academic and non-academic areas like 3rd Language, elective subject, SUPW and Physical Education.

4. Out of the five compulsory academic subjects, the first, second, third, fourth and fifth position in terms of weekly time allocation is given, on an average, to Mathematics, English, Mother Tongue, Social Science and Science respectively.

5. In terms of maximum marks allotted in the annual examination, five compulsory academic subjects are given the first priority

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Source : Weightage given to different areas of School curriculum in various states, NCERT 1984

The second, third and fourth position is given, on an average, to 3rd Language, Physical Education and Drawing respectively.

(b) Classes VII and VIII

6. The duration of a school day ranges between 5 hours and 7 hours with an average of 6.06 hours. The duration of recess period ranges between 20 minutes and 90 minutes with an average of 41 minutes. The actual instructional times ranges between 4.50 hours and 6.25 hours with an average of 5.39 hours.

7. The total number of curriculum areas in different states ranges between seven and ten, out of which the number of examination subjects ranges between six and nine, while the number of non-examination areas is either one or two.

8. In terms of time allocation per week, the five compulsory academic subjects, namely, Mother Tongue, English, Mathematics, Science and Social Studies are given more weightage than all other areas like 3rd Language, Physical Education, SUPW etc.

9. Out of the five compulsory subjects, the first position is given to English and Mathematics, the second position is given to Mother Tongue and the third position is given to Science and Social Studies.

10. In terms of maximum marks allotted in the annual examination, the first position is given to Mother Tongue and English, while the second position is given to Science, Mathematics and Social Science. All the remaining areas like 3rd Language, Physical Education, elective subject, SUPW, etc. are given the third position.

(c) Classes IX and X

11. The duration of a school day in different states ranges between 5.50 hours and 7 hours with an average of 6.15 hours, while the duration of recess period ranges between 20 minutes and 90 minutes with an average of 41 minutes. The actual time for instructions ranges between 5.17 hours and 6.25 hours with an average of 5.48 hours.

12. The total number of subject areas in different states ranges between seven and nine, out of which the number of examination subjects ranges between five and nine, while the number of non-examination subjects ranges between zero and three.

13. In terms of time allocation, per week, the five compulsory academic subjects, namely,Mother Tongue, English,Mathematics, Science and Social Science are given more weightage in comparison to all other areas like 3rd Language, SUPW, Physical Education, etc.

14. Out of the five compulsory subjects, English is given the highest weightage in terms of time allocation per week. The second position is given to Science and Mathematics, while the third and fourth positions are given to Mother Tongue and Social Science respectively.

15. In terms of maximum marks allotted in the annual examination, the first and second positions are given to Mother Tongue and English respectively, while the third position is given to Science, Mathematics and Social Science.

(d) General

16. In terms of time allocation per week, Mother Tongue is given second or third position from Classes VI to X whereas in terms of examination marks, it is given the highest weightage in all these Classes.

17. From time allocation point of view, English is given, on an average, second position in class VI but first position in Classes VII to X, whereas from examination point of view, it is given first position in Classes VI to VIII but second position in Classes IX and X.

18. From time allocation point of view, Mathematics is given, on an average, first position in Classes VI to VIII but second position in Classes IX and X, while from examination point of view, its first position in class VI is reduced to second posit in Classes VII and VIII and finally to third position in classes Ix and X.

19. From time allocation point of view, Science gradually improves its position from Class VI to Class X but from examination point of view there is a downward trend in its position during the middle and secondary stages of school education.

20. From time allocation point of view, Social Science is given third or fourth position from Classes VI to X, whereas from examination point of view, its first position in Class VI is reduced to second position in Classes VII and VIII and finally to third position in Classes IX and X.

21. Weightage given to different areas from time allocation point of view is not related weightage given to these areas from examination point of view.

Summary of Discussion

The study has revealed that despite our concern for the balanced and all round development of the child's personality, academic subjects are still given considerably more weightage, both in terms of time allocation for their teaching and marks allotment in the annual examination, in comparison to the non-bookish curriculum areas like Physical Education, SUPW, Drawing, etc. This is perhaps in response to the compulsions of the present day competitive society which tends to give priority to the students' achievements in these subjects, for their career advancement.

out of the academic subjects, compulsory subjects considered to be components of minimum essential core curriculum are given more weightage both in terms of time allocation and marks allotment, in comparison to the elective subject or 3rd Language.

The study has also revealed that different states give weightage to different curriculum areas, either from time allocation point of view or from marks allotment point of view. English and Mathematics are the two subjects which are allocated more time forteaching in the schools from Classes VI to X. The most probable reason for the high weightage given to these subjects is the general impression that from students' point of view, these are difficult subjects, and hence they require more time to move ahead in these subjects. It is very often argued that students need more time to learn English, because of its being a foreign language. It is also argued that more time is also needed for mastering skill involved in the study of Mathematics. However, from examination point of view, Mother Tongue and English are given more weithtage in comparison to all other subjects.

Science is given less weightage from the viewpoint of time allocation in the lower classes but it is given more weightage in higher classes. This shift in emphasis may be attributed to the growing importance of Science in the present times. It has now been realised that a school leaver must possess as much knowledge of Science as is necessary to prepare him for modern living.

The study has revealed that there is no linkage between weightage given to different subject areas from time allocation poin of view and weightage from the viewpoint of examination marks. This implies that the subjects which are given first priority from time allocation point of view are not necessarily given the same priority from examination point of view also. The absence of any type of relationship between the two types of weightage simply suggests that there are different considerations for giving weightage to various subject areas from time allocation point of view and from marks allotment point of view. A subject is not given more weightage from examination point of view simply because of the fact that it is allotted more time for teaching per week in comparison to other subjects.

CURRICULUM LOAD
AT THE SCHOOL LEVEL
- A Quick Appraisal -
NCERT

FINDINGS AND CONCLUSIONS

The problem of curriculum load at times emanates from unrealistically high aspirations of parents, students, teachers and schools and also from the competitive spirit that has afflicted all spheres of our social life. Percentage of marks obtained at the annual examination has become the sole indicator of a student's worth. Many schools, specially un-aided recognised and unrecognised schools, require their students to buy books that are not prescribed by the Education Department because it is felt that these may help them in showing better performance in the examinations. To ensure bright future, most of the students have to burn the proverbial mid-night oil and in some cases parents are compelled to engage private tutors for their children.

Curriculum has to be respensive to the changing realities and growing demands of society. Occasionally there are demands for inclusion of new topics in the school curriculum. The desire to accelerate the process of modernisation and the aim to improve the educational standards so as to ensure international comparability on the one hand and inadequacy and uneven distribution of physical and human resources on the other are some of the factors which impinge upon curriculum load.

Analysis of a variety of data obtained from the four states and one union territory has supported the contention that curriculum development including its implementation and evaluation is a multi-dimensional phenomenon. Therefore, any discussion on the question of curriculum load has to encompass all aspects of the total endeavour made under the

name of curriculum development and transaction. Experiences of the Working Group have, therefore, been synthesised around the following aspects of curriculum endeavour :

A. Physical facilities and their utilisation

The quality and extent of facilities provided in the school are relevant in the context of curriculum load. It has been observed that majority of schools in all the states, particularly primary schools and schools in rural areas do not have adequate number of teachers, classrooms and most essential teaching aids such as blackboard, chalk, maps, etc. Several high schools do not have suitably equipped libraries, science laboratories, and other essential audio-visual aids. Teachers find it difficult to transact the curriculum effectively without the requisite support materials which facilitate understanding of basic concepts on the part of students. Many a time absence of essential facilities leads to overcrowding in classes and loss of instructional time. It is obvious that the quality of output will depend to a large extent on the quality of inputs.

Teachers and schools continuously demand more and more facilities which are indeed woefully inadequate but there is also a disturbing aspect of this unfortunate situation. It has been observed that the majority of teachers are reluctant to fully utilise available facilities to ensure effective curriculum transaction, Science equipments, books, charts, models, films etc.,where available, are not fully used in majority of schools, particularly in primary and middle schools. Optimum use of existing facilities, howsoever inadequate, may improve the situation to a great extent. The main reason for this unfortunate situation appears to be the prevalence of examination oriented teaching.

The perception of curriculum load also depends on the socio-economic status of the parents and on the quality of facilities available in homes. The survey conducted in Delhi schools has revealed that majority of homes in Delhi do have facilities like television, radio, newspapers, magazines, dictionaries and atlas. These would no doubt help the children in their educational advancement by widening their mental horizon. However, the data have shown that where facilities do exist, these are not fully utilised.

Teachers expect the parents to send their wards to school in time and to help them in completing the home work assigned. Majority of students, being first generation learners, their parents are not in a position to help them in their studies at home. The school programmes should be such as will enable the students to cope with the school work on their own.

B. Curriculum Organisation and Materials

School curriculum comprises scholastic areas like languages, social sciences, physical sciences and mathematics on the one hand and non-scholastic areas like work experience, physical education, etc. The former are generally examination subjects while the latter are non-examination areas. It has been observed that non-examination areas are not taken seriously either by students or by teachers. Suitable steps are needed to set things right in this regard.

First Language

The existing curriculum of First Language, from primary stage to secondary stage, has been found to be quite manageable in all the five states. But the pupils' attainment in the mother tongue at the primary stage has been found to be inadequate. This is based on the results of the Reading Ability Test which was given to 370 students of class II and V. The use of different forms of numerals in different books also proves to be a source of difficulty for the pupils. At the primary and upper primary level, children find it difficult to comprehend and appreciate the poems that are written in language which is not contemporary. Likewise, students of class VI and VII find it difficult to understand and appreciate the poems which have too much of symbolism in them.

English

The study of English, as second language, is introduced in class VI in Delhi, Rajasthan and Madhya Pradesh while it is introduced in class IV and V in Orissa and Karnataka respectively. In some states, curriculum of English, specially in classes VI to VIII, seems to be somewhat difficult to teachers as well as to students. It has been highlighted that this is due to teachers'inadequate command over English and lack of mastery of the elements of language by students in the initial years of language learning. Most of the teachers conceive of English as a 'content' subject like history, geography, economics, etc. They generally follow the traditional translation-cum-grammar method while teaching the textbooks. They lay emphasis on comprehension of the prescribed text and make little effort to develop the four basic skills of language i.e. listening, speaking, reading and writing. Ineffective methods of teaching create a wide gap between the actual attainments in English and the expected linguistic goals.

Third Language

The study of third language is introduced in class V or VI in different states. In Rajasthan, Madhya Pradesh and Delhi, majority of students take up Sanskrit while in Orissa and Karnataka they study Hindi as third language. But it is given a low weightage in school curriculum, both from the point of view of time and marks. In the school timetable only two or three periods per week are allocated for its teaching. This is not found sufficient for the teaching and learning of a third language. Moreover, many students have little motivation to study third language seriously, specially when they know that they can be promoted to the next higher class without getting through the examination held in it. The thus, find it irrelevant.

Science

The present curriculum in science for classes III to X in all the states has been found to be manageable except for classes VI to X in Delhi where it is considered to be somewhat lengthy. However, a few topics included in the syllabi of different classes in various states have been considered to be difficult for pupils. For example, Gravitational Force, Electricity, Magnetism, Rocks, Density are the topics which are included in the courses of classes III to V but these are considered to be difficult for pupils. In classes VI to VIII topics entitled Hydraulic Machine, Hydraulic Brake and numericals based upon it, application of Newton's first laws of Motion, Specific Heat, Latent Heat and its numericals, Conservation of Mass, Chemical Equations, Metals, Nervous system, Mendel's law up to F_3 generation, prove difficult for pupils of different classes, the syllabi of which contain these topics.

At the secondary stage, in Delhi, course 'A' is considered to be ambitious while course 'B' is found to be alright as far as difficulty level of the course content is concerned. The following topics in the Physics and Biology portions of the 'A' course are difficult for the students : (i) Mathematical derivation of Mirror and Lens Formulas, numericals based on these formulas; (ii) study of Coulumb's law; (iii) numericals based on Relative Density; (iv) comparative anatomy and physiology of Hydra, Earthworm, Cockroach, Frog and Man.

The present curriculum of science draws its subject matter from the disciplines of physics, chemistry and biology. By and large, disciplinary approach rather than integrated approach is followed in the organisation of its syllabus as well as its teaching. Thus,in place of one integrated area of science, there is only a loose combination of three disciplines. In Rajasthan, general science is taught as a core subject while physics, chemistry and biology are taught as elective subjects. In all the states, almost equal weightage is given to the three branches except in Madhya Pradesh where biology is given 50 per cent weightage in terms of marks.

It has been observed that methods of teaching used by majority of teachers are far from satisfactory. Reading the book para by para, lecture method and lecture-cum-discussion method generally find favour with most of the teachers. Demonstration, observation and experimentation are sparingly used, specially at the primary and upper primary stages. The students are seldom encouraged to undertake the activities suggested in the textbooks. In a large number of schools in Karnataka, Orissa, Rajasthan and Madhya Pradesh science graduates are not available

to teach science at the upper primary or middle stage. At the primary stage, even those teachers have to teach science who themselves have not studied this subject.

The NCERT and Education Departments of different States have recommended 6-8 periods per week for the teaching of science. However, it has been found that government schools in Delhi allocate 8 or 9 periods while central schools and public schools allot 10-12 periods for science in a week. This suggests that the schools find the course too lengthy to be completed in the time recommended or prescribed. In other states too, it was found that periods meant for non-scholastic areas are sometimes utilized for the teaching of science.

Mathematics Mathematics is a compulsory subject in school curriculum from class I-X in all the states. The existing curriculum in mathematics for classes III to X is quite manageable in the five states. However, the prescribed course for class VII in Orissa and for classes VIII to X in Karnataka is found to be slightly heavy for the pupils. In the case of Delhi, Binary System in class V, introduction of Twin primes and Odd primes and Symmetry in class VI; solution of inequations in class VII, are considered to be difficult for pupils. At the secondary stage, mapping, graphs of quadratic polynomials are considered to be difficult for pupils. However, the teachers in Delhi suggested strengthening of course by increasing number of problems in exercises.

In some states the curriculum in mathematics of one stage is not articulated with that of the next stage. This results in wide gaps between the courses prescribed for different stages. Further, in some

states, teachers who have not studied mathematics up to the higher secondary level have to teach the subject at the middle stage.

Social Studies

The present curriculum of social studies draws its subject matter from the disciplines of history, civics and geography. At the primary stage, it is taught as a part of environmental studies. As in science so also in social studies, disciplinary approach rather than integrated approach is by and large followed in the primary, middle and secondary stage. In place of one integrated area, it is just a combination of three areas. The same teacher finds it difficult to teach all the three branches. Many a times, teachers with adequate background in geography are not available.

It has been observed that the prescribed curriculum in all the five states is not difficult for the pupils except for a few topics in one class or another. However, keeping in view the present allocation of 6 periods in class VI-VIII and 7 periods in classes IX and X, the prescribed curriculum in Delhi from class VI-X, proves to be somewhat lengthy.

Language used in the textbooks of science, social science and mathematics is sometimes more difficult than the language used in language textbooks which are first written in one language and are then got translated into another. For instance, books of science and social science used in Delhi schools prove difficult for the students because of inappropriate literal translation.

Prior to the introduction of 10+2 pattern of education the duration of general education was 8 years and diversification of course started in class IX. But under the new pattern the duration of

general education has been extended by two more years. So there was need for devising courses for the two extended years in order to ensure continuity between the courses of upper primary/middle stage on the one hand and of secondary stage on the other. However, it has been observed that there is much overlapping between the courses of these two stages in content subjects, namely, science, social science and mathematics.

Management of Curriculum Transaction

Any curriculum is developed on the basis of certain assumptions. For instance, it is quite natural for the curriculum designers to assume that a minimum essential level of physical facilities, adequate instructiona time, well-qualified teachers in adequate number and suitable curriculum materials will be available in all the schools. The failure to provide pre-requisites may sometimes lead to the problem of curriculum load.

The quantum of the present curriculum in the five states was determined on the basis of the assumption that 220-240 working days in an academic year would be available for its transaction. It was visualised that after reducing the days earmarked for holding terminal examinations, school functions, etc. about 200-220 days would be available for instructional work. But it has been highlighted that about 50-60 days are lost on account of examinations and tests, functions, admissions, strikes, etc. Under these circumstances, it is quite natural that the present time allocation for some subjects in some classes is considered to be inadequate.

While the duration of a school day and that of class period is considered to be a problem of management, it has an important bearing on the question of curriculum load. In Delhi, the duration of a school

day is 5 hours in winter and 5 hours 30 minutes in summer while Kendriya Vidyalayas and public schools have a school day of at least 6 hours. In Karnataka and Madhya Pradesh the duration of a school day is 6 hours while in Rajasthan the duration ranges between 5½ and 6 hours. In Madhya Pradesh the duration is only 5 hours in those schools which have to run for two shifts. The duration of a class period in Government schools of Delhi ranges between 30 and 35 minutes while it ranges between 40 and 45 minutes in Kendriya Vidyalayas, public schools and the other four states. The duration of a class period cannot be increased in those schools which have two shifts because of the limitations of time and space. Inadequate time affects the quality of curriculum transaction because any imbalance between the quantum of the course content and the time available in the school time table compels the teachers to make use of strategies that are pedagogically not desirable. Thus, an administrative problem which has its roots in paucity of resources, leads to the emergence of a curriculum problem.

It has been observed that quite a sizeable number of teachers do not possess adequate command over their subject. This is more true in the case of teachers of English and the third language. This is also true in the case of undergraduate teachers teaching at the higher primary or middle stage, particularly in science, English and mathematics. It has also been observed that many teachers are called upon to teach those subjects for which they themselves are not qualified. For instance, in primary schools, a teacher has to teach all the subjects up to class V. Many teachers have not studied science even at the high school stage but they have to teach it. While such anomalies may be due to some administrative and financial constraints, they adversely affect the quality of curriculum transaction which in turn may lead to the problem of curriculum

load.

It has also been observed that weakness in the school management and supervision system contributes in making the curriculum heavy for pupils. For instance, heads of schools are called upon to take classes in addition to their administrative responsibilities. In the absence of a standby teacher, either the headmaster or the teachers on duty have to take classes of teachers proceeding on leave. Thus, teaching work in a number of classes gets disturbed. It has been observed that teaching work seldom takes place in the so-called 'arrangement periods' because of obvious reasons. Academic guidance is generally not available to the teachers either from the head of the institution or from the inspector or supervisor because they are administrators first and teachers afterwards.

It has been observed that size of a class in a number of schools in the five states ranges between 50 and 60. Overcrowding in classes is said to be responsible for the perception of curriculum load because it gives little time to the teachers to pay individual attention or organi remedial teaching. However, the results of the survey conducted in Delhi do not support the contention that there is positive relationship between class size and perception of curriculum load. But in the case of teachers teaching a class of more than 45 pupils increased load in subjects like Science and English is perceived. This could be due to the nature of the subjects. Science requires practical work and English requires pattern practice and lot of oral work.

It has been seen that whenever a new curriculum is introduced, there is some sort of initial resistance which withers away with the pass of time as the teachers get used to the handling of new materials.

Teachers are generally left to their own resources to use and interpret the new materials as per their experience and capacities. While in-service training of teachers considerably improves their teaching competencies, such facilities are at present very inadequate and as a result only a handful of teachers can take advantage of them.

Textbook has been the main source of learning for the majority of children in our country. However, during the past few years, the need has been felt for providing some additional textual materials to children. Workbooks and supplementary books need to be made available But in some states only supplementary readers have been made available, that too in some classes and in respect of one or two subjects. These have been found to be quite useful by the students. Likewise, Teacher Guides, prove to be fairly good support for the teachers.

Home work is rightly considered to be an essential supplement of classroom instruction. But in order to show better pass percentage, some teachers become over-enthusiastic and assign too much home work to children On top of it, lack of system and order makes things look heavier than they actually are. On some days, there is too much home work assigned by teachers of different subjects, while on some other days, there is no home work at all. It has also been observed that majority of teachers assign routine type of home work such as doing sums in mathematics, writing a few pages in languages, writing answers in social studies or sciences etc. which the student looks upon as a chore. There is need for assigning a variety of innovative type of home work which the students will enjoy doing.

D. Examination and Tests

The entire educational system in India is examination oriented. A student's worth is judged in terms of percentage of marks that he/she secures in a public examination. Likewise a teacher's worth is judged in terms of the percentage of his/her students getting through the examination. Therefore, the teachers adopt only those strategies which are likely to yield better results. With the majority of teachers, the sole purpose of teaching is to help the students get through the examination. It is perhaps due to their preoccupation with examination results that the teachers generally make such demands as are not educationally and psychologically desirable. For instance, the majority of teachers and principals emphasise the desirability of holding public examinations at the end of primary and middle stages. They are even in favour of holding tests a few days before the final examination.

It has been repeatedly pointed out that students' attainment at the end of the primary stage is generally not satisfactory. Their acquisition of the four basic language abilities of listening, speaking, reading and writing are said to be inadequate. A large number of teachers feel that in the absence of remedial teaching at the primary stage, the present policy of automatic promotion to the next higher class is also responsible for the enhancement of the curriculum load. This policy of non-detention is based on sound principles of psychology and pedagogy because failure during the early years of schooling is a frustrating experience for the child and it may push him out of the school system. But in actual practice, it leads to a mismatch between the actual attainment level of the pupils on the one hand and the level of attainment expected of them in particular class under the existing norms

on the other. Attributing the mismatch to the policy of non-detention at the primary stage is a negative way of looking at things. The teacher works under a number of constraints which prevent him from giving effective guidance to slow learners, more so he is not familiar with the strategies of formative evaluation and remedial teaching. The educational planners have also failed to clarify the educationally sound concept of non-detention.

The practice of holding unit or periodical tests aims at reducing curriculum load for pupils by making pupil evaluation a continuous process rather than a one time affair. In addition to the annual examination the performance of students in the periodical tests is also taken into consideration while deciding their annual result. However, it has been reported that annual examination is still the mainspring of curriculum load for most of the students, though its weightage has been reduced to some extent in the matter of pupil's promotion to the next class. But frequency of class tests, specially when not planned and announced in advance, increases curriculum load for pupils.

CONCLUSIONS

The foregoing discussion of the results of the study leads to the following conclusions :

1. The failure to provide the pre-requisites for the effective transaction of curriculum leads to the problem of curriculum load.

2. The problem of curriculum load is more a problem of educational management and resource constraints than a problem of curriculum development.

3. Lack of order and system in any of the aspects of curriculum development and implementation, including that of home work assignment, contributes substantially to the problem of curriculum load.

4. The quality of curriculum transaction is a major determinant of curriculum load. Even a flawless curriculum, if transacted in an inappropriate manner, may prove to be heavy for pupils.

5. The problem of curriculum load is also a social problem having roots in the high aspirations of students and parents and in the widespread spirit of competition which permeates all walks of our social life.

6. The present system of examination with its emphasis on memorisation is responsible to a great extent for the problem of curriculum load.

7. Many a times, errors of judgement on the part of curriculum designers with regard to matching the cognitive demands of the subject matter with the pupils maturity level leads to the problem of curriculum load.

8. The desire to include more and more content in order to raise the educational standards, sometimes makes the curriculum ambitious.

9. Lack of coordination and articulation between the curricula of different stages and of different subjects leads to considerable overlap which should be avoided to ensure manageability of curriculum.

ACHIEVEMENTS OF INDIAN CHILDREN IN MOTHER TONGUE(HINDI) AND SCIENCE

There is a general view that standards in education have continuously and alarmingly deteriorated during the post-independence period in certain sectors. A balanced assessment of the situation related to standards in education was given by the Education Commission (1964-66) which observed that the overall situation is a "mixed picture of light and shade, of improvement as well as deterioration, and rise in standards in some areas accompanied by a comparative decline in others".

Of the series of studies conducted during 1969-71 by the International Association for Evaluation of Educational Achievement, India had participated in the measurement of achievement in two subjects, namely mother tonge (Hindi) and Science.* The sample of Indian students was limited to the six states where hindi was the principal spoken language. The sample consisted of students of age 10 +, roughly corresponding to standards IV-V, age 14 + corresponding to standards VIII - IX and students in the last grade of secondary schools.

In the two tests used to test reading comprehension and word knowledge, the achievements of Indian children were lowest among all the 14 countries which participated in the study. Indian children began with very low mean achievements in comparison to

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* The study was conducted by Smt. Snehalata Shukla, National Council of Educational Research and Training, New Delhi.

developed countries (Table 1).

Mean Scores (on reading comprehension and word knowledge texts) for Indian students and students in Developed Countries

Group	Students in Age-group 10 +	Students in Age-group 14 +	Students in last year os secondary school
Median for developed countries	17.6	25.5	25.2
India sample for IEA Study	8.5	5.2	3.5

(i) Means are obtained from corrected scores (as are all means in the table)

(ii) Maximum Score is 66

As Table 1 shows, the initial poor achievement in reading of 10 year old Indian children continued to deteriorate as reflected in the achievements of older children.

Table 2 indicates the levels of achievement of Indian students in Science, in comparison to developed countries. Indian students scored

Table 2

Mean Scores on Science Test for Indian students and students in Developed countries.

Group	Students in age - group 10+	Students in age - group 14+	Students in last year of secondary school
Median for developed countries	16.7	22.3	21.9
India sample for IEA Study	8.5	7.6	6.2

(i) Means are obtained from corrected scores (as are all means in the table)

(ii) Maximum score is 66.

appreciably lower than their counterparts in developed countries. As in the case of reading comprehension text scores, not only do the means start at a much lower level compared to the median for developed countries, but this gap continues to incurease at higher levels of education.

To compare the privileged children with the regular Indian sample, the IEA test were also administered to small groups (comparable in ages and grades to those included in the Indian sample) in three elite schools in Delhi. These privately managed schools charged higher tution fees and taught students through the medium of English. The scores for these students and their counterparts in the regular Indian sample and from developed countries are given in Table 3.

Table 3

Means of selected and general groups of children.

Group	Population I		Population II		Population III	
	Science	Reading	Science	Reading	Science	Reading
Median for developed countries	16.7	17.6	22.3	25.5	21.9	25.2
Indian select sample: Elite Delhi Schools	14.2 (237)	15.5 (238)	26.8 (155)	18.4 (152)	27.4 (49)	14.1 (57)
India sample for IEA study	8.5	8.5	7.6	5.2	6.2	3.5

(i) Means are obtained from corrected scores (as are all means in the table) The figures in parantheses are Ns

(ii) Maximum score is 66.

It could be seen that children from the selected elite schools located in Delhi schools start lower as compared to their counterparts in developed countries in terms of achievement in science. But they make up

this gap at later levels. Their scores in both science and reading were much higher than the scores of Indian students in the general sample at all levels. The most striking feature was that children who attend English medium schools in Delhi did much better in the reading comprehension test than the students attending Hindi medium schools in the Hindi speaking states.

SCIENCE, TECHNOLOGY AND EDUCATION RESEARCH IN INDIA: A DISCUSSION PAPER

Introduction:

Even a few days of listening, reading and talking in India can throw up a host of issues related to science, technology and education (STE). Concerns about STE are clearly very near the surface. Within this short period[1] there have appeared: (1) the latest controversy in a round of intense debates about Nehru's plea for "scientific temper"; (2) an attempt at a national level to prevent some engineering colleges from charging up to 10,000 dollars as capitation fee - so fierce is the competition to enter the prestige science and engineering sector; (3) a twenty page feature in Business India on the Indian Institutes of Management (IIM), covering all the issues that emerge whenever prestige training and Indian industry are examined: brain -drain to US industry, student disenchantment with "managing" rural development and social welfare, creativity and its lack; discrimination in admissions policy, and the role of liberal education in the ordinary university sector.

Without prompting, the intellectual community and policy makers on science and education planning link the alleged malaise to a combination of structural and educational factors. The world's third largest stock of scientifically-educated manpower is frequently caricatured for being mediocre, unable to compete internationally, and having no particular comparative advantage. In almost exact parallel, the products of industry itself are equally criticised; they are mass-produced like the products of the education system, and like the latter they lack quality and finish. The pass mark in the school leaving examinations is 35%, and the poorest colleges will accept students at this "pass"level. Similarly, weak quality control allows goods into circulation that are very poorly finished. Quality control is set very low, and the general image of industry is of low standards, and of a lack of concern with international competitiveness. Of course both education and industry are more differentiated than that. They combine relatively small "elite" sectors which seek to remain on the gold standard (for example, TATA enterprises and the Indian Institutes of Technology (IIT))along with a mass sector that has allegedly gone off the international standard.

Paradoxically, India has done what many other Third World countries are berated for not having done. She has in general not tied her school and college standards to some high cost western benchmark, and consequently is able to offer many of her people some of the cheapest school and and college education anywhere in the world. In parallel, where Indian industry is most internally competitive, there is the possibility of purchasing an enormous range of goods at very low cost, even if of very variable quality.

No one doubts that the patients (education and industry) are very much alive. Indeed they both demonstrate a frenzy of activity. The worry rather is about content and direction. There is a desire on the one hand for an internationally competitive scientific research community and a similarly export and quality oriented industrial sector. But this coexists with the view that Indian science (and by extension, Indian industry) is in reality a sea of mediocrity, and that somehow this failure to be

innovative and to produce quality products is education based. Analysts know only too well that, to an extent, colonial education deliberately excluded the quest for innovation and creativity (engineering college syllabuses, for example, were organized around maintenance rather than design work). But in the 35 years of independence, the desire for industrial and scientific autonomy has been somewhat inadequately fulfilled by the school and college system. Dinesh Mohan of IIT Delhi implicates the school system quite directly:

> One cause of mediocrity at the college level is that we seem to have expanded our post-secondary capacity very fast without inculcating the scientific temper in our primary and secondary schools. Education for the student, all too often, is instead an exercise in memorising information uncritically, for its own sake. We have failed to make quality education available to the majority of India's children (Mohan, Seminar Feb. '81, p.6)

On the other hand, despite not being internationally competitive, Indian scientific capacity for all its numbers has allegedly made little dent on the mass problems of poverty, disease, drought and energy. The "Statement on Scientific Temper" drawn up by twenty leading scientists and widely publicised since July 1981 made the point very starkly:

> We have all the technology available right now within the country to give water, food, shelter, and basic health care to our millions. And yet we do not. Something has gone wrong. (Mainstream, July 25, 1981, p.7).

In sympathy with this conclusion, but reaching it from a very wide spectrum of political philosophies, are any number of organizations, voluntary societies and individuals who have sought to make science a much more powerful and popular vehicle of development. Indian science despite not attracting accolades internationally does not apparently even have the satisfaction of having taken itself to the people. This failing is the spark for a host of almost uncoordinated attempts to bridge the gap between scientific knowledge and poverty. Some use the formal school, some non-formal education with adults. Some treat "science" as a weapon of awakening as Freire treated "Literacy". Villages are adopted to prove the value of applying relatively high technology to village backwardness, others to demonstrate that the scientific improvement of traditional technology is the way forward. A mass movement for people's science in Kerala vies with young scientists who have left the cities to work with one subdistrict, or with one scientist trying to run a personal primary school exposing just ten children to scientific methods.

The scientific apparatus is equally varied. Overhead, the Indian satellite will from August 1982 use "high" technology to get development films to a certain number of states with receptors supplied. Elsewhere simple primary science kits in plastic bottles with 30 experiments emerge from the science education centre named after one of India's most famous nuclear scientists, Bhabha. Elsewhere again physics, chemistry and biology are taught without a lab, and without any materials for practicals at all. Yet physics, chemistry, biology and maths are all compulsory up to grade X, the school leaving certificate.

Lower down the training and industrial systems, India has massive resources of skilled people, some in traditional handicrafts, some in the modern sector. In industry in particular, the tradition of developing skills on the job is firmly entrenched, and a whole system alternative to formal training exists for producing/roughly equivalent /pe

to skilled worker, technician and engineer. The latter, termed "engineering practical", underlines a further point that is part of this complex interaction of skill, technology and education. There is a widespread feeling that trained people do not work in fields they are trained for. Engineers work as inspectors, supervisors or on sales or marketing because the less formally trained "engineering practicals" take their place. At the apex of the engineering training system in the IITs, a significant number after graduating go straight to the other apex institutions for management training (IIMs) and thus become managers rather than engineers. The system whereby a large group of the same people get both the best engineering and the best management training has been termed "gold-plating gold."(1) By contrast, the whole routine maintenance sector, from cars, to phones, to buildings and electrical machinery is serviced by people with few formal skills, and who, moreover, are seldom likely to possess any of the products they are said so inefficiently to be maintaining.

This enormous informal alternative sector in Indian industry, and its learning and training methods are clearly another ingredient in the mix of factors leading to indifferent quality in industry, and to the non-utilisation of the formally trained in the positions suggested by their diplomas and degrees.

The last set of factors that relate to the whole discussion about science, technology and education is the question of foreign collaboration, industrial self-reliance, imports and protection. Unlike most countries in the South or North (with the possible exception of Russia and China) almost everything openly available for sale has been made in India, most of it on machines made in India, but a very high proportion of the electrical and mechanical items were originally made through a foreign collaboration and in many cases continue to be. Despite the high collaborative element, quality has remained a problem, as has the alleged continued dependence on foreign collaboration. It is further widely argued that "there is hardly any science-based innovation in Indian industry" (Mohan op. cit. p.6).

It can be seen that many of the same issues reappear in different arrangements in many of the areas centrally affecting science, technology and education. Some of these will be examined at greater depth, to give an indication of the many action research areas already covered, as well as some which are only beginning to attract serious attention:

1. Issues relating to the quality of science education in the formal sector.
2. Research accumulation on non-formal science education.
3. Utilization of science manpower.
4. Changing ideologies of science and technology.

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(1) Business India, July 5-18, 1982, p.54

1. Quality of Science Education in the Formal Sector

At one level, science is better established in the school system of many Indian states than is the case in other countries, including some in Europe. Science through environmental studies commences from Grade I; in the upper primary school, science is disaggregated into disciplines of physics, chemistry, biology and maths, and in the high school it remains compulsory until Grade X. The pattern will change somewhat from state to state, but the common thread is a strong science emphasis. Common also is a resistance on political grounds to devising one curriculum for stronger students, and one for the less academic. Professional educators may be attracted by differentiation, but not so the policy makers. Not surprisingly, the pass mark at school leaving certificate (SLC) is kept low (35% for maths and science subjects) and even then rather less than 50% pass. Even in the highly educated (and some would say science-motivated) Kerala State some 350,000 are taking the SLC for the first time in any year, while a similar number are repeating.

A good deal is known in general about the examination-orientation of much Indian education, but how this affects particular subjects in science, and how far the backwash of SLC washes down the school system is not known. If there is a role for schools and colleges in producing this scientific temper, then presumably the teaching and learning environments for science become important. In resource-poor schools, without labs, there may be enough material for the teacher to demonstrate, even if no student can personally experiment. In other schools, completely without science materials, science subjects presumably become like maths, or history, taught entirely from the blackboard and textbook. Science is then learnt free of any practical experience. Even in better endowed schools, practicals in science are frequently squeezed out by the mass of theoret material in the four science subjects.

The way that science is first acquired may seem a far cry from the larger questions of quality and innovativeness of industrial research but it is widely felt that if science education is to become a questioning attitude of mind, then it cannot easily be acquired in an education system that works in an atmosphere of conformity, non-questioning and obedience to authority[1]. It is for this reason that the Kerala Science Movement (Kerala Sastra Sahitya Parishat - KSSP) since 1971 has been taking science education into the schools with popular publications for different age groups, developing also several thousand science clubs and science corners, and promoting quiz competitions across the state. This voluntary association has a whole non-formal adult science education wing, as will be seen later, but in schools alone their impact has been presumably an important supplement to the regular curriculum. According to one teacher, his science club allows the children to ask questions which there is no time for in class. More important, the KSSP begins to put across to children the idea that science is not about formulae but about the application of knowledge to socio-economic problems.

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Action and Research in Science Education

Apart from the KSSP, there have been a series of other bodies concerned with the improvement of science education in schools. Most of these accept that the explosion of new knowledge makes science education even more critical in schools; they are equally aware that science teaching generally is a parody of scientific method. The emphasis is on more and more information correctly remembered, and ideally quoted from the textbooks. The very goal of promoting more science can thus be counter-productive. Whole sections of science knowledge are pushed further and further down the school system; concepts once taught in higher secondary are introduced in the primary school. The overloaded science syllabus then requires more traditional teaching and memorisation; it is difficult to justify time on experimentation and discovery. Hence the increasingly academic status of science in schools.

Different approaches to this oppressive teaching of science have been tried over the last 15 years, particularly during the 1970s and most have sought to reinstate the importance of discovery, observation, and independent judgement. Methodologies have included the use of kits, materials development, simplification of language, teacher orientation, national talent searches, science fairs, science centres etc. In general, and perhaps inevitably, these activities of intervention and change have not been very carefully monitored; the process of adding up what has been learnt in a decade and more of experimentation is just beginning. It may be useful therefore to give some indications of where reflection upon action would be particularly valuable to the science community in India and to its counterparts in other countries.

Homi Bhabha Centre for Science Education

Tata Institute of Fundamental Research (TIFR). Spun off from TIFR in 1974, the Centre institutionalised several years of voluntary work by TIFR scientists in the Bombay Municipal school system. It was now possible to innovate and experiment in science education with the advantage of the TIFR research base. Understandably, this centre's work has been particularly concerned with the evaluation of its activities. Broadly, these have included a series of materials dealing with scientific problems raised by children, a set of concerns with simplifying the language of science, action research projects in providing discovery science to first generation learners in the rural area of Khiroda in Maharashtra, supplementary (Saturday) science for backward caste children from Bombay secondary schools. The last activity emphasises all the aspects that are missing in traditional science teaching and in pupils' attitudes, but beyond the problems of science education in general has the additional aim of giving the scheduled caste children the self confidence that they can succeed on merit. (One of the problems of the national government's policy of quotas and reservations for scheduled caste and scheduled tribe students, and the practice of allowing their entry to institutions at much lower grade scores than the other students is precisely the damage done to their self confidence). By contrast the Homi Bhabha centre wants to show that with the little supplementation (2/3 hours a week for 2 years), promising students can adopt a qualitatively different approach to learning. A second wave of students has now started the same 2 year program and this time there is a control group of equally bright students not attending the centre. As anticipated, exposure to the Homi Bhabha "system"

does make a significant difference in their ordinary end of year exam scores, as well as to their attitudes to learning. Sceptics would argue that weekly contact with talented and committed research scientists, intent on question-raising and personal experimentation, is bound to have an impact, but how can it be generalised, how can it stop being the personal tuition experience of 30 selected students, and affect the schools from which they are drawn?

The centre can defend this action of experiment on a variety of grounds: it offers directly relevant policy research on equalising opportunities for scheduled caste students. It feeds directly into materials improvement for secondary school students. It also acts as an inhouse lab for examining processes of change. There is finally the possibility of continuing with a longitudinal study as the pupils leave school for higher education and the labour market.

The centre's wider concern with educational measures to counter social deprivation has led to their search for relatively low cost changes with high pay-off. One of the most attractive of these has been the production of an alternative set of science books for Marathi speakers from grades V to VII. Everything was held constant in the new texts - identical pictures, pagination, etc. to the government textbooks -- but the language was dramatically simplified. Results were very encouraging; increases in mastery were evident, but decreases in the tendency to memorise passages, which so often affects student learning. Pupil and teacher participation also improved noticeably. Persuaded by these initial findings Bombay Municipal Corporation has encouraged a much more comprehensive trial of these simplified science texts(1).

The Homi Bhabha centre illustrates the range of different action research approaches to specific and general problems of improving science education. Materials development: but how to get them into schools. Discovery learning: but how to spread it beyond the range of the centre's influence. Moving from micro to macro has been attempted in the centre's Khiroda experiment where many of the centre's strategies were applied to a rural school network and further materials developed. From available documentation, this pilot extension of the centre's methods seems to have worked out well between 1975 and 1977. The hope had been then to move to implementation on a large scale, and it was assumed that the personal contact as a means of communication would have to be replaced by modern technology of mass communication. (2) This has not happened but we will notice later the potential of INSAT, the Indian satellite launched on April 10 1982 as a possible follower of educational work under the 1975/6 SITE satellite program.

Science Education via Science Kit

A natural response to the lack of any equipment in most schools,

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(1) V.G. Kulkarni and V.G. Gambhir, Homi Bhabha Centre for Science Education, "Effect of Language Barrier on the Universalisation of Education" Indian Educational Review, Jan. 1981. pp.48-59

(2) Proceedings of the Conference on Science Education, Khiroda, Jan. 17-19, 1978, TIFR, Bombay

and the consequent teaching of science as an entirely academic subject has been the development of science kits. The attraction of putting together a set of teaching aids in a portable container encouraged UNICEF and the National Council for Educational Research and Training (NCERT) from 1972 to promote India-wide kits and supporting guides. At the state level these have been made at relatively low cost (and ease) compared with many other Third World countries, and with some variations from state to state have found their way into primary schools. In Gujerat, for instance, a single kit box for St. I to St. IV went out to each of the state's 30,000 odd primary schools free, and for standards V, VI and VII, kit boxes were also developed and sold with differing degrees of state and district level support.

Kit boxes have not been given out in isolation from support activities. Indeed as part of their support to science education, UNICEF encouraged the establishment of science education units in the State Institutes of Education, and these in turn then ran a whole paraphenalia of courses -- for science teachers in teacher training courses, for science inspectors at the district level, for lab assistants in colleges, and also kit box courses for primary school teachers themselves. No less than 25,000 of the latter had been exposed to those 3 day courses since 1972. But what is known of the impact of these state wide initiatives with science kits? Very little.

Preliminary inquiries in Gujerat State for instance reveal that kits on arriving in schools are entered on what is termed appropriately the Dead Stock Register. This is annually inspected, and should anything entered there be lost or broken, the procedure for removing it from the dead stock register must be initiated. The complexity of this bureaucratic procedure is such that few headmasters or teachers would willingly embark upon it (for articles lost costing more than 10 dollars, a whole committee has to be set up at the district level to make recommendations). In consequence, the kit box is better preserved locked and ready for inspection.

Kit boxes are a good example of the problems of curriculum innovation in sciences. Even if teachers are allowed to use them, they are only a partial answer to the problem of doing rather than learning science. At best, in a class of 40 or 50, the teacher may demonstrate something, but the pupils will not be much nearer trying things out for themselves. So even if the obstacle of the dead stock register is overturned, there still remains the question of access and personal observation.

One of the most original attempts to work with kits and still make all pupils participate has been that associated with Hari Parameswaran and the Dynam Engineering Corporation of Bangalore. Ten years of trying to market low cost science kits to schools have brought the conviction that one kit per school is really not worth fighting for. It cannot be replaced, it cannot be shared, or experienced. After abortive attempts to market kits to 26,000 schools, and intensive interviews with all kinds of teachers, Parmeswaran now runs a "teacher proof" use of science kits, in the sense that he has his own cadre of 26 teachers, who are dedicated experimental science teachers. In schools that agree to take the programme (at 5 rupees (50 cts) per pupil per week, they will offer

a weekly exposure during a double period of activity methods. For this price, all children will have access to cheap microscope or whatever materials are necessary. The children's regular teacher will sit in, and insure coordination between the live science program and the regular syllabus.

There is as yet no evaluation of the program, but the following points may be made. There is a built in advantage of the same agency organizing the teaching and producing the kits. It is possible to have rapid feedback from the schools and make modifications and explanations to the kits and literature that a purely commercial operation would not be interested in. Live science can be organized as a supplement to regular science teaching through an itinerant teacher corps (just as it can on Saturday afternoons at the Homi Bhabha Centre), but ultimately Parameswaran would need to retrain the regular science teachers if the scheme was to move beyond the schools currently involved. Finally, because of the cost factor, the present schools are largely those which, though overacademic, really need the supplementation the least. Poorer municipal schools cannot pay for the program unless there is an official subsidy.

At the moment India has probably got a wider experience of differe kinds of science kits than many other countries. In addition to those mentioned, there is a science-kit-in-a-jar produced by Homi Bhabha and intended to make possible 30 basic experiments. At the other end of the market there is an electronics kit produced in Madras by the Committee on Science and Technology in Developing Countries (COSTED), and distributed to colleges and schools. It would be very timely to try and pull together what has been learnt in all these separate initiatives. Such has been the importance of UNICEF support that a separate analysis of its program via NCERT should probably be undertaken. Equally, some detailed work needs to be undertaken that examines the interaction of teaching aids (such as kits) with the syllabus in ordinary primary and secondary schools. What kind of science understanding can there be in a 2 teacher village school, where the presence or absence of a science kit is the least of the school's problems? No sanitation, no electricity, little or no equipment, pyramidal drop-out pattern etc. The inventiveness associated with kits is hard to visualise in the absence of much more basic infrastructures.

Community Science Centre, Ahmedabad

Kits and curriculum materials are two ways of attempting to bring science alive. We have noticed in their application to the school system a tension between "adding-on" live science and installing it directly in the regular curriculum. Inevitably community science centres (and science museums) will be more on the enrichment-supplementation side of the spectrum. This is true of the CSC in Ahmedabad, one of India's most distinguishe attempts to make discovery science influence local schools and the local community. Here too despite 16 years of very rich experience, there seems to be little comprehensive analysis of the lessons that have been learned. Yet some account of the diverse action in curriculum development, programmes for motivated students and teachers in lab work, and the more

recent moves into non-formal education in rural areas would be very valuable. Of course much of this is available in annual reports, and in the occasional evaluation report of a particular activity, but a more synthetic account of a decade and a half's attempt to influence local schools, teachers and textbooks would be useful.

Each CSC unit has an institutional memory of trying certain approaches, working with students / teachers, both in a targeted and in an open house fashion. The same tension noted earlier inevitably appears: if promoting discovery approaches to science, do you narrow the discovery to illustrating particular problems in the actual syllabus of different grades, or do you develop non-syllabus specific exercises in observing, doing or questioning? Years of doing the latter may mean almost no dissemination of materials painstakingly developed. The former draws the centre into the narrowness of "experiments for 5th graders". This last is particularly problematic if the very basis of the 5th grade syllabus has little intellectual justification.

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As with the Homi Bhabha Centre, part of the rationalisation for having small groups of St. V, VII, or post-graduate students utilising the CSC labs on a weekly basis must be to extract from those motivated students insights, problems and procedures that can be made the basis for new curricular materials, or new orientation courses for teachers. But what has been the experience with teachers? That only 3 out of a group will be sufficiently motivated to put CSC ideas into practice? What about supplementary materials for children? Will children really read booklets that are 100% or even 30% science information? What is the experience of Kerala's KSSP with its 35,000 circulation of EUREKA[1] to children in primary school?

At least one member of CSC's staff, Jayashree Mehta, is worried about the tendency for action to push out reflection. Her three years of weekly visits to a rural school to teach and monitor science have led to major questions about the kind of concepts children can deal with in upper primary school. Is there perhaps a need for more basic research related to the reality of rural primary science? Perhaps partly in acknowledgement of the difficulty of making rapid progress with the formal school, the centre has diversified towards non-formal education, and is developing programmes in nutrition and health education for rural functionaries (with the help of CARE, and then USAID). Attractive as these new activities are, there is a continuing obligation to work with schools and colleges, and hence a need to consider what has proved possible and what not feasible amongst the demanding objectives set forth in 1966. For example

> "1. to promote among students, teachers and the lay public (a) an understanding of fundamental concepts involved in the physical and biological sciences and mathematics (b) the acquisition of scientific knowledge and insights as far as possible by the process of inquiry through experiments, AV media, and other means ------- 4 to help make clear the social implications of science and technology.

Kishore Bharati and Friends Rural Centre, Rasulia, Hoshangabad, Madhya Pradesh

These organizations have just completed a decade of action and research for the improvement of science education in middle schools. Faced with the familiar problems of memorised science, the increased quantum of information in textbooks, and the rural-urban school communication gap little appreciated by curriculum planners, the Hoshangabad Science Teaching Programme (HSTP) aimed to introduce discovery science in ordinary government middle schools. Starting with 16 schools in 1972, it encompassed all 220 middle schools in the district from 1978. It has recently reflected on some of the major achievements and existing limitations of this programme. (1) On the credit side, the workers feel that they have demonstrated that innovation is possible in government educational structures, and that joint voluntary agency-government initiatives are one way of implementing changes that neither might achieve on its own. A really large cadre of teachers can become committed to the new approach of teaching science by discovery methods, experiments and field trips. A crucial element in the mix has been the commitment of high quality research scientists from TIFR, IIT, UGC, Delhi University, and other universities and colleges in this science-based improvement of village education.

On the debit side, the major limitation "concerns the attitude of the government. Barring some motivated government officials at senior and junior levels, the general government attitude has been of apathy and unconcern. The rigidity of administrative structures tends to reduce creative efforts to naught and considerable inputs are required to overcome such barriers". The point is made very forcibly that counter-balancing the bureaucratic structures of government really requires very major capabilities and human resources on the side of any voluntary agency. This is an issue that will be encountered again when the problem of taking "science" to the community is examined.

For the moment, one of the most significant outcomes of Kishore Bharati's reflection on its past experience is the decision to explore further areas of expansion-to carry the science programme beyond the district to the state, and to other states if there is interest. It is also apparent that there is now a concern about transferring the specifically science education methods to all other subjects and school levels. This is itself an interesting comment, for science has thus far attracted much more innovatory attention than other subjects.

The vehicle for extending the scope of the last 10 years' work

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(1) Evolving Systems for the Introduction and Diffusion of Educational Innovations: Micro level Experiments to Macro level action (Kishore Bharati, Hoshangabad, M.P. 1982)

is to be an Institute for Educational Research and Innovative Action which will have a coordination and planning centre in Bhopal and four field centres. It expects to draw its support from three sources, state government, central government, and private agencies, and for the first 3 years they have worked out a rather demanding program. A major task to facilitate this expansion programme is "a comprehensive manual in which our experiences, methodology, working methods, examination method, etc. are distilled"(1). Such an analysis would not only be very timely for focussing attention on the science education system; it would also be concerned to pinpoint processes that allow the diffusion of micro experimental schemes into macro level action programmes. The transition from micro to macro has been the reef on which most innovative action has foundered.

> Creating a few model schools and universities (Sevagram and Shantiniketan come to mind easily) is in the wider context quite meaningless as the beneficiary populace is not even a countable fraction (2).

The above four institutions (Homi Bhabha, CSC, Parameswaran's science kits, and HSTP) were selected in no particularly scientific manner to illustrate something of the state of research and action in science education over the last decade and more. Doubtless, it would have been just as easy to select other agencies (3), and reach some similar conclusions about the current climate of science research as it impacts on the formal system.

We have noted a strong and growing interest in adding up what has been learnt in this decade, and also other areas where it is more difficult to pinpoint research-based conclusions. A partial listing of areas that would benefit from further review and research attention would include:

(i) Qualitative studies on how science is actually taught in primary and secondary schools and colleges. It is widely assumed that the present methods are travesty, and that one should proceed forthwith to innovate in the various ways mentioned above. It would, however, be very useful to examine in more depth what is actually achieved in 3 years of upper primary science (for those who then drop out) and the further three years of secondary science (for those who continue). How much "scientific temper" is transmitted by non-experimental, rote learning? /a

(ii) How much significance should be attached to examination scores in science and maths as indications of learning? The rote learning system, with its precise notes, exam guides from the bazaar, supplemented by very large amounts

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(1) Evolving Systems op cit. p.13

(2) Ibid. p.8

(3) For a listing of some of these, see Proceedigs of the Conference on Science Education op. cit

of homework (and occasional private tuitions) does presumably have some positive aspects. Is a poor teacher better with the old methods or the new? Is is possible to argue that the old system is more "teacher-proof" than the new? Given the importance attached to homework and frequent tests in many other studies of student achievement, there are perhaps some aspects of the existing science teaching that need closer analysis. It is worth noting that one of the researchers in Kishore Bharati has made a related point about the eventual examination results of the HSTP schools:

> After the middle school stage these students are not required to employ the qualities and skills which they are supposed to have acquired through the discovery method. Hence it would be expected that, in a traditional examination system, the performance of the students from the schools under the programme would be indistinguishable from that of students from schools where science is taught by the traditional method. An evaluation made recently confirm this hypothesis (1).

(iii) The larger question raised by these radically different teaching styles concerns their enduring effects. Examination scores are relatively meaningless when it comes to measures of creativity and independent thinking. It would be entirely possible for students taught in a discovery mode to do less well in formal examinations than ordinary students (the exams after all are a very close reflection of the teaching methods of the schools). The question then becomes what difference creative teaching makes in situations other than the examination? e.g. in technical work, in research activit in agriculture. Is there any link to the alleged lack of creativity of highly trained scientific manpower? What are the larger term consequences of exposure to the Homi Bhabha centre's supplementation, or to Hoshangabad? Is it worth conducting some analysis of the post-school consequences of really good science education? Although good education is intrinsically valuable, it may be worth looking in addition at the range of expectations that are assumed to flow from it. Sorting out the variety of these more or less idealistic expectations is itself important, for there is always a danger, as H.N. Sethna has warned, of believing "that science can achieve anything and solve any problem"(1).

(iv) A closely related issue concerns the quality of university-level trained science students. India has an enormous production of these, going to polytechnics, science colleges

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(1) Rex D. Rozario and A.P. Gupte, "Science Teaching Programme in Hoshangabad District", Proceedings of the Conference on Science Education, op cit. p. 207

(1) Khoroda Conference Proceedings op. cit. p.21

engineering and medical schools. Teaching styles may not be that different in college than what has been described for schools, but again very little seems to be known with any certainty about the skills and attitudes with which people emerge from science colleges. Sethna of the Atomic Energy Commission has asked "what must be the quality of those third class (science) graduates, if we are finding the vast majority of even the first classes so pitiably ignorant in their subjects"(2).

(v) Science kits have been picked out in this paper because they are an indicator of a whole range of responses to what is seen as over-academic science teaching. But broader issues about the nature of educational aid and innovation strategies are raised by this subject. Kits are not necessarily synonomous with creativity and experimentation; they can open up inquiry or close it off. Again, kits can symbolise a more democratised access to experimentation (Parameswaran) or they can be as inert as any article too precise to use. So analysis of their utilisation in in order, to supplement an understanding of the ways science is learnt.

2. Science to the Community: Non Formal Science Education

Although it is a mistake too rigidly to separate non-formal science education from the issues discussed in the last section relating to formal sector science, the context and problems are sufficiently different that it is organizationally easier to draw some distinction between the two. However a number of agencies (including CSC Ahmedabad and Kishore Bharati) operate in both sectors, and are aware of the necessary connection between the two spheres of action. Given the drop out rate of 70% in primary education, and the very small proportion continuing beyond St. 8, Kishore Bharati have noted the contradiction between the objective of hoping to influence a majority of the age group and working in the school system. "Exploring innovations, methodologies and structures for such a large deprived community cannot be ignored. It has been our experience that such non-formal work not only has the potential of benefitting drop outs but also contributes to the enrichment of an environment-based school curriculum and teaching methodology".

The major conceptual distinction between formal and non-formal sector work is that the former, to have any influence at all, has to pay attention to school definitions of science. However creative, formal science education needs to relate at some point to the determined syllabuses. The starting point has to

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(2) Op. cit. p. 21

(1) Evolving Systems op. cit. p.15

be the existing definitions of science knowledge even if the intention is to expand these, subvert them, supplement or redefine them. In carrying science to the community, on the other hand, the enemy is much less apparent, and, accordingly approaches are much more divergent.

One of the difficulties about analysing non-formal "science" education is that almost every type of rural development acti can loosely be seen as the application of scientific knowledge to rural areas. Village level health, agricultural extension nutrition, contraceptive programmes, water development and energy experiments, all seem candidates for inclusion. To reduce the universe somewhat, it may be appropriate to look particularly at those initiatives which have had (a) a pronou scientific research base at the heart of their activities, (b) have been investigating new ways of transferring science knowledge and new technologies to rural communities. It will noted that the mechanisms for transfer frequently involve a participatory dialogue between the scientists and the village communities. This means, in turn, that several of these initia partake to some extent of the wider culture of popular partici and consciousness raising that informs so much of the voluntar agency world, either in theory or in practice.

(a) Elite Science and Rural Development

A feature of many of the most science-based endeavours i that they emanate from institutions of elite science, such as the Indian Institutes of Technology and the Indian Institutes of Management (IIM). These institutes, as we have mentioned, take students who have successfully survived one of the toughest examination marathons in the world, and are only too sensitive to sniping about their isolation and their failure to address themselves to rese relevant to rural India. It is perhaps not surprising th small groups of faculty have over the last decade applied their scientific training to rural development and proble of ordinary education.

The example of the Homi Bhabha Centre for Science Educati has already been referred to in relation to the Tata Institute for Fundamental Research in Bombay. That initi was primarily concerned with formal schools, but other TIFR faculty have attached themselves to rural projects. In the case of IIM Ahmedabad, there has for seven years been a rural development project in Jawaja, a block locat in the state of Rajasthan. IIT Madras has run a Centre for Rural Development since 1976, and the Indian Institut of Science in Bangalore has since 1974 had a cell for the Application of Science and Technology to Rural Areas (ASTRA). Finally, the Space Applications Centre (SAC), a part of the Indian Space Research Organization, has long had an interest in the social impact of both scientific and other programmes sent to a particular project area.

The Jawaja Project, Rajasthan

The aim of this project was to raise the technological and productive base of certain villages using a technology

the changes in ways that increased local autonomy. We have seen earlier that making a small dent on the formal school system can require a major and sustained application of pressure from the change agent. This seems to be even more the case with even small scale non-formal intervention in the rural areas. One of the most remarkable aspects of the Jawaja project has been the detailed documentation by letters from the project team to one of the key officials in the Jawaja area. These letters lay bare the extraordinary range of contacts that the project leader, Ravi Matthai, brought to bear in the process of investigating new technologies, new sources of finance, and new markets for the produce of the weavers, spinners, leather workers and tomato growers. Agencies at the block, district, state and natural level were called upon for technical advice, support, markets[1]. Of the multitude of authorities asked for technical advice in the early stages of the project, there are mentioned: Central Sheep and Wool Research Institute, Central Glass and Ceramics Research Institute, Forest Research Institute, Central Cottage Industries Council, National Dairy Development Board, National Institute of Design, Weavers Service Centre, Council for Scientific and Industrial Research, Rajasthan Small Industries Corporation. Many of these were brought into a continous relation with the project, as was the Bank of Baroda for loans. Constant pressure and information exchange with the local administrative structures was also an essential component.

The list of high level bodies is not intended to suggest that this was an exercise in rural development by one powerful institution (IIMA) pulling strings, for there was an incalculably important input from the unpaid Independent Volunteers, and very genuine attempts to relate the technical advice to very specific village suggestions for new products. Rather, the importance of "The Jawaja Letters" (and the longer narrative account of the project) is attributable to the honesty of analysis of this intervention project. For anyone thinking that improving the design of the weavers and leather workers, and arranging small bank loans is something that can be rapidly initiated, and allow the project team to move on elsewhere, these letters are compulsory reading. There turn out to be almost endless ripples of obligation and accountability that spread out from the few initial changes in design, and in tanning technology; there is also a constant awareness of the trade-offs between fixing things and increased dependency.

There is always a tendency in looking at a project of this sort to ask what is generalisable, what is replicable. Given the hope that the scheme could illustrate an alternative learning system (hence the use of the term "Rural University"), it is appropriate to try and distill the essence of these 6 years of negotiated technological change. In such a skill-rich environment, is the new technology the least of the problems? Are the real learning problems the ones associated with sales, marketing, and the management of rivalry and competition? Beyond the historical detail of these "Rural University" letters, it would certainly be valuable to have a terse commentary on the lessons of

seem to be as complex and political as any major technology transfer at the international level.

Centre for Rural Development, IIT, Madras

At the other end of the scale from open-ended negotiation with existing village skills is the CRD, run by the IIT just at the boundary of Madras city. In contrast to Jawaja's decentralised groups, CRD is the expression on a single site of the concept of interlinking a series of available technologies and producing a commercially viable model of a miniature industrial estate. Unlike many government schemes which don't have to show a profit, the CRD was organized around a straight-forward bank loan of ½ million dollars, and the expectation that 300 new jobs could be found for the nearby villagers. The emphasis is on wage employment rather than self employment, and on modern technology rather than improved village technologies

While Jawaja's technological changes have been principally related to one or two new woven products from new looms, and new tanning technology for new product markets, CRD, freed from the need to negotiate and improve on village technology, had within two years produced an entire integrated system: new construction technologies, biogas, energy, paper making, fish farming, rice milling, dairy, agriculture, forestry, water development, electronics, screen printing and plastics, soap making, garments, printing press, engineering products and carpentry.

Taken one by one, each of these activities is very common in any large town in India (with the possible exception of fish farming). The IIT's contribution has been their combination into a model micro-industrial estate. Like the IIM and Jawaja, the IIT can offer access to some protected markets and materials (scrap paper, printing orders, etc). It has also been able to rely on IIT graduates for its chief techno-economic officers in charge of the three main divisions of civil, mechanical and agricultural engineering.

It presents therefore a polar opposite to the Jawaja style. Both are concerned with new technology, higher productivity, job creation, and eventual local control of the new processes. The CRD has probably attached a larger number of villagers (300) than the total number of weavers, spinners and leather workers related to Jawaja. The general differences in style, however, are so great that it would be instructive to have a comparative critique of their impact on those they have sought to serve

Space Applications Centre, ISRO

During the year of the Satellite Instructional Television Experiment (SITE) 1975/6, TV programmes were beamed to schools as well as broader messages to adults on agricultu nutrition, family planning and animal husbandry. In fact the bulk of adult audience had a much larger proportion of basic entertainment, in addition to the subjects

mentioned above. It was found in the school broadcasts that merely altering the medium of science education did not make much difference to understanding or school achievement. A TV science programme, like a science kit, does not have a life of its own, but is highly dependent upon intelligent pre and post telecast discussion by teachers. On the whole these pre and post-sessions did not take place, despite teachers being given TV orientation to utilising the programme to the full.

As far as broadcasting to adult viewers is concerned, SITE provided an important learning experience for SAC. It had become clear that the software was much more difficult to plan than the hardware. Beaming science-based information in agriculture, nutrition or health told one very little about the nature of the programmes' impact. Nor did a once-only summative evaluation indicate the complexity of the development communication process. Indeed a major research outcome of the SITE year was the recognition that both quantitative and qualitative methods of evaluation would need to be followed, accompanied by an indepth anthropological study of the process at the village level if social science was to profit from this novel communication.

In the years that have followed the end of the first satellite transmission, SAC has continued to beam its own TV programmes to part of Kheda district in Gujerat, but there has been a significant shift toward/ decentralised and participatory /a communication process. As an analogue to the more participatory attempts to teach science discussed above, SAC began to explore with villager cooperation some of the major social and economic problems of rural life, especially for the lower castes. Direct villager involvement with social scientists and communication scientists in the production of TV programmes raised awareness of problems with an immediacy not easily found in other media. For example, filming a politician preaching against caste, asking for water and refusing to accept it from a harijan, then filming villagers discussing the rights and wrongs of the situation turns out to be a very potent message if beamed back to the very villages experiencing this. So potent in fact that there are real dangers and moral dilemmas posed in broadcasting these films.

The SAC example may seem somewhat remote from the other illustrations of taking science to the people; it is different principally in having moved from a centralised transfer of science-based information to a decentralised participatory process. In the interim, faith in the power of science information by itself to make an impact has been altered towards a social science appreciation of the conditions of impact. As Insat is in position from mid August '82, SAC's experience in transmitting both science and social science to villages will be vitally important. What they have learnt from both formal and non-formal science programming should be available for this next round. But to what extent have the SITE lessons been more widel absorbed, especially SAC's view that"the planning for software aspects of communication technologies must start

many years prior/the planning of hardware aspects" (1).

Application of Science and Technology to Rural Areas (ASTRA), Indian Institute of Science, Bangalore

The last of the initiatives emanating from the most prestigio science and technology management institutions is ASTRA(2). It was not possible to visit ASTRA's staff or its extension centre in the rural areas. But there exist several accounts of the Centre's work, which allow one to see that ASTRA is much the most "technological" of those we have treated so far. Its role is primarily to work on the generation of new technologies for villages, and to try these out in the extension centre, as far as possible in active collaboration with villagers. Dr. Amulya Reddy, the ASTRA director, is aware of all the dangers of scientists generating appropriate technologies in complete isolation from village reactions and rural conditions. He is also conscious that the status of scientific work for villages will tend to be downgraded in a high powered science institution; hence he has had to argue that simple products and processes require sophisticated thinking and research. Indeed "efforts to generate appropriate rural technologies necessarily require more, not less, simultaneous emphasis on basic research and fundamental science", (3) since there is no beaten track from which to start.

There are intriguing difference between the ASTRA approach and that of CRD in Madras. The latter spent much less effort on the generation of intermediate technologies, but innovated in the inter-linking of a series of broadly modern technologies. ASTRA has felt it important to try and "expose the people to a wider range of technological options instead of the two-option Hobson's choice with which they are currently confronted - either suboptimal traditional technologies or far-too-expensive "modern" technologies"(1). There are major differences also in the extent of negotiation and popular participation. Obviously CRD's operation that needed rapidly to become commercially viable acted under greater constraints than that of ASTRA.

ASTRA has sought to reflect on what they have learnt from the model they have applied since1974(2). In particular

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(1) E.V. Chitnis quoted in Binod Agrawal, SITE Social Evaluation Results, Experiences and Implications, Space Applications Centre Ahmedabad, 1981, p.60

(2) Beyond those mentioned, there are rural activities in other IITs and IIMs.

(3) A.K.N. Reddy, ASTRA, in K.P. Kannan (Edit) Towards a People's Science Movement (KSSP, Kerala, 1979) p.22

science training system with its set of values mirrored from developed countries and the need to generate and diffuse new technologies for rural areas. They see the patterns of technological capability distorted towards the problems pre-occupying the developed countries. This in turn is reinforced by the foreign graduate training of the best science students.

> No wonder that most foreign returned scientists and engineers spend the bulk of their remaining active professional lives continuing the themes of their foreign researches even though the stark reality outside their laboratories and workshop is clamouring for a local commitment and a native orientation.(3)

In this situation, it would seem that indigenous technological capability is neither being developed adequately to modify or challenge western industrial technology, nor to develop a wide range of newer small scale rural technologies. With the orientation of existing scientific research firmly fixed on the urban industrial sector, one wonders what progress has been made in institutionalising the rural commitment of scientists. Reddy correctly looks to re-orientation of the existing educational infrastructure rather than the creation of a few institutes for rural technology; but one wonders what progress has been made over the last decade in research re-orientation towards rural requirements Has the pattern of annual scientific awards at all altered to recognise the kind of work ASTRA has been promoting? Have the various cells and individuals dedicated to these rural technologies become regular departments or faculties of universities? Is this thrust becoming part of the regular academic programme, and not an extra-curricular activity of a few scientists/engineers with an urge for social work"?(1) Some indications of what might be expected in such a re-orientation have been sketched out by Prof. B.M. Udgaonkar of TIFR(2), but there still seems to be a tendency for the rural technology cells (or other initiatives) to be quite on the periphery of the prestigious institutions which house them. It would be useful to analyse to what extent there have been significant changes in research emphasis, and what are the limitations that may be expected in any such redirection of science towards community service. Even if most major institutions now have some sort of window on rual development, what kind of influence have these had on th regular departments and student

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(1) Reddy op. cit. p.16

(2) Reddy op. cit. pp.20-23 and Reddy et al, "Problems in the Generation and Diffusion of Appropriate Technologies - an Institutional Experiment", in S. Radhakrishna (ed), Science and Technology for Integrated Rural Development (COSTED, Madras, 1977) pp.147-164

(3) Reddy et al op. cit. p.137

participation? To use Kishore Bharati's term, what sort of "dent" has been made in mainstream science by the presence of the rural scientific extension centres. Any analysis of progress and achievements these last ten years would have to pay attention not only to the few institutions mentioned here, but also to assessing the Karimnagar experiment in Andhra Pradesh, which was the rural experiment and demonstration centre of the Council for Scientific and Industrial Research (CSIR)(1), and several other initiatives.

In this section on the rural aspect of certain prestigious science institutions, it would also be worth noting the role of the Committee on Science and Technology in Developing Countries (COSTED). With its secretariat in India, at Madras IIT, and its president the vice chancellor of Nehru University, it has had a particularly close liaison with some institutions mentioned above. Indeed, its scientific secretary, S. Radhakrishna, is also the chairman of the Centre for Rural Development at IIT Madras(2).

In many of these various exercises of what we have termed elite science institutions, there is a need to take stock, and look across institutions at what has been learnt in common about different methodologies, communication strategies, ways of negotiating on technologies with villagers.

(b) NGO Science for Communities

Beyond the several attempts by renowned institutions to relate to rural communities or rural technologies, there is a wide scatter of non-government agencies committed to similar founding goals. Some of these are national, some statewide, some very localised. Although some are linked to political parties, many are explicitly delinked and yet are working on the major issues of social transformation with particular communities. For many, the potential of science is strongly affirmed, but they are disenchanted with the official recipes and structures for "delivering"

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(1) Reddy "ASTRA" op. cit p.14

(2) B.M. Udgaonkar, "Science and Technology for Rural Development: Role of Institutions of Higher Learning" in Reddy et al op.cit pp.74-105

(1) For more detail on CSIR's Karimnagar project, see Hari Narain, "Karimnagar-CSIR's Experiment in Integrated Rural Development", in Radhakrishna (Edit) op. cit. pp.106-120

(2) Its president, Y. Mayudamma is now a governor of IDRC

science. D.L. Sheth, who has been studying the new politics of these NGOs has commented:

> --the educational and professional establishment are fast losing their credibility as instruments of modernization. The magic of the "science of management" is fading away. What once looked like problems solvable by proper application of social science knowledge and modern management now appears to lie beyond their ken -----
>
> All the programmes and activities of the established institutions now look lustreless; they hold no promise of solving any real problems of the poor. Now the university graduates going out to work with the people acutely feel the need to delearn what they have learnt in these institutions(1).

As it was not possible to spend time with any of these groups, reliance must be placed on written sources. This is seldom satisfactory, since many of the groups do not have the time or inclination to commit much to paper. Hence there is a natural tendency to overemphasise the significance of the more formal institutions which have the infrastructure to produce annual reports, evaluations and conference papers. By contrast, the process of documenting science to the people via NGOs is much less straightforward.

Two exceptions to this relative dearth of written material are Kishore Bharati and KSSP (the Kerala Science Movement). Both of these, we noted, had a concern with formal science in schools, but have also made major contributions to understanding the role of science in relation to rural communities. Useful recent documentation on what they have learnt in the process of carrying science to communities is available in two key statements:

1. Science for Social Revolution (Kerala Sastra Sahitya Parishat, 1980) and
2. Anil Sadgopal, "The Place of Science in a People's Movement", Vikram Sarabhai Memorial Lecture, August 1981, reprinted in ICSSR Newsletter, XII(1), April-Sept. 1981

These documents are valuable summaries of work during the 1970s in Kerala and Madhya Pradesh, but for our present purposes they also serve to differentiate science-based

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(1) D.L. Sheth, "Movements and the Future of Politics" VII World Conference on Future Studies, June 6-8, 1982 (World Futures Studies Federation) mimeo, p.22

rural development from many other varieties of action programme in rural areas. In examining Kishore Bharati's attempts to apply science and technology, Anil Sadgopal draws a distinction between observation of reality in the social science and in the natural sciences. Although observation, data collection and inference are common to both, experience with Kishore Bharati had shown how frequently in social science the aspect of reality perceived was related to one's cultural and economic background. Observation of the "needs" of rural people differed widely depending on the nature of analyst, whether aid agency, government department, rich farmer or poor. "In contrast, the process of observing and analysing reality in the natural sciences is dependent only on the scientific skills of the worker, and not on his or her class background"(1).

This ability to observe and conduct analysis in the natural sciences is not something that is the prerogative of the educated; the poor can be trained to it. Indeed the method of science can be spread amongst the poor so that they can perceive their own socio-political reality, and can plan their own development "on the basis of reliable data and logical thinking".(1) However, the problem in popularising scientific method, or scientific temper seems to be two-fold. As far as those currently applying science to rural areas is concerned, the objectivity mentioned above soon vanishes:

> the moment one begins to relate science to the problems of society (for example, the case of technology) the class affiliations and the vested interests of the worker begin to influence his or her objectivity in a manner similar -- to the social sciences (2).

Sadgopal has no shortage of illustrations of how the process of applying technology -- whether wells, improved cattle, improved potting, science aids -- has reinforced inequality; the scientific temper is quickly overlaid by the class interests of those mediating and distributing the technology. On the other hand, the scientific method is still very inadequately understood by the poor, and where it exists potentially, it is constantly being undermined by lack of information, fatalism, fear of reprisals, and inability to generalise and abstract. These continually interfere with accepting the logic of scientific analysis, just as other forces distort the application of science and technology through the official channels and agencies. There is thus a kind of dialectic that needs to operate

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(1) Sadgopal, op. cit. p.14

(2) Ibid p.14

continually between political or other impact upon the barriers to self-perception and the process of education in scientific methods. The dynamic relationship between scientific method and incremental political changes is at the heart of Kishore Bharati's experience:

> The educational work of spreading the scientific method does not progress as long as such barriers continue to exist but can be started all over again once these barriers have been broken by mechanisms which are beyond the realm of science(1).

The "syllabus" of non-formal education (science for rural communities) is thus a good deal more complex than the inquiry-based science teaching programme in schools. The former proceeds by fits and starts. If "inquiry" is the active ingredient in the school science scheme, political action or insight even on a micro scale, can be its equivalent in the non-formal, community science. For example, seeing a common village scene of discrimination against harijans heightened by a SAC telecast. The parallelism between the formal and non-formal sides of Kishore Bharati has been touched on earlier, but put another way, it could be said that science via the inquiry method produces a challenge to traditional methods, and hopefully produces a more creative worker, while amongst the peasantry the hope is that scientific methods can become part of a people's way of thinking, and can in turn challenge the vested interests in the village and countryside.

The latter may sound rather idealistic, but certainly it would be interesting to have documentation on how this non-formal science "syllabus" has worked out in practice with some of the communities in the vicinity. Presumably one of the moral dilemmas central to this pedagogy is how to handle the awareness raising aspect, without which the cognitive work on new science-based knowledge and method may sometimes lie inert.

It is not possible here to go into the methodologies of the many other science movements such as the Centre of Science for Villages in Wardha, the Society of Young Scientists, the initiatives of Dr. Shankar Chakravarty in West Bengal, the Science Education Centre in Attara, Uttar Pradesh. Nor will we go further into the relatively well documented KSSP in Kerala, beyond stressing that its action research component has become increasingly important in mobilising local and state wide opinion against the misapplication of technology in development schemes(1). What would be useful, however, would be to have a review of the different "characteristics of "science" within these,

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(1) Sadgopal op cit. p.19

(1) KSSP, Science for Social Revolution (Trivandrum, 1980) 26 pages, and Towards a People's Science Movement (1979)(Trivandrum) 206 pages

and the range of ways that scientific knowledge and method is related to popular participation and community transformation.

3. Acquisition and Utilization of Science and Technology in Industry: Formal and Non-Formal Patterns

Our concentration thus far has been very much on problems connected with the learning of science in schools, and colleges, as well as non-formally in villages. There is no doubt that there is concern also about the acquisition and utilisation of science and technology in industry, even though we have noted a widespread feeling that the science system is already too much oriented to industry.

One set of issues seems to relate to the disjunctions between scientific research and industrial adoption. Despite research being pre-occupied with industry and commerce (rather than rural development), it still seems to appear irrelevant. Allegedly the research and the prototypes produced in many of the national institutions are remote from possible applications. It is not infrequently that the National Institute of this or the National Laboratory of that is being chastised for having virtually none of its products or prototypes adopted. Various reasons for the malaise are often suggested in the intellectual weeklies, in readers' letters, and in conversations. They tend to mention the bureaucratic structures of the institutions, the lack of personal and structural incentives to creativity, a lack of commitment to productivity, authoritarianism by institutional heads, and the derivative nature of the research done in Indian labs. The following perception is widely shared:

> The practice of science in India is imitative and not innovative. Our scientists add to the data that no more than confirm the conclusions reached elsewhere. The local needs and resources are seldom the subject of Indian research. This is why we neither have Indian science nor Indian technology. Originality and inventiveness are derived and if pursued, in spite of derision, punished. The science administration is by and large unscientific (The Hindu, July 8)

On the other hand, the official view of the Council of Scientific and Industrial Research (CSIR) with its 35 national laboratories, 71 extension centres& regional labs, is that it renders wide ranging services to support the national infrastructure in the achievement of self reliance. It sees itself as one of the largest state-supported R & D organizations in the world. No less than 4,500 scientists are on roll, supported by 14,000 staff. The total number of processes released to industry up to 1981 was 1,293 of which 571 are reportedly in production(1).

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(1) A.M. Zutshi 'Gulzar', PRO,"CSIR and National Development," Mainstream. XIX, No. 51. August 1981. pp.30-34

However that may be, there seem to emerge constant reports about the conditions under which scientists have to work, their subjugation by the bureaucracy, the failure of their professional associations to support them or criticise them when appropriate(2), and, of course, running through it all, the alleged irrelevance of their research endeavours.

In this atmosphere, it is not surprising that some scholars should have tried to examine this research culture more closely, and ask questions about the truth of the caricature. One of these, Dinesh Mohan, has even tried to get some sense of where Indian science stands internationally, by looking at their standing against a series of rough and ready benchmarks of quality (International and national awards, appearance in most cited articles, faculty members of highly rated universities etc. etc)(3). The outcome is very tentative but both at home and abroad it seems that Indian scientists are not making their presence felt in the innovative or frontier areas of research and development.

For our present purposes, what is of interest is whether there is any particular reason to believe that the educational system itself has any part to play in the production of this research malaise. We have already noted the extraordinary concentration on reproducing exactly the knowledge given by text book and teacher, at every level of education, and we have also paid some attention to the agencies trying to instill discovery and creativity into primary and middle school. Doubtless, part of their rationale for promoting discovery science in school is their awareness of bureaucratised research at the post-college stage. Mohan himself, teaching in an IIT, is clear that early education is quite largely responsible. Some of this is attributable to the perpetuation of a colonial education discouraging Indian innovation, some to the uncritical teaching and learning style of present institutions, and some (perhaps a great deal) due to the continuation of English language, dividing India still into two nations:

> The persistence of English as the language of Indian science and technology automatically precludes the participation of the overwhelming majority of India's population in the scientific culture. Most of those who still manage to engage in scientific activity do so at arm's length and at an enormous cost. They are forced to conceptualize and be creative in an alien medium(1).

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(2) K. Ashok Rao, "Role of Professional Societies in the Development of S and T in India" IIT, mimeo 1981

(3) Dinesh Mohan, "Sea of Mediocrity", Seminar, Feb. 1981

(1) Mohan, Ibid

Obviously, there are no single factor explanations of these features of the research culture. In the academic institutions and government research laboratories the role of funding is critical in addition to all the other factors mentioned. While in industry itself, the extent to which research is at a premium will closely relate to whether the company is reproducing technology through collaboration, or developing new products on its own. There may, however, be some merit in suggesting that the specifically educational contribution to this problem be examined in a little more depth.

It is possible that this issue has already been over-examined, but there may be room for some of the following:

- A review of studies that have analysed the higher educational environment in which the research culture is nurtured.
- Qualitative studies of university science environments, and of particular research labs.
- Analysis of what studies have been done on the role of research in the private sector.

This last is particularly crucial for a better understanding of research potential and its utilisation in industry. One relatively common view is that there too, like the government sector, there is hardly any science-based innovation. It is argued that industrialists want a foreign collaboration for even the simplest product(1). More specifically it has been said of the pharmaceutical sector that despite claims of significant inhouse R & D in India, not a single drug has been discovered by any of the main centres:

> A large part of the so called research is actually quality control, market studies, clinical trials and other similar activities ---- None of the projects carried out address themselves to the basic problems of major illnesses like tuberculosis, leprosy, malaria, diptheria, gastro-enteritis, etc.
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> Since R & D expenses in India are relatively low, the facilities of some of these laboratories are utilised to carry out basic research required by their parent companies who themselves carry out the intermediate and penultimate stages, keeping the Indian subsidiary in the dark(1).

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(1) Mohan, op. cit

(1) M.S. Iyengar, "The Status of Research and Development in the Private Sector", mimeo, Dept. of Mechanical Engineering, IIT, Delhi, p.9

The terms in which these discussions are carried on may seem somewhat overdrawn, but they indicate a little of the sensitivities and concerns about creativity, innovation and nationalism that emerge whenever the role of research in industry is discussed. They are part also of a wider debate relating to indigenous technological capability (ITC) and this in turn has sought to examine the historical differences between Indian and other Asian industrial nations (notably Japan) in respect of research and innovation(2).

Scientific research and industrial innovation, however, is only one aspect of the many possible relationships between science, technology and education in industry. Doubtless, case studies of particular firms would be valuable, especially if attention is paid to the varieties of ways in which innovation can express itself apart from major technical advances. But there are many other facets of ST and E that seem equally important.

The changing pattern of utilisation of technologically trained manpower is an area that seems crucial, and this in turn has a very close and and dynamic relationship with the planning of different categories of higher technological education. There has, for example, until recently been a tradition of limiting rather strictly the expansion of engineering colleges, and above them the Indian Institutes of Technology. This has then offered a certain premium and protection to the engineer over other forms of technical and technologically trained manpower. One consequence of this special treatment for engineering colleges has been that much more attention has been paid to evidence of unemployed engineering graduates than to other categories of science graduate. Indeed, it could be said that very much less interest attaches to the notion of unemployed science graduates than to engineers.

These processes of limiting seats for certain vocations and being relatively flexible with the expansion of science colleges produces a hierarchy of preferences within the education and training system. This sets up very powerful pressures to expand those sectors most protected by limitation of seats. Hence, in difference States the emergence of private engineering colleges, particularly in Karnataka, Andhra Pradesh and Bihar(1).

As the tussle goes on between limitation and expansion in the few protected islands of India's sea of higher education, it is important to look at a double set of influences: the backwash on schools and the "forewash" towards industry. Science continues to be critical in schools as only the highest

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(2) see papers by Ashok Desai, Ron Dore and Tom Eisemon, at Conference on ITC, Centre of African Studies, Edinburgh University

(1) The Hindu July 18, 1982

possible exam marks will secure a place in medical or engine college. Once that selection has taken place, however, pure science becomes much less important; indeed entry to polytec is more favoured than the ordinary range of science colleges. The status differences then amongst the three groups (engineer degree holders, engineering diploma holders, and science graduates) are much wider than would be anticipated, and have important consequences for the pursuit of science knowledge in the different institutions.

On the industrial side, the utilisation of these and other categories of trained manpower is presumably a good deal more untidy. Employers are aware that the brightest students in the school system have entered engineering colleges (includin IITs which are basically engineering colleges). They may ther be tempted to recruit them as managers as much as for their engineering skills. This position of engineering as the flag of the science training system probably produces some distinct patterns of industrial organization. First, there are likely to be a larger group of top managers with engineering backgrour than in many other countries. No bad thing, it would be thou compared with systems where management has a non-technical background. However, the very status and aspirations of the engineer, at the peak of the education system, may lead to his under-utilisation in the sectors for which he was prepared. This tendancy could well be compounded by the existence of the large informally trained labour power:

> in many industries, both large and medium scale, there has not been full utilisation of the products of the engineering education and training system. Partly on account of economic reasons, and partly because of a failure to upgrade technology, the engineering graduates and diploma holders have not been fully utilised. Many industries continue to use a large number of unqualified technicians and even engineering supervisors. The private sector particula finds that experienced workers, mainly those who ente the factories at lower levels, are better at handling production than fresh diploma and degree hol s; and therefore it continues to use a large nu er of "praticals"(1)

It would be dangerous to generalise before looking in much more detail at the utilisation of different grades of manpowe in different kinds of firms. For example, one firm that was visited had no less 60 engineering graduates, 60 engineering diploma holders, and a small number of science graduates. A

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(1) Mahesh Verma, "Planning for Development, Training and Utilisation of Manpower in Industry and Agriculture", Planning Commission, New Delhi, mimeo p.10

third of the whole workforce was derived from these three groups. Significantly, this enterprise was making a moped without any foreign collaboration. Doubtless, very different mixes appear in other kinds of firms, and these will be different again from the more standardised ratios of engineers to other categories in the railways and public sector concerns.

Overall, however, the widespread availability of both formally and informally trained manpower has meant that firms could increasingly draw upon more educated, science-trained candidates if they so desired. To the extent that firms do use these, it would be interesting to know what difference to quality or productivity it really makes to employ a virtually graduate and school-leaver workforce. It is often assumed that an oversupply of ordinary science and arts graduates is wasted if they work in firms that don't really require their level of knowledge and expertise. But very little work has been done on the phenomenon of "over-education".

It is possible that the real merit of having an over-supply of various categories of scientifically educated worker is their capacity to master rapidly the techniques of production, and in due course set up on their own. One's impression is that this moving into self-employment happens very widely. Many factors fuel this, but the ease with whcih an entrepreneur can find the talent available is clearly an important one. Among questions that could be addressed in this situation would be:

- Amongst communities (e.g. Gujeratis and Sindis) that have a long tradition of business enterprise, does it really matter that their formal education is such as has been described earlier? Does examination-oriented, non-discovery schooling really make for lack of initiative and creativity? Home influences perhaps continue to be more powerful than the school and encourage creativity and enterprise that the school has not wiped out.

- Amongst groups where there is little home stimulation towards independent thinking, and new work experiences, then the school has an enormous gap to close. It will take all the power of Hoshangabad science to compensate for the home environment.

- Learning on the job vs learning institutionally. Presumably there is a changing relationship between these two learning arrangements as the workforce, including craft level, becomes more educated. In the newer knowledge-based industries, the trend towards institutional learning will be most marked. But even in the older industries like foundries where workers' formal education was minimal if it existed at all, it would be interesting to examine the impact of secondary education upon greater concern with quality, etc.

- Analysis of the unqualified technician or "Mistry": An important aspect of learning on the job relates to the hundreds of thousands of "mistries" (senior mechanic or master) who in countless workshops across the country are responsible

for welding, painting, building, machining, automotive repair, etc. etc. Are they a case of the good being the enemy of the best? In the sense that their learning has been rote, trial and error learning, and that they have little or no theoretical knowledge, they have been characterised as highly individualistic, yet conservative. They extemporise but do so in a setting of un-standardised machines and product At some point they too seem to relate to the problem of quality to which we have kept returning --"the technical outcome of this fantastic expertise is often uncertain. Poor quality of craftmanship and low maintenance standard of servic equipment - from bicycles, automobiles, electrical goods, to manually-operated mechanical systems of all kinds bear testimony to this -- unfortunate state of affairs"(1).

4. Changing Ideologies Towards Science and Technology

In general, the various centres and groups mentioned in this pape have regarded science and technology rather positively. Certain science would have to be taught better to have an impact and technology be more oriented to rural problems, but the extension of scientific method was not itself under dispute. In parallel, however, with the growth of groups concerned with the extension of scientific temper to poor schools and backward classes, there has grown up a critique of the role of science and technology in Indian society.

Over against the calls for scientific temper, or for national science campaigns directed towards poverty, disease and ignorance, science studies groups have drawn attention to the need more dispassionately to disentangle the relationships between state power and the science establishment, between contr science research and uncommitted research in universities (2) and between the extension of modern science and the existence of local knowledge systems. One dramatic presentation of some of the issues in dispute between scientific temper and scientific danger exponents is available in the contrast between two short tracts. They offer a valuable counterpoint to the more applied research topics we have been discussing:

1. A Statement on Scientific Temper (Mainstream, July, 25, 1981)

2. A Counter-Statement on Humanistic Temper (Ashis Nandy, Mainst Oct. 10, 1981)

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(1) Aqueil Ahmad, "Scientific and Technical Human Resources in India". National Council of Science and Technology Panel on Futurology, DST, April 1977

(2) Dipunker Gupta, "State, Science and Universities", op.cit

These contraversies about the role of science are not necessarily academic. The signatories to the Statement on Scientific Temper work in major science teaching and research institutions, including some of those mentioned in this paper, and are concerned to challenge the obscurantism of many areas of Indian life. There is a near missionary note in parts of the Statement ("Our Nation's survial and its future depends on upholding Scientific Temper . Superstition shall not pass and darken its portals"(1)), but the group are sufficiently scientific to want "to combat the tendency to treat science and technology as a sort of magic". Problems of caste, class and corruption do not crumble away in the face of science, but "when the social structure and stratification prevent the application of rational and scientifically proven solutions, the role of Scientific Temper is to lay bare the anatomy of such social barriers"(1).

This laying bare is not intended as an empty aspiration, but has already become, as we have seen, the method followed by Kerala's KSSP in making villagers aware of the politics of pollution and other development problems(2). It was also part of Kishore Bharati's non-formal science education, and figured prominently in the series of "awareness" films produced by the Space Applications Centre. It would, however, be rash to suggest that science is yet being widely sued to demystify systems of oppression.

Indeed, the Counter-Statement would want to argue that science and technology have themselves been so intimately linked with oppression that they constitute a rather ambivalent armoury to wield in favour of the oppressed. The critics of "development science", notably the Centre for the Study of Developing Societies, have increasingly begun to carry the debate about science beyond the pages of the academic journals and weeklies, and into discussions with activist groups around the country. In particular through their involvement with Lokayan, the loose network of activist groups in different states, the Centre (CSDS), has been drawn into discussing ideologies of science with some of the very groups using science in social transformation (3). In this connection, it would perhaps be valuable to have CSDS examine in some detail the assumptions about science and technology of the myriad groups flying a science flag in their rural development and education endeavours.

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(1) Statement, p.9

(2) "When we visited this village last year, we were amazed to see how technical terms such as sulphur dioxide, carbon monoxide, percentages and solubility had become part of the common idiom". Sadgopal, op. cit.

(3) Lokayan, Bulletin No. 5 (Lokayan Delhi, Feb. 1982) pp3-1

Conclusion

What stands out in this brief paper on Science, Technology and Education in India is the particularity of the science research environment. India has acquired an enviable position in its application of science and technology since 1947, compared with many other countries. Products can be as rapidly put into production as anywhere in the world. The design may be originally derived from elsewhere but there is frequently considerable originality in reproducing it in India. Some corners are cut, some quality is let slip, some packaging and presentation cheapened. But a local version of virtually everything is available in India.

The comments made here are not intended to question this achievement of self-reliance, but rather to reflect some current concerns about the science training and science utilisation policies that are related to these achievements in agriculture and industry. The ferment about scientific research, the education of scientific manpower, and the role of science in rural transformation are all high on the agenda of the research community. It seems that the lessons and experiences of the 1970s are beginning to come into sharper focus, and plans are being laid in many centres, institutions and agencies for the more targeted application of science, technology and education to rural and industrial development.

COMPUTER LITERACY AND STUDIES IN SCHOOLS
(Excerpts from the NCERT publication
CLASS)

DR. P.L. MALHOTRA
Director
NCERT

I consider it a rare privilege to welcome so many distinguished scholars and specialists from all parts of the country to this National Workshop on Computer Literacy Curriculum, organised by the National Council of Educational Research and Training in collaboration with the Indian Institute of Technology, Delhi, Department of Electronics, and the Ministry of Education and Culture, Government of India. On behalf of the NCERT, the collaborating agencies, and personally, I most heartily welcome you all to the Workshop. I am indeed beholden to you for having accepted our invitation to attend the Workshop at a very short notice. I hope through our combined effort we would be able to make this Workshop a very significant preparatory step for the launching of the pilot project in computer education, sponsored by the Department of Electronics, in July 1984 in a representative sample of 250 schools spread all over the country.

It is significant to note that the initiation of computer literacy in our schools coincides with the completion of a decade in the implementation of the new 10+2 pattern of school education in the country. As you all know, the major achievements of this new pattern of education lie in the introduction of science and mathematics as major components of general education in the ten-year framework of school education and in the vocationalization of the plus-two or the higher secondary level. I must emphasise here that in spite of several organisational and resource constraints all the States and Union Territories have accepted the rationale and objectives of the new pattern of education. While the educationally advanced States have by now been able to strengthen their resource base in supporting a continuous process of curriculum renewal, the remaining States are in the process of making serious efforts to overcome the influence of the traditional curriculum. However, this major reorganisation of school education in the country has not reached the present level

of achievement without encountering serious problems of implementation. Lack of adequate resources, both physical and human, happens to be the most limiting factor in our efforts to improve the quality of school education and in its quantitative expansion.

More than 35% of our primary schools are managed by single teachers and a large number of secondary and middle schools are yet to provide basic facilities for teaching. In view of this background, one of our major concerns in curriculum development has been to ensure equality of opportunity to children of diverse socio-economic backgrounds while promoting innovative measures for universalisation of elementary education and the improvement of the general quality of school education.

It has also been observed in the recent past that the quality of science education could not be improved by investing on laboratory facilities alone. Very often such facilities remain unutilised or underutilised in the absence of proper motivation on the part of school administrations and science teachers. Excessive emphasis on annual and terminal examinations and an overwhelming stress on rote learning have been found to be the main reasons for the lack of adequate teacher and pupil motivation in innovative teaching and learning for genuine understanding and development. It is, therefore, almost imperative that an educational innovation in order to be widely replicable should not only be effective in accelerating the process of classroom teaching and learning in a desired direction, but must also be equally effective in positively influencing the organisational behaviour of the school system.

I have narrated this background only to highlight the context in which we have decided to implement the pilot project on computer appreciation-cum-education in the selected schools.

You will be happy to know that the Government of India have been extremely careful in identifying schools for participation in the pilot project. This exercise is being done in close collaboration with the State authorities and other agencies concerned with school education, including the Kendriya Vidyalaya Sangathan, Central Board of Secondary Education and NCERT. An appropriate mix of schools under different managements under the overall technical criteria recommended by the Electronics Commission, is sought to be achieved. Resource needs of the selected schools may therefore vary considerably.

Of late, several studies have been published on the nature and scope of computer education in schools and also on the broader issue of the relationship between technological change and educational development. The idea of using microcomputers in schools is not altogether new. The philosophy of programmed instruction, which became popular in the 1960's,

was in fact the intellectual forefather of computer assisted instruction (CAI). The intellectual environment that gave rise to the first generation of CAI systems in the early 1960's was strongly influenced by the programmed instruction movement, which was based on a science of learning or, to be more precise, self-learning. Initially, CAI was seen as a direct continuation of the mechanical teaching devices which were designed for automatic testing and scoring. By 1970 it became clear that the conventional CAI exploited only a small part of the computer's power by restricting itself to electronic page turning. Today, a microcomputer in a school has been widely accepted as a tool for problem-solving and self-learning.

The developments in microcomputer hardware and software have been so fast during the last 6-7 years that the role of microcomputers in enhancing the intelligence of very young learners and in making knowledge more operative and dynamic is clearly visible. Besides the prospects of a rapid decline in the cost of the hardware, there are overall welcome aspects in the field of software for educational microcomputers. Broadly speaking, a well designed and relevant software package may bring about a qualitative change in the attitude of teachers, principals and educational administrators in the present context of our school education where textbooks and a content-dominated examination system overshadow the real learning and development of pupils. Well chosen software, suiting our situation in the classes, can enable educators to promote children's thinking and reasoning.

In this sense, the use of microcomputers in schools and in the training programme of teachers has an important affective role liberalising the process of education, in addition to its role in accelerating skill development.

In almost all the countries where computer literacy courses have been introduced, the most important gain has been observed in terms of a perceptible change in the classroom behaviours of teachers in favour of greater flexibility and innovativeness in lesson-planning and self-learning. Parallel to these positive experiences, the leaders of many pilot projects also had to face numerous negative factors. The most complex of these negative factors is the difficulty of integrating new tools into an existing curriculum. Many of them found it was extremely difficult to procure software and other computer materials that were educationally sound and developmentally appropriate for a particular group of students. In most cases, the materials that were easily available often did not fit into the curricular plans of the users. Moreover, many of the skills that computers taught best were not included in the existing curriculum. Since there was no room for adding on to the existing curriculum new skills and content

had either to replace existing material or be ignored.

There is also a growing apprehension among a group of educational philosophers that an excessive interaction with and dependence on the computer in the early stage of education may promote a highly structured and linear thinking among children, which may adversely affect their emotive development and holistic vision. This aspect is particularly important for us in India, for our cultural heritage and ethos always promoted a balanced world view, with greater emphasis on higher human values as a guiding force in cultural renewal in contrast to the emphasis on information processing as the basis of such renewal.

Another factor that kept schools from becoming computer-literate was the inflexible work-day of teachers, which did not allow them time to experiment with new machines, to invent new techniques, to search for appropriate software, to read journals and books about computer based instruction, or to perform a series of related tasks. Only a few highly motivated teachers who participated in a pilot project did manage to find time to engage in such activities—particularly when they were able to take computers home on weekends and holidays.

I cited the above instances only to highlight the fact that developing a computer-literate school is a complex process and there is an urgent need to systematically plan every step for the implementation of our pilot project so that appropriate steps could be taken immediately to overcome the known practical problems of failure.

I firmly believe that the considerations involved in the designing of a computer literacy course for students and a training course for teachers cannot be completely delinked from the operational and management aspects of the project. As the operational aspects of the project would be explained in detail by our distinguished colleagues from the Department of Electronics, I would like to very briefly state at this stage some of the issues related to curriculum development and implementation in this new area of our pedagogic interest.

The proposed computer appreciation-cum-education course will be primarily available to the secondary level students in the selected schools on the basis of voluntary participation. The course duration has been tentatively recommended as 30 hours of lecture and 60 hours of practical experience. As a school has on an average 30 working weeks, the average number of contact hours per week for a student comes out to be 3, which is equivalent to 4 periods of 45 minutes' duration. The course, therefore, might have to be spread over a full academic year and the participants of the course would be expected to be highly motivated so that they would be able to sustain their interest even on the eve of examinations.

As we all know, student motivation to participate in any optional course depends either on its relevance to the terminal examination or its recognition in the job market. The first aspect of the course is distinctly related with the general or universal function of secondary education, and the second aspect may be characterised as being preparatory to professional training or occupation-related to specific skills. From the point of view of a prospective participant, the proposed course should either enable him to learn his regular subjects better or to acquire some additional skills which might be treated as a premium either in the job market or in higher education.

It is, therefore, obvious that there is a wide scope for the introduction of different types of courses with a given hardware and software facility although initially the project might be launched with a single course outline in view. However, if such a course is not designed to transfer generalisable learning skills of immediate relevance, there might be a growing demand to link the computer appreciation course with the existing curriculum in the pilot schools. Hence, there is an urgent need to review the available software in the light of their relevance to the existing instructional materials in the pilot schools.

As the technical expertise required for identifying the expected learning outcome of a computer software in relation to the existing school curriculum in behavioural or structural terms may at present be available only in a few agencies like NCERT, there might be a need to take up this responsibility centrally in the initial stage. Subsequently, this responsibility may be transferred to the resource centres and, if possible, to the level of the school teachers. This is also important due to the fact that all the schools selected under the pilot project do not follow the same curriculum or medium of instruction. In contrast to the involvement of students in computer literacy curriculum in the affluent countries, where individual students and parents have easy access to personal microcomputers, the thrust of computer literacy should initially be on teachers' involvement and development in the context of India. It is only through a well thought out teacher training programme that we would be in a position to develop our capability to initiate supportive projects for the development of indigenous software with the active participation of teachers and subject specialists.

The resource centres in computer education have the added task of intimately acquainting themselves with the curricular concerns and constraints at the secondary and higher secondary levels of school education, in addition to the training of school teachers in the effective use of the new educational technology. Nothing other than a true spirit of

mutual learning on the basis of equal participation among the resource persons and concerned school teachers can be effective in making the pilot project a viable one in terms of indigenisation of this new technology in India.

The Department of Electronics, the Ministry of Education and Culture and the two major back-up agencies, namely, NCERT and IIT, Delhi, have made a humble beginning by developing several background documents giving an indication of the direction in which the Workshop is expected to concretise the curriculum outline. I hope you will have an opportunity of going through these papers by tomorrow morning when we propose to take up some of the issues raised in these papers.

I am also happy to announce that a team of British experts in the field of computer education would join us in the next session and demonstrate the computer hardware and software used by them in the U.K. and share their experience with us. On behalf of the sponsoring agencies, I would like to extend a hearty welcome to the members of the British team.

I would once again like to express my sincerest thanks to Professor Sampath, Professor Jha, and other distinguished participants and guests for joining us in this National Workshop. I am also grateful to the Department of Science and Mathematics, Professor Ghosh, Professor Jalaluddin, Mr. Saxena, Dr. Mathur, Dr. Maheshwari and Dr. Gupta for taking great care in organising this National Workshop.

THE INTERACTION BETWEEN EDUCATION AND PRODUCTIVE WORK

Bulletin of the
International Bureau of Education

No. 225 - 1982

One of the main events of the thirty-eighth session of the International Conference on Education (Geneva, November 1981) was the adoption of Recommendation No.73, addressed to Ministers of Education, on the interaction between education and productive work. This topic had already been partially dealt with in its relationship to secondary education, giving rise to Recommendation No.68, approved at the thirty-fourth session in 1973. This was the first time that productive work had been dealt with in relation to the education system as a whole and at all levels.

Underlying principles

First, it is proposed that education and productive work should interact upon one another, with the latter being defined as follows: 'production of material and intellectual goods and services that are useful to the individual or to society, not necessarily in return for remuneration, and taking account of the training contribution of the productive sector itself. (1)

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1. International Conference on Education, 38th Session, Geneva, 1981. Final report. Paris, Unesco: International Bureau of Education, 1982, P.28 (ED/MD/66).

Next, it is proposed that the interaction between education and productive work be emphasized at all levels and in all forms of the educational process, emphasizing the interdependence between theory and practice, and stressing the role of productive work in promoting the values of society.

The third principle calls for the inclusion in educational programmes of measures to promote creative and productive activities both inside and outside the school.

The fourth principle outlines steps to be taken in promoting interaction between education and productive work. It calls for the inclusion of productive work in the educational process and proposes that the working population be given an opportunity to continue education without interrupting productive work.

The fifth principle refers to the prerequisites for the merging of productive work and education, taking into account national structures and objectives.

The sixth principle calls attention to the need to respect national laws and standards pertaining to the work of children and adolescents.

SOME CURRENT EXAMPLES

In elementary education (6 to 12 years of age) practical and creative activities are assigned a very important place. Such activities include work with wood, metal and plastics, as well as gardening. From two to three

hours each week are devoted to these activities. Various approaches have been adopted to encourage participation in directly productive activities, whether at school or outside. In some cases, the education system is considered to provide an effective instrument for the introduction of innovations into rural communities in order to increase revenues.

Educational methods differ between industrialized and developing countries. In industrialized countries, the main objective is to develop the psychomotor capacities of the child in order to equip him with the knowledge and skills needed for creative activity. It is a matter of the child being gradually introduced to the world of work. In developing countries, where children have been traditionally engaged in performing productive tasks from a very early age, it is a matter of assisting the childb o identify himself with the community and at the same time to prepare himself as a source of initiative for development.

In secondary education, two trends are observable. The first of these is to extend basic programmes to all branches of education and to all pupils, and the second is to introduce into education an increasing number of activities related to production. In many respects, the most complete efforts being made to bring about effective interaction between education and productive work are those in which the principles of polytechnical education are applied. The process begins with the

kindergarten and continues through the handling of tools all the way to direct productive activity and laboratory work in enterprises during the last years of secondary education. This system requires broad co-operation between the centres of education and productiv e enterprises. During the last two years at school the work periods amount to three hours per week and the students are integrated into the regular work force of the enterprise.

The diversity of approach has led to the concept of productive work as a means of reinforcing, modernizing and diversifying the apprenticeship and of combining teaching with practical work in order to augment the teaching output.

As far as higher education is concerned, only a few countries resort to training with business enterprises as a means of improving interaction between education and productive work. In some cases, community work is required, whether voluntary or compulsory, in order to qualify for a degree or diploma. Other countries demand practical experience as a condition for admittance to university courses.

In respect of the teaching staff, there is a tendency to employ specialized personnel to prepare and supervise productive work. Sometimes, technical non-teaching personnel, such as skilled workers, are called in; in some cases they receive special training in order to tea

EXPERIMENTS WITH PRODUCTIVE WORK AS AN ELEMENT IN EDUCATION PROGRAMMES

Many experiments have been carried out which involve the interaction between productive work and education in different countries. Some of these have come about through national programmes to reform and update education systems in accordance with the values and socio-economic principles of different countries. Other experiments, which are limited in time and space, have less ambitious goals and have been set up in communities which are struggling to survive and preserve their identity. In general, these are carried out under conditions of struggle against social, economic and cultural inequality - tied to the struggle for human freedom. These appear to be more realistic and innovative as far as the fields of application are concerned, even though they may be less elaborate.

Open or latent criticism of existing education systems is apparently at the origin of a certain number of actions aimed at the introduction of productive work into educational programmes which are considered to be inefficient and out of date. On the whole, the aim is to refuce the number of failures caused by the education system without pretending to replace or destroy the existing system. In other cases it is planned to reorient the system with a view to introducing a certain professionalism. Here it is a question of eliminating,

or at least reducing, the gap which has existed until now between the school and the reality of work, between book knowledge and practical knowledge, and of overcoming the schools' inability to guarantee to students the skills they need for entry into working life.

Various approaches have been adopted in organizing experiments which combine education and productive work according to the context. The following approaches are the most widespread: (2)

(a) Education programmes and productive work are parallel activities. There is no relation between the two and no coincidence of any kind between the schedules for education and work.

(b) The educational programmes are subordinate to productive work. In this case, the educational programmes are shaped to provide the qualifications needed by the economy.

(c) Productive work is subordinate to academic curricula. Work is viewed as an educational factor and a means of instruction free from all productivist aims. This 'educationally useful work', as it is now frequently termed, is used to illustrate theoretical knowledge deemed excessively abstract. This is particularly the object of workshop, laboratory or gardening activities, etc., the students involved being completely unconcerned about the profit they may derive from such projects.

(d) Academic curricula and productive work are combined. The time devoted to the two activities is redistribut and the school timetable reorganized to enable allowance to be made for practical activities in the curriculum.

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2. International Meeting of Experts on the Promotion of Productive Work in Education, Paris, 1980. Secretariat working document. Paris, Unesco, 1980, p.10 (ED.80/Conf.627/3)

In each case, this typology should be adjusted to the socio-economic and education system to which it is being applied.

Any analysis of experiments to merge educational programmes and productive work should not fail to take into account one factor of decisive importance for the orientation and, in many cases, for the survival of the experiments. This factor is the government in power and the influence it exercises over the organization and orientation of educational experiments. It is a question of observing the influence of the political orientation of a country upon the development and spread of such experiments. Either they have their origin in the will to reorient the education system, and in this case the authorities play the role of initiators, or they are the result of demands expressed by the communities and, in this case, the government plays a primary role in defining objectives and means, in addition to providing practical support and assistance.

Experiments in combining education and productive work can be grouped into four categories:

Economic considerations. Here the main objective is to bring education systems more in line with the needs of the economy. It is a matter of reorganizing education in order to convert it into an effective instrument for obtaining employment. Through participation in various practical activities, both intramural and

extramural, the student is supposed to acquire an understanding of scientific principles and methods applicable to different types of work, and of the material and social conditions of the work. Reform of manual work is accompanied by initiation into the principles of productivity and the methods of converting the school into a producer of agents of economic growth.

The aspects which have been briefly mentioned are common to all countries. In certain countries, the introduction of productive work is considered to be a means of solving the problem of limited financial resources since it is believed that the students will be able to finance part of the cost of their education on their own. In such cases, it is not a question of a simulation, but of a real contribution by the students to their country's development on an equal footing with the other members of society.

Social considerations. The closer relationship between manual and intellectual work which is implied in the introduction of productive work into the educational process is looked upon in many countries as an effective means of reducing social inequality. In some countries it goes so far as to envisage the elimination of differences between general secondary teaching and technical and vocational education. In other cases, productive work in school appears to play the role of a social regulator in dealing with growing youth unemployment. Another approach is to emphasize the importance of the contacts

with the reality of the world of work gained through productive work, stressing its importance for certain sectors and classes of society. Among the objectives, emphasis is given to the notion of service to society, the development of positive attitudes with regard to work, and solidarity.

Educational considerations. The conviction shared between educators and administrators concerning the effectiveness of the introduction of productive work into education through the gradual creation of new attitudes and the transformation of the students' system of values is a major justification for bringing about interaction between work and educational programmes. It is a matter of restroring to manual labour its dignity and legitimacy. Direct application of theoretical knowledge opens the possibility of reducing the gap between knowledge and know-how. This approach gives greater weight to the experience acquired during apprentice-ship outside educational institutions and to the integration of formal and non-formal knowledge.

Greater importance is also attached to the interdisciplinary approach. In addition, this method promotes greater harmony within the school between teachers and students, besides placing the teachers in contact with the world of work.

Politico-ideological considerations. The common basis for the many and varied experiments carried out in different countries is their emphasis upon production as a means of stimulating growth. It is a matter of developing positive attitudes in children and youth towards work and workers. At the same time notions of social responsibility are propagated which are expressed particularly through respect for common property. One important aspect is the stimulation of initiative and perseverence in attaining social objectives.

Types of activity

Among the many activities proposed in the various experiments, a predominant place is assigned to agricultural work and to industrial and artisanal manufacturing. Cases that have been reported show a development of the concept of productive work and its social utility.

Here, it is a question of activities to improve the environment, living conditions and the material infrastructure (food, hygiene, health, household furnishings, etc.), cultural and recreational activities (art and handicrafts, decoration, games, etc.), experimental and investigative activities (investigations into electronics and biology in order to obtain useful information) and social services (solidarity, protection of the common heritage and the environment, youth activities).

Action and support structures

With the introduction of productive work into educational programmes, new actors appear on the scene, not only in the role of clients, but also in the double role of proposers and executors. Examination of the experiments reveals the role played by educational establishments, particularly technical and comprehensive ones, which play a part in the education system, and by interministerial bodies, particularly in the field of socio-economic planning and development. In many cases they are responsible for the financing of projects. Together with this growing interest of public authorities, there is an increased participation of private organizations such as business firms (whether private or state owned), cultural and social services and voluntary organizations.

When work is considered as an element in education, it becomes necessary to evaluate the place of production as a possible factor in education. What is needed is an 'educational interpretation' of the enterprise and the work performed in it for the purpose of identifying those training aspects and values which can contribute to the education of the younger generation. The technical and social division of work and the new qualifications which are required as a consequence of the scientific and technical revolution are the principal factors which enter into an understanding of the production process as a whole, as well as of its contradictions.

The discussion of co-operation with the world of work would be more fruitful if it were possible to evaluate its relationships in depth and as a whole rather than engage in an exchange of partial information.

On various occasions concern has been expressed with finding a means of preventing the introduction of productive work being refuced to mere productivism in order to meet immediate economic objectives; and the primary of the educational factor has been emphasized. How should this primacy be understood? Is it a question of recuperating some elements in order to enrich the methodological apparatus of the school? Is it a matter of replacing certain contents and programmes? Or is it a question of an open dialogue in which the education system listens to other voices and benefits from external contributions in order to conduct a reappraisal?

In a document on the future development of education one reads:

It is also frequently said that education has ceased to be the business (some would say the monopoly) of schools alone. This opinion is based essentially on two things: the growth of the mass media and the development of out-of-school education. A redefinition of roles is thus called for, and this implies consideration of two aspects of the problem: firstly, the relationships

between the school and other social institutions whose functions include that of instruction; and secondly the relationship between school education and other types of education and training "(4).

A more complete understanding of the possible contributions to educational planning by the various social sub-systems, such as the communication media, the production establishment, the school system, the family, voluntary associations, etc., would make it possible, particularly in countries which are not industrialized, to adjust the existing educational structures to the requirements and plans of society.

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4. International Panel on the Future Development of Education, 2nd meeting, Paris, 1981. Reflection on the future development of education: working document. Paris, Unesco, 1981, p.6. (ED.81/FUTURED/3).

REPORT OF THE COMMITTEE

ON

RATIONALISING, RESTRUCTURING AND REORGANISING VOCATIONAL EDUCATION AND TRAINING COURSES IN GUJARAT STATE

The Government of Gujarat constituted a State Committee on 12 November 1982 to go into the question of rationalising, restructuring and reorganising of Vocatinal Education and Training (Certificate Level) Courses and to suggest ways and means for improvement, mddernisation and coordination of the current systems of vocational education and training in Gujarat.

Terms of Reference

1. Codification, standardisation, rationalisation and restructuring of vocational education/training/courses/programmes on a well-established and organised basis at different levels of education in Gujarat.

2. Promoting and developing vocational education/training system by taking into consideration the present-day needs and demands and the existing resources in terms of institutional facilities and trained staff.

3. Considering the feasibility of running institutions/centres conducting vocational education/training programme under one Government agency, so far as possible, for the purpose of uniformity and standardisation in such matters as administrative control, educational standards, examinations and grant-in-aid.

....2/-

4. Suggesting revision in grant-in-aid formula for non-government institutions/centres conducting certificate level courses/programmes in context of the need for further development and progress in the field of vocational/occupational system of education and training.

5. Suggesting measures and procedures of inspection and evaluation of institutions/centres conducting recognised certificate courses.

6. Making any other recommendations germane to the object of promoting, developing and reforming the vocational education and training system operating under the administrative control of the Directorate of Technical Education and the Technical Examinations Board.

Historical Background

The introduction of practical (vocational) bias at the school stage of education was first recommended, as far back as in 1882, by the Indian Education Commission. But little or no effective action was taken to implement the recommendations made by the Commission and reiterated by various committees. Even as late as in 1966, as revealed in the Kothari Education Commission Report, the enrolment in the vocational courses was only 9 per cent of the total enrolment at the secondary stage of education, which was among the lowest in the world. In the absence of accurate statistics, it is not possible to figure the

...3/-

present enrolment in vocational education, though it may be nearer to the truth to say that the percentage has perhaps declined because of a very rapid increase in general education. Yet, most of these training programmes are meant to prepare semi-skilled and skilled workers for jobs in industry. This development apart, a wide range of other occupations - in commerce, agriculture, transport, administration, small-scale industries, health, wholesaling and distribution and services - are not yet thought of as the fields for which occupational preparation is considered necessary. Two examples may suffice here to highlight this lacuna or lack of foresight in developing vocational courses. There are no organised programmes of instruction for preparing persons for Materials Purchasing and Store Keeping and Merchandising and Distribution. If we take stock of persons engaged in these two occupational areas in Government and semi-Government establishments and fair price shops and consumer stores, there may be thousands of them not having acquir ed any kind of vocational areas where education and training in the vocations concerned as a pre-condition for entry to first jobs.

There were several plausible causes for the vocational education system passed through. Firstly, very little importance was given to the vocationalisation of secondary education at the national, regional and

...4/-

state levels. Secondly, there was no Central funding system. Even the States were stingy in providing adequate financial support. It was the federal grants for vocationalisation in secondary schools that stimulated the development of vocational education system in the U.S.A. - an experience that has a valuable lesson for India. Thirdly, out-dated and sub-standard forms and methods of vocational education adopted. Fourthly, lack of opportunities for further and continuing education allowing vertical mobility. Fifthly, inequality in educational opportunity in various forms - regional imbalances in development; educational, social and economic disadvantages; differences in the standards of admission to courses; restricted choice of route or mode of attendance. Sixthly, almost non-existence of the kind of administrative set-up and educational leadership that was necessary to promote, encourage and develop vocational education courses. And finally, but most unfortunately, the widespread belief that vocational education was an inferior form of education, fit only for drop-outs and the last choice of parents and students. No concerted effort was made by both authorities concerned and business and industry - through enlightened wage policies, vocational guidance and the education of public opinion - to promote the status and value of the skilled and semi-skilled craftsmen.

...5/-

Gujarat, at its start, derived the state of affairs as bequeathed by the State of which it was a part. That way, the stage setting was not encouraging or cheerful. The vocational education system did not undergo any significant changes in the first decade after the formation of the new state, except for the fact that part of the administration concerned with course formation, conduct of examination and conferring of awards was transferred from the Department of Technical Education to the Technical Examinations Board in the year 1968. To some extent, the Board became instrumental in bringing about the desired changes in the process and procedures leading to the awarddof certificates.

The period 1960-80 has synchronised with a significant quantitative growth in terms of institutions, courses, intake capacity and out-turn of end-product. During this period, the strength of institutions grew from 111 to 464, of courses from 25 to 66, of sanctioned intake capacity from 6,615 to 29,525. The out-turn of certificate holders sealed to a record high of 21,953 in 1982. The strength of institutions has phenominally risen in recent time, from 464 in 1980 to 757 as on 31st March, 1982.

Strengths and Weaknesses of the System

The statistical figures presented in the preceding para point to growth in terms of number of institutions, number of courses offered, intake capacity, etc. Though such growth parameters are of satisfying nature inasmuch as they tend to signify the fulfilment

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of planned physical targets, yet they do not reflect the totality of achievements and developments. True that the Department of Technical Education had done well in expanding the frontiers of vocational education in Gujarat.

There are several elements of the system that have a direct bearing on the quality of education imparted. Of these, the following are significant for the purpose of our study and review: (1) the character of institutions; (2) the pattern and structure of courses offered; (3) the extent and quality of essential inputs such as instructional and supervisory staff, curricula, methods of instruction and evaluation, instructional materials, etc; (4) the standards of education; (5) the kind of administrative set-up; (6) the structure of grant-in-aid and fees. For the purpose of the review under consideration it is necessary to take stock of the present position.

Character of Institutions. - As on 31st March 1982, the total strength of recognised institutions conducting certificate level courses is 757. Their spread in the State is far and wide.

(i) Nearly 58 per cent of institutions are situated in four districts only, namely, Ahmadabad, Vadodara, Kheda and Mahesana.

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(ii) Saurashtra region shows up badly (13%). And so is the case with South Gujarat.

(iii) There is no rationale in the distribution pattern. For instance, Mahesana district is number two in respect of vocational institutions, but its position in respect of economic indices is not that high. But out of 106 institutions in Mahesana district, only 23 conduct two or more than two courses.

(iv) 398 (52%) institutions conduct one course only. 204 (28%) institutions two courses only and 86 (12%) institutions conduct three courses only. There are 69 (8%) institutions only that more than three courses. This points to the fact that most of the institutions are of small size, almost of the nature of coaching classes, catering to courses like tailoring and cutting, embroidery and fancy work, wiring and jointing. Hardly about 20 per cent of the recognised institutions could be reckoned as having semblance to what we normally call institutes or centres of vocational education.

(v) 82 (11%) institutions are government-managed, 7 semi-government-managed, 425 (55%)social organisation-managed, and 243 (33%) private or proprietor-ship-managed. Thus, one third of the institutions are virtually owned by private managements - with the sole objective of extracting monetary gains through dubious means. Though registered under the Trust Act, most of the private managements seem to have flouted all ground rules of responsible management.

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(vi) Hardly 10 per cent of the institutions are aided institutions. Most of the non-governmental institutions avoid claiming grant for reasons explained in Chapter 7.

It need not be emphasized here that quality of education depends primarily on the institutional character and institutional management. Non-government institutions suffer from two main weaknesses: A precarious financial position, due partly to the inadequate provision of government grants and partly to their incapacity to raise funds; a bad and, very often, unscrupulous management. The consequence is that most of these institutions hire instructors at scales of pay (including allowances) as low as Rs.75 per month. Such institutions which are not able to raise adequate finance and, in consequence, are not in a position to apply standards and norms in the matter of providing instructional facilities, make a rather negative contribution to education and life, and thus pose a major problem in the effort of improving the quality of education.

Pattern and Structure of Courses - The following represents a detailed analysis of the present position:

(i) The present pattern and structure of courses cannot be considered as up-to-date. Most of the courses were designed long back and have structures that are

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quite out-dated. According to the modern concept of course organisation, curriculum strategy and instructional strategy form an integrated whole. It is therefore obvious that there cannot be quality of instruction if the curriculum structure is based on ideas and conetpts ruling at the time the courses were formulated, about 20 or 30 years back.

(ii) The duration of courses vary from six months to three years. Ordinarily, long-term courses should not be of duration less than one year and of more than two years. What is crucial to determining the duration of a course is the efficiency and effectiveness of the instructional process designed. The learning process could be accelerated by adopting the latest techniques and methods of instruction.

(iii) The entrance qualification varies from Standard IV pass to Standard X pass, depending upon the nature and content of courses. Ordinarily, the entrance qualification should not be less than VII Standard pass, otherwise the quality of education will suffer. As a special case, disadvantaged groups like tribal youths, blind persons, etc., may be given some degree of remission as suggested elsewhere in the Report.

(iv) Only full-time attendance route is followed at present. No part-time courses are organi-

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(v) Total course or instruction hours for some courses are not adequate. For instance, wiring and jointing and electrician courses suffere on this point. Both the extent and quality of instruction of these courses are not satisfactory.

(vi) No options are provided under the present system of course offering. This means the contents and subject-fields have no variations to suit local needs and aspirations of young people. All are required to do the same things throughout the State. Options allow for equalisation of educational opportunities and choice of study area one could be most interested in.

(vii) Of 60 certificate level courses, none is structured to include any kind of practical training in industry. In other words, the courses are almost 100 per cent institution-organised with no in-built arranagement for pre-job industrial training.

(viii) Four courses in tailoring and cutting, wiring and jointing and electrician trade are in large demand - between them taking up about 70 per cent of the aggregate seats in the State. Some courses covering industrial traddes are hardly in demand. In general non-trade couurses predominate in respect of demand -

and popularity. Most of the private institutions not caring for grant go in for such courses as they offer good opportunity for profit making.

Extent and Quality of Essential Inputs - This element of the system is central to quality development. The position in this regard is:

Instructional and Supervisory Staff - The available data and information reflect a rather unsatisfactory state of affairs. Low emoluments paid can rule out any possibility of improvement. The whole issue of staffing needs to be examined by the administration in several aspects - pay scales, academic qualifications, industrial experience, pre-training and in-service training, and such important inputs.

Instructional Facilities - Facilities in terms of building space, equipment and tools, educational or instructional aids, etc., cannot be considered as adequate. Deficiencies mostly stem from the incapacity of institutions to raise money. No grant is admissible in respect of these facilities. Therefore, except for Government, semi-Government and well managed voluntary institutions, a majority of institutions try to manage the things somehow or other in this regard.

Curriculum and Instructional Methods - As said for structures of courses, the subject areas, contents and such other elements of curriculum design are far from up-to-date or modern. No courses has been designed

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on the basis of task or activity analysis. No performance terminal or enabling objectives have been laid.down. Designing of curriculum in old manner is out of place with the present day thinking and requirements. Instructional system, and the quality of education, is much dependent upon the q uality of curriculum design and development. The whole instructional system needs to be reonstructed on the lines suggested elsewhere in the Report.

Administrative set-up - The administrative set-up necessary for the management of the vocational education system is quite adequate for the current tasks. Two Class I officers and five Class II officers are looking after the system in the Department of Technical Education. All are technically qualified. But judged in the context of the changes and reforms suggested by the Committee, particularly in respect of course structure, curriculum design, instructional strategy and the like matters, the kinds of new tasks that may emerge will call for professional services of higher order for persons who should be well prepared to spear-head dynamic transformation in the system of vocational education. It will be challenging responsibility for the Department - inasmuch as that the officers and other staff entrusted with duties of administering, inspecting and evaluating shall be required to undergo a vigorous process of specialised training in arts of validating courses, conducting field surveys, interviews and investigations in different

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areas of occupations, carrying out task analysis, and designing and writing curriculum and instructional strategies. The Technical Examinations Board shall have also to prepare their officials accordingly.

The Department and the Board will do well to plan and phase out actions in this direction quite in advance of introducing these suggested changes and reforms. The Committee further suggests that the persons needed for these new administrative and supervisory tasks must and be hand-picked, preferably in the age group 35-45. It will be of no use entrusting such duties to persons who have rea ched a stage beyond which training and retraining them becomes counter-productive. More than that, specialised training is a costly affair, and therefore, it will be a good sense to invest on the training after ensuring that trained persons continue to serve the cause intended for a period of at least ten years.

Structure of Grant-in-Aid And Fees - The issues involved and the state of affairs in this regard are discussed in Chapter 7 at some length. The data and information given in part II of this report also substantiates the general findings that grant-in-aid provisions are far short of the minimum that can sustain a system of education that is mostly raised on voluntary effort. In the Committee's opinion, most of the reported drawbacks of the system stem from this basic cause.

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The structure of fees is rather archaic. The Committee feels that most of the non-Government institutions collect tuition fees on an arbitrary basis. There is a semblance of fees structure for Government institutions and institutions receiving maintenance grant. A majority of non-Government institutions have managed to remain outside the administrative control simply through the present strategy of charging very high fees - a perverse practice indulged in because of a lacuna in the present framework of rules, procedures and conditions governing recognition and affiliation of institutions. The administration will do well to correct this situation as early as possible in the overall interest of bringing about improvement in the quality of education.

In the final analysis, what effective steps are initiated to improve standards of education and examination, what purposeful measures are taken to orient courses to industrial practices and what facilities and resources are provided adequately - all this and such other efforts and inputs shall determine a broadbased and integrated structure of qualitative improvement.

Questions and Issues Considered

Among other things, and within the ambit of reference, the Committee covered the following questions and issues of major importance for the purpose of study, discussion and formulation of suggestions and recommendations:

1. What shall be the policy and objectives underlying vocational education?
2. For whom shall vocational education be provided?
3. For what trades or occupational areas vocational education be designed and organised?
4. What shall be the levels and types of courses? What shall be the levels and values of awards?
5. What shall be the routes and channels of vocational education?
6. What shall be the character and set-up of institutions?
7. What shall be the nature, contents and depth of the curriculum for vocational courses?
8. How and to what extent shall vocational education be oriented to trade practices or career situations?
9. What shall be the key persons and agencies for designing the curriculum, instructional and examination sub-systems?
10. What shall be the means and methods of instruction?
11. What shall be the standards and norms and how shall they be established and maintained?
12. How shall liaison between institution and system and industrial or business system be established and maintained?
13. Who shall administer and operate vocational education system? What shall be the nature and firm of the agency for establishing and maintaining coordination between different Government Departments/Agencies concerned with

vocational education?

14. Who shall pay for vocational education?

What shall be the grant-in-aid system?

Acceptable answers to questions and issues raised above involve a searching edamination of many principles, concepts facts and practices in vocational education. The Report is designed to provide information guidelines and suggestions that will be useful in arriving at acceptable answers to the above and other similar questions and issues - leading finally to the necessary administrative decisions and actions.

Excerpts from "Education and Modernization in India"

by M.S. Gore

A major study on education with its sample drawn from eight different states was completed in 1967. The study covered over 11,500 students studying at various levels - the high school, college level and the professional college. The data relating to the social background, i.e. age, sex, caste, father's occupation, father's education, etc. are available in the All-India Report on Field Studies in the Sociology of Education. A few of the relevant facts taken from the summary of findings of this study are presented below:

1. Educational background: Despite the fact that nearly 80 per cent of the country's population is illiterate, there are not more than 25 per cent students in any state, at the high school level, who are drawn from homes with illiterate fathers of guardians.

   At the primary stage, in the rural areas, the percentage of illiterate fathers is higher but still varies between 40-80 per cent.

2. Occupational background: Most students are drawn from urban occupational groups at the high school level. The purely rural occupations are represented only to the extent of 21 to 35 per cent of the high school students.

   At the primary stage in the rural areas, the percentage of fathers with agriculture as their occupation rises, but is, again, never larger than 60 per cent of the group.

3. Caste background: The overwhelming majority of students to whom caste is applicable at all are drawn from non-scheduled and non-backward caste backgrounds. Only about 10-15 per cent belong to the scheduled and backward class categories, except in Mysore and Andhra where these percentages are higher.

   Even at the primary school stage, the upper and middle castes are over-represented among the students both in urban and rural areas.

4. Religious background: The overwhelming majority of high school students - 60-90 per cent -- expectedly belong to the Hindu religion, but their percentage is often lower than the percentage of Hindus in the total population. This implies that some of the religious minority groups are over-represented among the students. This greater representation of religious minority groups among students is particularly noticeable among girl students. The communities generally over-represented are Christians and Jains. Muslims are over-represented in Andhra, Bengal and Mysore -- 24, 16 and 15 per cent respectively. At the primary school stage this over-representation of minority groups is not noticeable.

If the data on father's education and father's occupation are taken together it is clear that the educated, white-collar section of society is represented among students of schools and colleges in proportions larger than its proportion in the general population. This can mean either of two things: that education is a priority with those who are already educated and are in the white-collar group and therefore they are more likely to use educational facilities than other groups in society; or, education is differentially available to those who do and those who do not belong to the white-collar group in society.

Both these interpretations are possible and would be valid. It is impossible to say on the basis of data of the above study which one of the two interpretations is more valid. Yet the implications for educational planning of the two interpretations are likely to be very different.

To the extent that the former interpretation is correct it probably underlines the irrelevance of much of our education to non-white-collar groups in society. Their lack of interest in secondary education arises out

of the fact that for the occupations they would aspire to, secondary education makes no meaningful contribution.

The fact that those who send their children to secondary schools, and even those who send them to primary schools, largely aim to have them enter white-collar occupations is also shown by other data of the study; it supports the assumption that those who do not send their children to schools either cannot or do not aspire to such occupations.

From the point of view of man-power planning it need not be a misfortune if all parents do not aspire for white-collar occupations. But that education fails to involve the interests of coming which has serious implications for man-power planning. Also, in so far as the white-collar and non-white collar occupational groups represent differential life opportunities the fact that many cannot aspire for the white-collar jobs also indicates the existence of a crucial inequality of opportunity. That this inequality is linked to unequal economic standing is seen from the fact that among the non-white-collar rural occupational groups it is only the economically better-placed who send their children to schools and colleges.

The data on caste show that it is not an unimportant factor in the system of education. It enters education in three different ways: (i) It determines the changes of a child entering the system of education and continuing in it; (ii) It determines the chances of a person entering upon teaching as a career at the primary level and the

higher levels of education. If he is a lower caste person he is more likely to be represented at the primary stage; if he is high caste he is more likely to be found at the secondary or college stage; (iii) It also enters into the teachers' perception of the student's ability to cope with his work.

This need not mean that caste, as a social institution, independently serves as the determinant of opportunities. It is possible that the real differentiating factors are occupational and economic standing; but then the data would mean that at least as of today high and low caste status is also indicative in our society of high and low occupational-economic status.

There is nothing in the data which suggests that caste discrimination exists or is practised in admissions to schools. However, the data do show that higher castes are better represented among student populations than backward or lower castes.

The most pronounced differentiator in educational opportunity is probably sex. While education for girls has made strides and while today many more girls than boys are to be seen in some of the faculties and departments of universities, the data show that the girls who enter the educational system are largely those from the urban, high-caste white-collar families. Rural residence, low caste and low economic standing definitely tend to deny opportunities of education to a girl. This is so to a much greater degree than in the case of a boy.

The data on the social background of high school and college students show clearly that different groups in society are represented in different proportions in the student sample. Whether this difference is because all the groups are not equally keen to enter educational institutions or because they do not all have comparable economic resources to invest in education cannot be said conclusively. Since, however, the groups that are under-represented are also the economically poorer groups it may be justifiable to assume that the ability to pay for education is one of the important factors determining the relative proportion of representation of different groups in the student population of our society.

Even without any reference to the significance of the economic factor, it is clear that in so far as different community or caste groups have different degrees of access to education, and in so far as education is an important channel of social mobility unequal access will make for a slower pace of change in our traditional status system based on birth and community affiliation.

This has also, of course, the other converse implication that individuals and groups who cannot hope to rise in social esteem through the channel of education will seek to do so through other available channels. One such, equally approved channel is the channel of political office. A slow pace of social change will at least in the short run shake the faith of the deprived sections of our society in the promise of equal opportunity through the system of education. The effectiveness of

the system of education to serve as an equalizer of life opportunities depends largely on whether it is meaningfully linked to the broader economic system of society and whether, in its turn, the economic system is developing sufficiently rapidly to provide increasing opportunities for the growing number of educated in society. The subject of the linkage between education and the national economy is too broad to be discussed in any detail in this paper. However, enough has been said and written in this area to enable us to say that in our society education equips individuals for a relatively narrow range of occupational functions and, further, that the development of our economy is not rapid enough to provide opportunities for the growing number of educated youth. The strife in educational institutions is in no small measure a consequence of this situation.

Equality of opportunity in a society depends on the ability of its members to notice and support merit wherever it is found irrespective of caste, class, race, religion or language differences. Education can do a great deal to promote this attitude of mind. The experience of students as candidates for admission to educational institutions and their conviction that these admissions are based on considerations of merit can itself be an important element in their developing such attitudes. Additionally, the curricula followed in schools, the attitudes of teachers and, particularly, the content of ideas that education communicates through books and the spoken word become important socializing influences.

No one can say that all educated persons are necessarily more liberal, objective or rational, but the right kind of education can be a great instrument in the fostering of these attitudes and sentiments.

It is difficult to say to what extent the total influence of our system of education is in the direction of greater liberalization of the personalities of students or the extension of their sympathies. Not many studies are available to give definitive data on this subject.

In the study referred to above students were asked whether in their opinion caste and religion should have any place at all in social and political life. The responses varied somewhat from one state to another, from one level of education to another and also between the two sexes. The percentage who said that considerations of caste and religion should have no place at all in social and political life varied between 45 at one end and 80 at another. However, in most of the states the percentage of favourable responses was above 60 per cent among high school boys and above 70 per cent at the college level. Whether this response is satisfactory and encouraging is largely a matter of opinion and relative perspective. In my own view I would regard it as an indication that we have still a long way to go before we can say that the objective, secular frame of mind has become a part and parcel of our way of life.

It should be stated here that the question on caste and religion was not asked with a specific reference to educational opportunities nor even to the general area of equality of opportunities. It is quite probable that if a specific question were asked: Should all groups of persons have equal access to opportunities for education or for work?, the answers would have been universally in the affirmative.

On the other hand, a question not so directly framed is probably a better indicator of the extent of our acceptance of universalistic criteria in our life. The answers indicate whether the respondents would consider caste and religion to be relevant considerations at all in any social or political sphere. To the extent that those considerations are considered relevant at all they will interfere with the free operation of objective criteria of merit and to that extent will become obstacles to the spread of equal opportunity, whether in education, in work life, or in politics. The answers suggest that, for whatever reasons -- whether those of ideology or practical politics - the loyalties of caste and religion will form a part of the frame of reference of those students who do not deny the validity of such considerations. The data suggest that even at the verbal level about 30 per cent of the students are not ready to take this categorical position of denying any role to caste and religion in social and political life.

Finally, I would like to turn to a discussion of the teacher's own frame of reference vis-a-vis his students. Before, I introduce the question or the responses given by the teachers let me say that the question that was asked of the teachers was intentionally ambiguous. The answers given by the teachers are therefore subject to at least two different interpretations; but both the interpretations are disconcerting to anyone interested in exploring the extent to which education equalizes opportunities between different segments of the population.

In the study referred to above teachers of primary and secondary schools were asked the question whether in their opinion the performance of students was in some way related to their (i) caste, (ii) religion, or (iii) language. On the items of religion and language most of the teachers were agreed that they made no difference to a student's performance in class. However, on the item of caste a majority of teachers in primary as well as secondary schools said that caste was in some way related to class performance. This response, as mentioned above, can be interpreted in two ways, viz. (i) that the teachers are expressing a view based on their actual observation that students of some castes generally do better than students of other castes in their class work, or (ii) that teachers are merely giving expression to their prejudice in favour of or against certain caste groups.

In either case the implications are disconcerting. If it is the actual experience of teachers that students do better or worse in their studies depending upon whether they belong to one or the other caste then it is a clear indication that there are serious difficulties in the way of education serving as an equalizer of opportunities. Admittedly, there is no suggestion that children of some castes are innately more able than children of other castes; but obviously, since children of different castes do differ, according to the teachers, in their performance this difference in scholastic performance must be put down to some factor - perhaps the social-cultural factor - whose effects cannot be compensated for by the facility of equal opportunity to be admitted to an educational institution. Much more needs to be done to enable the 'disadvantaged' children to benefit from their schooling and very little is presently being done.

IN-SERVICE TEACHER EDUCATION

Bulletin of the
International Bureau of Education

Nos. 218/219 : 1981

The goals of the in-service education system for teachers are formulated fragmentarily and vaguely, most frequently as separate educational courses for serving teachers. Notwithstanding the considerable variety of concrete programmes, there do exist two fundamental objectives which must be tackled by any project of the in-service education of teachers:

1. The function or purpose of the project with regard to the personality of the teacher, his motivation, qualification and specialisation, his in-school and out-of-school activities;
2. The selection and arrangement of the content of the in-service education of the teachers.

The objective of the in-service education of teachers is always to change their attitudes, knowledge and skills - in psychological terms, the personality and behaviour. With regard to the perfomance of teaching skills, the changes may aim at compensation, adaptation, re-training, broadening, specialisation or updating. Although the individual functions usually overlap, these are the main ones.

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The in-service education of teachers, however, has other, secondary functions to which appropriate attention may not have been given in the initial training stage. It brings the teachers together, giving them the opportunity to exchange experience. It may also be assumed that the return of the teacher to the role of student could protect him from the tendency towards dogmatism and authoritarianism, and may make him more aware of the situation and difficulties of his pupils.

With regard to content, the in-service education of teachers is a non-specific type of education, i.e. basically anything in human knowledge and action may become a priority for the teacher's self-education. In actual fact, however, decisions are taken according to the needs of the education system in which the teacher participates. These needs may be classified into three groups.

1. The assessment of the educational significance of technical development, scientific discoveries, new artistic creations, new phenomena in the life of society in general;
2. The introduction and verification of education experiments, such as the creation of new curricula and textbooks, testing and evaluation methods, etc.

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3. The encouragement of innovation in the content, methods and organisation of education, i.e. the general introduction of changes which are considered to be useful and viable, such as new syllabuses, modern teaching techniques, etc.

It has hitherto been the rule that these needs were enforced gradually. Only exceptionally did teachers take an active part in the assessment of new phenomena in social or cultural life, and only very rarely partake of educational experiments. However, the accelerating development of education systems means that these gradual and progressive changes are no longer adequate. We feel that it is unacceptable that flights into outer space should not immediately become part of the curriculum, that the teacher should wait for emerging new states to be published in the new issue of the school atlas before mentioning them, that he should not have knowledge of the latest trend in the musical interests of the younger generation, etc. It is therefore no longer possible to restrict the in-service education of teachers simply to updating their knowledge; the teacher is continually confronted with all kinds of changes in the education system. For these reasons it is evident that in the in-service education of teachers we constantly encounter three components - the general component, the subject component and the pedagogical (or professional) component, and two aspects - the theoretical and practical aspects.

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The interest of teachers in in-service education in different countries shows similar characteristics. A minority of teachers show a high and permanent interest in in-service education; the majority show no spontaneous interest. This is in contradiction with the objective demands which the development of the education system puts on the teachers. A solution is being sought through different means designed in stimulate the interest of the teachers. In some cases in-service education is assessed as part of their professional duties. The question of the obligatory or voluntary character of in-service education, however, no longer gives rise to misunderstanding or argument, as was the case only a few years ago. The mandatory character of a specific type of in-service education is no effective motive and cannot be a substitute for lack of interest, but it is a legal guarantee that the employer will enable the teacher to participate, that at least part of the expenses incurred by the teacher will be met, and the costs of organizing education during his absence will be covered.

Comparisons of teachers' interest in different forms of in-service education showed that they had a significant preference for programmes oriented directly towards everyday educational activity, practical exercises and demonstrations. Programmes of this type found a favourable response, even among those teachers

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whose initial response was neutral or negative. The lack of interest among teachers is often evidence of a concealed fear of failure and damaged prestige, lack of self-confidence and unwillingness to undergo examinations. On the other hand, the interest of teachers increases if they are given the choice of several programmes or institutions, etc,; if their work loads are alleviated; and if they can expect that their work will be appreciated (by higher qualification or degree, higher pay, better position, rank etc.).

CURRENT STATE AND DEVELOPMENT TRENDS

The inservice education of teachers has become a significant social activity which makes increasing demands for its organisation, contents, methodology and forms. According to the analysis of information sources in 1973/74 included in the ERIC system of educational information, until the mid-1970s attention was devoted only to individual elements such as programmes, institutions, courses, new curricula, the methodology of individual subjects, the induction of beginning teachers, etc. (ERIC Clearinghouse on Teacher Education, Washington, 1975). The concept of the in-service teachers was not tackled in a comprehensive way and most programmes did not deal with the teachers' profession, qualification and education on a general

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level nor did they cover the relation between the science of education and school practice from the point of view of the teacher's role.

The thirty-fifth session of the International Conference on Education, organized by Unesco+IBE in Geneva in 1975, represented a turning point. Among other things, this session dealt with the changing role of the teacher in a changing world and gave great emphasis to the in-service education of teachers. On the basis of Recommendation No.69 adopted at this session, the concept of the in-service education of teachers in various countries has become part of broader educational policy and research. More attention is being paid to the professionalization of the teacher and to the connection between in-service education and innovative efforts within the education system, as well as to practical activity at school. The in-service education of teachers is conceived as a part of their lifelong education and forms an integrated whole together with their initial training.

The orvanisational and support of in-service education for teachers are in most countries dealt with by central educational bodies, regional and local administrative boards, school leaders, as well as teacher organisations, trade unions, cultural institutions and mass communication media; but, first of all, associations of teachers may function according to their specialisation, function or region, In a number of countries teacher

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centres contribute to in-service education at some levels, providing necessary teaching aids, documentation and consultation. Their function has a great significance, particularly in the self-education of teachers.

Self-education represents one of the main trends in the present development of in-service education. The presentation of courses, television programmes, distribution of learning aids, opportunities for meetings, etc. are being considered more and more as a service for the self-education of teachers. This is conceived as a permanent process where a vital role is played by teaching practice with its beneficial formative and professional effects.

Such an approach to the in-service education of teachers provides the possibility for the improvement of qualifications and the development of the teacher's personality, particularly concerning his social and ideological profile, educational and psychological skills, professional knowledge within his specialisation, as well as his level of general culture. The task of this service consists in mediating information for teachers on:

1. The relation between society and education, i.e. educational policy and the aims of the education system; the need for and structure of manpower; and the development of the level of people's education.

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2. The process of instruction; the methodology of education oriented towards independent learning and creative activities; modern teaching aids.

3. Moral, aesthetic and physical education; as well as work education aimed at forming a harmoniously developed personality; community education; hobbies and out-of-school activities.

4. The responsibility of their counsellors, inspectors and school leaders, as well as in other educational and school professionals.

5. The organisation of work on their own special subject; classification of personal documentation use of the information service; the evaluation and generalisation of educational experience experimental and creative educational activity.

6. Comparative education; socio-economic conditions for the development of national education systems throughout the world; and international cooperation for the exchange of educational information.

INTERNATIONAL ACTIVITIES AND EXCHANGE OF INFORMATION

Recommentation No.69 of the thirty-fifth session of the International Conference on Education addressed mainly to Ministries of Education of Unesco's

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Member States, set up the base for the development on the national scale and also for broader international cooperation in the field of in-service education for teachers. The individual paragraphs of the Recommendation concerning the in-service education of teachers are the following:.

19. Continuing education should be an integral part of the teacher education process and should therefore be arranged on a regular basis for all categories of educational personnel. Procedures should be as flexible as possible and adaptable to teacher's individual needs and to the special features of each region, taking into account developments in the different specialities and the extension knowledge.

20. The functions of teacher education institutions should be extended not only to provide for the pre-service education of teachers but also to contribute substantially towards their further education; it is thus desirable that these institutions provide pre-service education and continuing education.

21. Special regional centres should also be developed for this purpose and also to provide initial in-service education for those teachers particularly in developing countries, who did not receive adequate preparation before starting teaching.

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22. Teachers' organisations should be encouraged to the continuing education of teachers by initiating opportunities for teachers to meet and work together on common problems. Conferences, seminars and courses organised by teachers' organisations may represent a significant measure in encouraging teacher development by the profession itself.

23. Self-education of teachers should be considered as an important element in their continuing education. The educational authorities and educational research and documentation centres should help the teachers to organise their individual in-service education by providing guidance, the necessary documentation and literature, library facilities, etc. and by making the necessary time available.

24. In order to make continuing education more effective and to reach educators in remote regions, extensive use ~~of~~ should be made of radio, TV and correspondence courses. The combination of short full-time courses with long periods of multi-media programmes, including radio, TV and correspondence courses may provide one immediate solution of in-service education of the broad mass of teachers.

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25. The strengthening of the continuing education of teachers as required at all levels of the system, from early childhood education to the tertiary level and adult education, will require considerable efforts on the part of education authorities. Such efforts include the qualitative analysis of teacher supply and demand in the country and the working out of national or regional plans for the continuing education of teachers.

26. Present rules, regulations and statutes should be so modiefied as to recognise the importance, necessity and effect of in-service education, to take into account the developments in its organisation which have already occurred and to provide a legal right for all educational personnel to take part in continuing education.

27. Measures should be taken to give all full-time or part-time specialists working in education the opportunity for in-service education and at the same time to ensure that their professional experience benefits other teachers.

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EDUCATIONAL RESEARCH AT THE WORLD BANK

George Psacharopoulos[1]

World Bank lending for education and training rose from $9 million in 1963 to $900 million in 1982, when the Bank's Executive Board approved 19 educational projects. During this time, the emphasis of the lending program has shifted from infrastructural needs, such as constructing school buildings, to "software items" such as curriculum development and the availability of textbooks that are present in the current portfolio of projects. Part of the change in emphasis is in response to the results of research in the educational sector, as described below.

The magnitude and diversity of this lending require a considerable amount of analytical work. A substantial portion takes place within the context of normal Bank operations, namely in sector and economic work, and the remainder is classified as research. Of course, there is no fine line separating these activities.

Key Issues for Research

This article is an overview of the educational research topics of interest to the Bank, a survey of findings, and work in progress. Within the very wide spectrum of research topics that conceivably could be tackled by an institution with global interests such as the Bank, the following short list provides insight about the key issues that are being researched by its educational sector: efficiency, finance and cost recovery, and equity.

The two issues of efficiency. Although it is now generally accepted that "education" contributes to a country's developmental effort, there is much less agreement on what types or levels of education and what mix between in-school and out-of-school training are most efficient in promoting economic growth. The issue of efficiency in education can be divided into two more or less distinct categories: First, *internal* efficiency, referring to what takes place within schools, such as student repetition and dropout rates, the relative cost of alternative teaching methods, and the determinants of educational achievement; second, *external* efficiency, referring to what happens after a student leaves school, such as integration into the outside world, especially the labor market. The two types of efficiency are linked when, for example, a policy maker asks the following questions: Given the circumstances in country X, should priority be given to the expansion of primary schools or secondary schools? If one opts for an expansion of secondary education, what is the optimal mix between the general and vocational streams? How does one decide whether the country "needs" another university engineering faculty and, given budgetary constraints, whether this should be provided at the expense of a faculty in business administration? What is the appropriate mix between a mere quantitative expansion of the educational system and improvements in the quality of the services it provides?

Finance and cost recovery. On the assumption that a particular educational policy (or project) is socially efficient, its implementation might not be feasible because of financial constraints. For example, one major issue that has arisen in recent years is the hesitancy of many countries to carry out educational investment programs because of the implications of recurrent costs of the programs throughout the life of the physical facilities. Hence, there has been serious discussion of alternative funding methods and the charging of fees to users of educational facilities. The possibility of instituting user's fees for education sparks these questions: To what extent are the beneficiaries able, and willing, to carry a part (or all) of the burden of financing education? How far can one introduce user's fees without discouraging enrollments in levels and types of schooling that exhibit high social profitability?

Concern for equity. Even if a given educational policy or project passes the tests of social efficiency and financial feasibility, it may well raise issues regarding equity. Or, vice versa, if a policy is judged

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1. Education Research Adviser, Education Department, The World Bank. This summary is by necessity a *personal* review of a vast amount of research activity that has taken place in the World Bank in recent years, as well as related research originating outside the Bank. Thanks are due to all those staff members who commented on an earlier draft, and apologies to a number of colleagues whose work, because of limited space, is only briefly mentioned.

as equitable, it may raise the issue of adverse trade-offs with efficiency. Questions of equity are notoriously difficult to research, and this is especially so in education, because of problems associated with separating values from facts.

A Survey of Findings

Internal efficiency and school quality. The early findings by Coleman (1966), which later became controversial in the United States (see, for example, Bowles and Levin, 1968), asserted that school inputs have only a modest influence on what children learn in school. Instead, socioeconomic background and other out-of-school factors were found to be a stronger determinant of achievement. This conclusion is relatively pessimistic regarding the value of policy intervention because "socioeconomic background" is not easily manipulated by policy changes, whereas other inputs, such as teaching and classroom variables, can be. Judging from the research literature on North American and European experiences, it appeared that additional investments in school quality yields only moderate returns for improving student achievement.

Research by the World Bank and others on the determinants of educational achievement in developing countries reports somewhat opposite conclusions. A review of 18 statistical analyses of the association between achievement and the availability of textbooks in developing countries (Heyneman, Farrell, and Sepulveda-Stuardo, 1981) indicates that in 16 cases the effect of textbook availability on achievement was positive and statistically significant. Also, in some cases the influence of the availability of books on achievement was stronger among students of low socioeconomic background.

Similar results have been reported in a recent World Bank study in the Philippines (Heyneman, Jamison, and Montenegro, 1983). Following an educational loan for textbooks, two groups of students were compared a few years after the books had been distributed; one group had benefited from textbooks and one had not. The results indicated that the group that had been exposed to textbooks showed a remarkable increase in achievement over the control group.[2] And as among the many other educational inputs that have been researched in developing countries, the effect of textbook availability on achievement was found to be strongest among students from the poorest households.

Similar results were reported by Heyneman and Jamison (1980) regarding the effect of textbook availability on achievement among Ugandan primary school students. Arriagada (1983) shows that among sixth-graders in Peru, socioeconomic background is not a statistically significant determinant of achievement, whereas the characteristics of teachers and of school management are.

"Education" has been measured in a great variety of ways in analytical models, for example, as the level of educational attainment of the population, the number of years of schooling of the labor force, the percentage of literacy in a given country, or the primary enrollment rate. Although it might appear that reference to the labor force is the most relevant factor in external evaluation, the educational attainment of the general population is also pertinent in the sense of capturing the economic effects of education in areas other than the labor market, as in the case of females and their productive contribution through nonwage household activities.

The dimension of educational quality is typically missing in quantitative measures of education. Yet, the few existing studies of educational quality in this respect have shown quality to be economically and socially productive. Regardless of whether educational quality has been measured in terms of school buildings, laboratories, textbooks, qualifications of teachers, nature of the curriculum, class size, composition of the student body, or per-pupil expenditures, evidence more recent than the Coleman study of [illegible]ows that such measures have an impact (1) on enrollment (Birdsall, 1982a); (2) on student achievement; and (3) on adult earnings (Solmon, 1975; Wachtel, 1975; Rizzuto and Wachtel, 1980). Also, the lower the gross national product (GNP) of a country on a per capita basis, the higher the impact that school quality appears to

2. The study was conducted among 8 million primary school students. Following the introduction of textbooks to first graders, 69 percent of these students achieved the mean score achieved by 50 percent of unexposed students the year before. Likewise for mathematics, 63 percent of the students exposed to textbooks achieved the mean score of 50 percent of the unexposed students. These learning gains are among the highest observed by educational researchers at the Bank.

have on student learning and the lower the impact that factors of socioeconomic status appear to have on learning (Heyneman and Loxley, 1983a). With respect to enrollment, the impact within at least one country, Brazil, was greater among poor households (Birdsall, 1982b). Such differential findings between rich and poor households or countries suggest decreasing returns to inputs designed to improve school quality; that is, such inputs are most effective when administered to a small existing base.

Consideration of school quality might contribute to explaining the widening gap in economic performance between developing and advanced countries or the alleged failure of some economies to grow in spite of the rising educational attainment of their populations. Jamison, Searle, Galda, and Heyneman (1981) report that whereas in 1960, the industrialized countries (members of the Organisation of Economic Co-operation and Development) on average invested 16 times more per pupil than did any of the 36 countries with per capita incomes below $265, by 1970 the difference had grown to 22:1 and by 1975 to 31:1. According to unpublished estimates this ratio stood at 50:1 in 1977.

Alternative teaching methods. "Distance teaching" by radio or television is a relatively recent technological development. An evaluation of a radio-mathematics project in Nicaragua concluded that students exposed to radio lessons scored significantly higher than those who were not exposed to the lessons (Jamison, 1978). It was also found that radio lessons significantly lowered the probability that a first grader would fail to be promoted. An experiment in the Republic of Korea with an Air-Correspondence High School provides a good example of the economics of alternative systems of delivery. Lee (1981) reports that the average cost per student in the air-correspondence high school is $50, compared to $230 in a traditional high school. Given the earnings of graduates of the two types of school, the rate of return (yield) to investment in the new type of school is estimated to be about 26 percent, compared to a 10 percent rate of return to investment in the traditional high school. This finding is not only due to the lower unit cost of the air-correspondence school, but to the fact that its students forgo less earnings relative to those in traditional schools, because the correspondence students are usually employed while studying. Perraton (1982) reports further case studies on "distance teaching" in developing countries.

External efficiency. The external efficiency of an educational institution has received much attention in the Bank's research program on education. The reason is that education projects often have to be justified in terms of their tangible contribution to the economy as a whole. The documentation of the external efficiency of schools has taken place at many levels of aggregation and from several points of view. For example, one can examine the transition from school to work and the absorption of graduates in the labor market. Or one can assess the extent to which training institutions provide the "necessary" skills for the smooth running of the economy. Further, one can compare the costs and the benefits of producing one extra graduate. Or one can find the contribution of education to the economic growth of the economy as a whole. And one could even trace the effects of education on other sectors, including the efficiency of "household production" activities.

Perhaps the ultimate criterion of the external efficiency of education, as in the case of any other project, is the social rate of return on such investment. Extensive review work by the Bank has concluded that the social rate of return to investment in education is at least as high as the returns to alternative investment projects. Table 1 on page six shows the results of a survey of the economic returns to investment in education around the world. The private rates of return are calculated from the point of view of the individual investor: earnings differentials are after tax and the costs include only what the individual actually pays for his/her education. On the other hand, social rates of return are calculated from the point of view of society as a whole, hence earnings differentials are before tax and the costs reflect all the resources necessary to sustain the student at school, regardless of who pays them. Because of public subsidization, social rates of return are lower relative to private rates.

The emerging patterns are as follows:

- The rates of return to investments in primary education are higher relative to investments in other levels of schooling.
- The lower the level of a country's development, the higher the returns to any level of education.

Table 1. **The Returns to Education by Region and Country Grouping**
(Percentages)

Region or country grouping	Private education			Social		
	Primary	Secondary	Higher	Primary	Secondary	Higher
Africa	29	22	32	29	17	12
Asia	32	17	19	16	12	11
Latin America	24	20	23	44	17	18
Developing countries average	29	19	24	27	16	13
Intermediate countries	20	17	17	16	14	10
Advanced countries	n/c*	14	12	n/c*	10	9

*n/c = Not computable, due to lack of a control group of illiterates.

Source: Psacharopoulos (1981), p. 329.

These main patterns are consistent with the notion of diminishing marginal productivity of investment and the relative scarcities in human capital endowments. Namely, the returns to investment in schooling are at their highest where not much investment has taken place in the past, such as in the poorest countries. There is, in addition, limited evidence that social returns to improving quality exceed the returns to continued expansion of facilities that represent low levels of quality (Behrman and Birdsall, 1983).

Recent research sponsored by the Bank has permitted preliminary analysis of the returns to education by type of curriculum. For example, Clark (1982) found that whereas the social rate of return to senior secondary schooling as a whole in Indonesia was 24 percent, academic graduates exhibited a higher rate of return (32 percent) relative to vocational graduates (18 percent). The same finding has been observed in other countries and levels of education. In higher education, for example, agronomy as a field of study exhibits a substantially lower social rate of return (8 percent) relative to study of the humanities (14 percent), law (16 percent), and economics (15 percent). The reason for such a paradoxical finding is that, in relative terms, the unit cost of narrower-track, vocational-technical subjects is high, and that generally prepared school graduates are more flexible in fitting into a larger variety of occupations and thus maintain a high rate of return on their investment.

The subject of the rates of return to investments in education has been highly controversial in the literature; the weakest links in the analysis are (1) the use of labor earnings instead of productivity in comparing the costs and benefits of educational investments; (2) the possible unemployment of school graduates; and (3) the ability factor in determining earnings. The World Bank research program in education has produced findings in all these issues, as outlined below.

Education in agricultural production. The basic empirical link between education and economic growth is the wage level of labor classified by level of schooling. Information about wages is mainly derived from data collected in employment surveys in the modern sector of the economy. In developing countries, however, the majority of the economically engaged population does not work for wages. Instead, agricultural subsistence or self-employment in the informal sector of the economy are dominant.

Bank research has significantly contributed to knowledge on the economic value of education in an agricultural context. Jamison and Lau (1982) synthesized the results of over 30 data sets relating schooling to agricultural productivity and concluded that, on average, farm productivity increases by about 9 percent as a result of a farmer having completed four years of primary education, rather than having no schooling whatsoever. The importance of this finding stems from the fact that measurements of productivity in agriculture are in terms of real (physical) output, thus avoiding the use of wages as a proxy for productivity. Jamison and Lau also report that in Thailand the effect of education on output, other things being equal, is greater in rural than in urban areas. To the extent this is true in other countries, as one might reasonably suspect, past estimates of the contribution of education to economic growth using urban wage differentials must be biased downward, especially in the case of developing countries.

One of the prime indirect ways in which education contributes to the economy is that it enhances the adoption and efficient use of new inputs. Whether the argument is cast in terms of the allocative efficiency of farmers (Schultz, 1964) or the more general ability to "deal with disequilibria" (Schultz, 1975), the literature is full of evidence that schooling acts as a catalyst in behavioral change that is conducive to economic growth. For example, Jamison and Lau (1982) report that in Thailand the probability of a farmer adopting a technology using chemical inputs is about 60 percentage points higher if the farmer has four years of education rather than none.

Graduate unemployment. The risk of unemployment among graduates is a perennial issue in Bank-assisted education projects that aim at creating a net increment of school graduates at a specific level of education. However, when a distinction is made between the mere *incidence* and the *duration* of unemployment, the statistics show that unemployment is mostly limited to a short period following graduation.

Tracer studies of whole cohorts of graduates have been used to record the length of time in finding a first job, with success in landing a job being a partial criterion of the "success" of the education project in meeting broad social and macroeconomic objectives. Based on a recent tracer study of secondary-school graduates in Indonesia, Clark (1982) reports that a great part of what might be labeled "unemployment" is the result of a voluntary job search that yields a rate of return on the order of 21 percent. Unemployment among secondary-school leavers was found to be, as elsewhere, a sharply declining function of age (Psacharopoulos and Sanyal, 1981). Hence, correction for "unemployment" in the early years of the earnings profile of the graduate does not have an appreciable effect on the estimated rate of return. Actually, in some cases it might increase the rate of return because of a lower opportunity cost if the control group exhibits a higher rate of unemployment relative to the target group (for example, see the case of Malawi in Heyneman, 1980).

Ability links. As mentioned, the cornerstone of assessing the contribution of education to an economy is the earnings differential between segments of more and of less educated labor. In the past, this observed earnings differential has usually been discounted by as much as 40 percent before entering econometric models purporting to explain the record of economic growth in a given country. The reason for the discounting was to make allowance for effects other than education, such as the differential ability between university and secondary-school graduates. Although the 40 percent discounting factor — known in the literature as the "alpha- (ability-) coefficient adjustment" — has been both plausible and intuitive (see Denison, 1967), recent evidence does not support its use.

Econometric analyses of the factors determining labor earnings using schooling and ability measures, such as the intelligence quotient (IQ), among the explanatory variables indicate that the effect of education on earnings is substantial, even after controlling for ability (for example, see Griliches, 1970). A review of the empirically derived ability discounting factor (Psacharopoulos, 1975) found that its value is more likely to be 0.90 rather than the originally assumed 0.67 and customarily used in growth accounting. Also, data from a recent World Bank research study among farmers in Nepal found that education has a significant effect on increased efficiency in wheat production, and that this effect does not diminish when the farmers' family backgrounds and measures of ability are introduced as additional control factors (Jamison and Moock, 1981). Essentially, the same preliminary result is

reported by Knight and Sabot (1982) using samples of urban wage earners in Kenya and Tanzania.

No matter how defined, "ability" interacts with education from preschool age through adult life. An important connection is the relationship between preschool abilities and education. The empirical evidence tends to support the notion of complementarity between both, implying that the rate of return to schooling increases with the level of ability of the entering child. The economic implications of such complementarity are quite powerful and were initially explored by Selowsky (1976). First, to the extent that early childhood abilities depend on factors such as early home environment, health, and nutrition, the above complementarity suggests a connection between investment in preschool-age children and investment in later schooling. Selowsky reviews the literature showing that preschool-age children from poorer households perform worse on most ability tests, with a large part of this difference being explained by factors capable of being affected by public policy (for example, infant nutrition and environmental stimulation). Selowsky (1981) developed a model incorporating the above concept of complementarity in order to assess the payoff of preschool programs aimed at boosting these early abilities; the benefits are derived from increases in adult earnings as a result of a given level of schooling, and the net gains from additional schooling induced by a higher rate of return to investment in schooling.

The hypothesis of complementarity between early ability and schooling in determining labor productivity has other important allocative implications, which were analyzed by Piñera and Selowsky (1981). It implies that any educational system wherein the selection of students and the amount of their schooling are determined by factors other than ability suffers a misallocation of educational resources and, concomitantly, that reform aimed at increasing the correlation between the amount of schooling and ability in the educational system will increase the value added of the existing resources in the educational sector. Piñera and Selowsky estimate the cost of misallocation in the present system (in relationship to a full "meritocratic" system) to be between 3 percent and 7 percent of GNP, depending on the type of country. This value is substantial compared to other costs of misallocation usually found in developing countries.

Evidence at the macroeconomic level. The foregoing comments on the economic role of education can be checked against evidence at the macroeconomic level, such as estimates of the contribution of education to economic growth. The most often cited early references on economic growth and the concept of human capital as it evolved in the late 1950s are Schultz (1961) for the United States, Denison (1967) for the United States and other advanced countries, and Krueger (1968), Selowsky (1969), and Nadiri (1972) for less advanced countries. After a rather long pause in the 1970s, interest in the topic has started picking up momentum again and new work is emerging; the recent (but less known) work of Hicks (1980), Wheeler (1980), and Marris (1982) has been sponsored by the Bank.

Application of an econometric technique known as "growth accounting" which decomposes the observed rate of economic growth of a given country into components corresponding to the factors of production that are responsible for growth, can be used to illustrate the contribution of education by percentage to economic growth (see Table 2). Although the pattern shown in Table 2 is mixed, there appears to be a sharp contrast between the much higher contribution of education to growth in Africa where human capital is relatively scarce, relative to Europe where education has a longer tradition and human capital is more abundant.

Table 2. **The Contribution of Education to Economic Growth**

Region	Growth rate explained by education (Percentages)
North America and Europe	8.6
Latin America	5.1
Asia	11.1
Africa	17.2

Note: Figures are simple country averages within regions, referring to a number of studies in different time periods.

Source: Based on Psacharopoulos (1983), Table 2.1.

The Bank has used alternative econometric techniques to the decomposition of growth accounting as found in the early works of Schultz (1961) and Denison (1967). Hicks (1980) compared the growth rate of different countries in the 1960–77 period with each country's deviation from a literacy-level norm. Table 3 shows that the top eight growth performers among developing countries had a clearly positive deviation from the norm in terms of literacy. In the case of the eight fastest growing countries, a 16 percent literacy advantage was associated with a higher growth rate of 3.3 percentage points. For all countries, on average, Hicks found that an increase of 20 percentage points in the literacy rate is associated with a one-half percent higher growth rate.

Table 3. **Economic Growth and Literacy in Developing Countries**

Type of country	Growth rate of GNP per capita, 1960–77 (Percentages)	Literacy deviation from the norm
Top 8 growth performers	5.7	16.2
All developing countries	2.4	0.0

Source: Based on Hicks (1980), as cited in the *World Development Report 1980*, p. 38.

Wheeler (1980) addressed the problems of simultaneity inherent in previous analyses, namely that the level of income might be influencing the level of education rather than the other way around. Pooling data from 88 countries and working with differences in the variables (rather than levels) and simultaneous equation techniques, he found that education has an independent effect on income. For example, on average, an increase of the literacy rate from 20 percent to 30 percent is the cause of an 8 percent to 16 percent increase in the real Gross Domestic Product (GDP). In the case of African countries the estimated responsiveness (elasticity) of output with respect to literacy is double, relative to the sample of all developing countries.

In another study, Marris (1982) used data from 66 developing countries in the 1965–79 period and a chain model of output determination to confirm previous results showing that the benefits of education in terms of economic growth are very high and, in particular that investment in physical capital generally plays a weak role when not supported by education. Costing the effect of education in the model, he estimated benefit-cost ratios for education (measured by the primary enrollment rate) ranging from 3.4 to 7.4. The benefit-cost ratios for education stood in a class of their own as compared, for example, with the corresponding ratios for investment in physical capital which ranged from 0.4 to 1.0.

Demographic and household links. In general, the effect of education on social welfare is not, of course, limited to narrow economic measures such as the gross national product. Bank research has contributed to an understanding of the role of education in a wider variety of "dependent variables" that ultimately link to the well-being of society as a whole. Beginning with the issue of *fertility*, numerous studies indicate that schooling serially affects demographic factors and through different channels, such as the impact of education on the demand for children, contraceptive use, and the child-bearing potential of women (Cochrane, 1979). An inference is that education has an important effect on increases in per capita income of what would otherwise be faster growing populations, and this effect goes unrecorded.

Regarding *infant and child mortality*, Cochrane, Leslie, and O'Hara (1980) summarized evidence from a number of developing countries and report partial effects of mother's literacy on infant and child mortality, as in Table 4. They also report a strong positive relationship between mother's edu-

Table 4. **The Effect of Literacy (Percentage) on Mortality**
(Per 1000 population)

Population reference	Mortality reduction following a 1 percent increase in literacy
Infants	−0.55
Children	−0.25

Source: Cochrane, Leslie, and O'Hara (1980), p. 86.

cation and child nutritional status. To the extent such considerations contribute to a nation's welfare, they also remain uncaptured in ordinary growth accounting.

The effects of schooling interact with health factors over generations. A World Bank study (Moock and Leslie, 1982) on heights and weights of children from the Terai region of Nepal reveals that *childhood malnutrition* is as severe there as has been observed anywhere in the world. This study demonstrates some of the negative effects of undernourishment on school enrollment and grade attainment of young (five- to eleven-year-old) children. A child's height-for-age was found to be the single best predictor of whether or not the child was enrolled in school. Regarding grade attainment, once again height was found to be an important determinant. Of those children who were enrolled in school, taller children tended to be in higher grades than shorter children of the same age. Jamison (1981) has reported the same finding for Beijing and the Gansu and Jiangsu provinces of China.

A positive effect of the level of *parental schooling* on the participation of children in school in the Terai was reported earlier by Jamison and Lockheed (1981). Paqueo (1981) in the Philippines found a direct relationship between father's education and whether or not his child was enrolled in school, as did Birdsall (1982b) and Birdsall and Cochrane (1982) between a father's education and a child's grade attainment. Birdsall, whose study is based on Brazilian census data, found that a mother's education was also related to grade attainment, and Balderston and others (1981) report that the children of literate mothers in Guatemala were more likely to be enrolled than were the children of illiterate mothers, all else being equal. Like Jamison and Lockheed (1981), Moock and Leslie (1982) found that girls in the Terai were less likely to be enrolled than boys. The same finding occurs in Balderston and others (1981) regarding Guatemala. On the other hand, Chernichovsky (1981) found just the opposite in rural Botswana, where boys play a central role in herding, a major source of income in rural areas.

Once human capital is created via education or training, it has to be preserved so that it yields a stream of benefits throughout its theoretical lifetime (which in this case is of the order of 50 years). Cochrane (1980) reports significant partial effects of literacy on *life expectancy* in a number of countries, after standardizing for the level of income. Also, Hicks (1980) reports positive deviations from normal life expectancy associated with a higher rate of growth of gross national product per person. As shown in Table 5, a nine-year positive deviation of life expectancy from the norm is associated with a 1.6 percent higher growth rate in per capita GNP.

Table 5. **Economic Growth and Life Expectancy in Developing Countries**

Type of country	Life expectancy deviation from the norm, 1960	Growth rate of GNP per person, 1966–77
Top-20 growth performers	8.8	4.0
83 developing countries	0.0	2.4

Source: Hicks (1980), as reported in the *World Development Report 1980*, p. 38.

What households consume and the goods and services actually enjoyed by their members is not totally captured in per capita income or other national accounts statistics. This proposition is more relevant in developing countries where a great part of household income is in kind. There may be many ways a higher level of educational attainment of the members of the household contributes to income other than through the labor market or agricultural production. For example, education embodied in females who are not employed in the formal sense is likely to have a great payoff in terms of *household production activities*, such as better sanitation conditions, more nutritious meals for the family, the quality of children (in the sense of embodying a higher level of educational attainment and health status), and more efficient consumption behavior. Also, of particular importance is the effect of a more educated mother imparting early abilities to preschool-age children (Selowsky, 1982). Although the beneficial effect of education in this respect has been mainly documented in advanced countries (Michael, 1982), one might validly extrapolate that the corresponding effect of educa-

tion in developing countries must be even greater, given the relative scarcities of human capital in the two types of societies.

Access and equity. Research on the subject of access to school services and its relationship to the distribution of the benefits and gains in education and the labor market has taken diverse forms, such as disparities in the regional distribution of educational opportunities, in determining who gets ahead in school as determined by socioeconomic background, and in the effects of public subsidies for education on income. Van Luisenburg Maas and Criel (1982) have documented a ten-to-one range in the degree of inequality in the district-wide distribution of primary school enrollments in Eastern African countries and the fact that a lower enrollment rate contributes to a more unequal distribution of school attendance (a higher Gini coefficient). Interestingly, this contribution weakens when countries experience more than 100 percent gross enrollment rates, presumably due to grade repetition.

Jallade (1974) replicated for the first time in a developing country the famous "Hansen-and-Weisbrod" (1969) study of the differential impact of taxes and subsidies for the California system of higher education on the children of taxpayers categorized by level of income. A widely cited result was that, in effect, poor families subsidized the rich via the existing tax-subsidy scheme, because relatively more children from high-income families attended university. Jallade found that the same applied to secondary and higher education in Colombia, although the public finance of private education there had a positive distributional impact, that is, it contributed to redistributing income from the rich to the poor. A similar study conducted in Brazil (Jallade, 1977) found that high-income groups enjoy better educational opportunities for their children and a higher rate of return to their investment than low-income groups. Therefore, introducing cost-recovery practices among the rich and subsidizing the education of low-income groups would have a positive effect on income distribution.

Anderson (1982) synthesized all existing world data on who is enrolled in school by socioeconomic background and concluded that the degree of selectivity in attending school varies greatly among countries, within regions of countries, and at each level of economic development. The degree of selectivity is only loosely associated with national per capita income. The study emphasizes the importance of appropriate methodology in averting distortions in measurement of selectivity. Studying the distributional and investment dimensions of public support for higher education in three divergent situations — Chile, Malaysia, and France — Bowman, Millot, and Schiefelbein (1982) found wide fluctuations over time, depending upon the political propensity to demand more equity or more efficiency. In each case, the results depended on the definitions chosen for family origin and higher education itself, as well as whether subsidies other than those for higher education were factored into the analysis.

Heyneman and Loxley (1983b) report that there are no dramatic differences in the distribution of educational *quality* within countries, and that school resources in both poor and advanced countries are, in fact, more equally distributed relative to personal income.

If one is willing to accept a wider notion of development, including not only the level of income but its distribution as well, education makes a further contribution to social welfare. Several studies, mainly in advanced countries, have found that an increased level of educational attainment of the population or the labor force is associated with a more equal distribution of income. For example, Marin and Psacharopoulos (1976) report that in the case of Mexico, providing primary education to 10 percent of those without the current opportunity would make income distribution more equal by nearly 5 percent relative to the present level of an inequality index. Also, Blaug, Dougherty, and Psacharopoulos (1982) found that the most recent (1972) raising of the minimum school-leaving age in England by one year, other things being equal, is likely to reduce income inequality, relative to its present level, by 12 percent to 15 percent in the future. There exists a dearth of such studies for developing countries.

Costs and finance. The Bank has been monitoring the pattern and evolution of educational expenditures throughout the world (for example, Zymelman, 1976b and 1982). During the 1960s, public spending on education measured as a percentage of both GDP and public expenditure rose in all

regions of the world. Whereas, on average, countries spent 3 percent of GDP and 11 percent of total public expenditure on education in 1960, by 1970 these figures had increased to 4 percent and 15 percent, respectively. These trends continued into the early 1970s, but the rest of the decade witnessed a breakdown of this uniform pattern. As a share of GDP, developed countries stabilized and in a few cases reduced their expenditure on education; in Eastern and Western Africa the share rose slightly; in East Asia, it remained constant; and in South Asia and Latin America, it fell.

A similar picture is to be found in changes in education's share of total public expenditure. In recent years, this share in developed countries has fallen back slightly, and a tendency to stabilize or reduce it has occurred in a number of developing countries. While the average trend may still be upward, a majority of countries in Latin America has reduced education's share, and in Asia, the situation is generally one of stabilization.

The problem of educational financing is especially acute in sub-Saharan Africa where unit costs are higher relative to any other region in the world. Teachers' salaries have often been identified as the major determinant of educational costs. For example, Eicher (1982) reports the following ratios of teachers' salaries to per capita GNP by region, in 1978:

Latin America	2.4
Asia	2.6
East Africa	5.5
West Africa	10.8
(Francophone Africa	11.5)

The combination of slow overall economic growth in the past few years and the declining, stable, or only very slight increases in the share of educational expenditure by government has led in many countries to only very small increases in real resources being committed to the educational sector. Given the high social profitability of education reported earlier, this trend might jeopardize longer term development prospects in many countries.

Work in Progress and Pending Questions

The current program on educational research at the World Bank aims at defining and deepening knowledge on practically every topic cited above and also addresses new topics that have not been the subject of research before. The major themes of research are along the axes of educational quality, external (labor market) evaluation of schools and vocational curricula, and the possibility of introducing cost-recovery mechanisms in education and the social sectors in general. Several research projects have already been started along these lines, and new ones are defined as operational questions mount and experience from past projects is gained. On the analytical side, the emphasis is on household behavior (for example, see Birdsall,1982a); on the data side, an effort is made to raise longitudinal histories of individuals (see Psacharopoulos and Hinchliffe, 1983).

A major project that started in the late 1970s and is still in progress concerns *literacy retention*, that is, the measurement of the determinants of educational achievement and the relationship between acquired levels of skill and school leaving at the primary level of education. The purpose of the study is to test the hypothesis that there exists a "threshold" level of education beyond which retention of some skills is assured. The study is also expected to produce measurements of the productivity of the school and home inputs and to examine the consequences of repetition for achievement and school leaving. The field work has taken place in Egypt where a sample of students from 60 primary schools has been followed over a period of two school years (1978-79). For preliminary reports on this study, see Swanson and others, 1981, and Hartley, Poirier, and Bencivenga, 1979.

Another major project under way concerns *diversified secondary school curricula*. The study aims at testing the assumptions underlying the introduction of practical/vocational subjects in the secondary school curriculum of many Bank projects. One issue, pertaining to former diagnoses in this respect, is the effect of family and school resources on both academic and vocational achievement. The research attempts to measure the impact of acquired vocational and academic knowledge on employment in the labor market, and of curricular effects on future education and postschooling training. In the longitudinal study, a cohort of secondary school students has been traced one year later. The country cases are Colombia and Tanzania (for a report on the nature of the data and the instruments used, see Psacharopoulos and Loxley, 1982).

Yet another research project focuses on the *labor market consequences of educational expansion*, with emphasis on secondary schooling. In particular, it addresses the issue of the reduction of the wage advantage of the more educated and hence the rate of return to education, in Kenya and Tanzania — countries that have experienced differential expansion of their secondary school systems. The project is also concerned with the productivity of wage labor, the distribution of educational opportunities, and increased mobility between generations (for a preliminary report, see Knight and Sabot, 1982).

The issue of *cost recovery in education* is relatively recent, triggered by the international recession of the late 1970s. It has been repeatedly documented, in both the Bank's work and elsewhere, that investment in education is one of the most effective means of contributing to a country's development effort. The great majority of this investment is, typically, state financed. In recent years, however, pessimism has broadened regarding the continuing potential of governments to sustain past increases in this expenditure. As mentioned above, in many parts of the world educational investment is now stagnating or even falling in real terms. This paradox of high social profitability combined with the inability of state finances to maintain past levels of expansion is due to the growth of many competing demands on only slowly growing state budgets.

In the face of government expenditure below that required to fund educational expansion at a constant level of quality, other sources of funds may be utilized. One of these, tapped only lightly in the past, is the contribution by firms for training. More potentially significant as a source of fees, nonetheless, are households. The introduction of, or increase in, fees, the development of loan schemes, and the encouragement of privately owned and financed schools are examples of ways to shift a greater amount of the costs of education onto the individuals who are the ultimate beneficiaries of such education. The overall aims of such policies are to increase the share of educational expenditure provided by pupils and their families and to increase the absolute level of total national educational expenditure.

However, knowledge of the extent and patterns of private funding of education in developing countries is very sparse. The implications for both efficiency and equity have barely begun to be analyzed theoretically or tested empirically. Hence, Bank research in progress includes studies in the areas italicized below.

Documentation of the existing levels and patterns of *private schooling* in developing countries in terms of enrollments, fee structures, relations with public schools, quality of education, socioeconomic background of students, and government involvement. What would be the effect of introducing and/or increasing *school fees* on the demand and supply of schooling? Considerations of efficiency here involve knowledge of levels of externally induced changes, excess demand, the responsiveness of demand with respect to fees, and changes of school quality. Considerations for equity involve knowledge of the differential impact on demand by socioeconomic groups of the population. An empirical study is under way among primary and secondary school students in Malawi and among households in rural Mali. A similar effort is planned for Kenya. Another area under study is the documentation of the experiences of introducing *student loans* and/or decreasing grants at the level of higher education and the effect on enrollments, socioeconomic access, actual extent of government savings, and feasibility of implementation in view of low administrative capacity in developing countries (Woodhall, 1983).

Regarding the internal efficiency of educational institutions, the current research emphasis is on issues of *quality*, that is, toward a better understanding of how specific school improvements relate to achievement, at what cost, for what benefit, and to whom? Only scant evidence exists on how better educational quality is rewarded in the labor market (see Schiefelbein, Farrell, and Sepulveda-Stuardo, 1983; Behrman and Birdsall, 1983).

If knowledge of the average cost per student in the main school ladder is inadequate (Eicher, 1982), then knowledge of the cost per student in particular types of schools is virtually nonexistent. An initial attempt is being made to derive the cost per student of selected Bank *vocational/educational projects*. This information will eventually be matched with tracer-study data on the labor market performance of the graduates to assess the external efficiency of technical schools.

To date, it is still debated what is the most cost-effective locus for the acquisition of specific occupa-

tional skills. Bank experience from *project-related training* is expected to provide some clues on the possibilities of substitution between different training modes in arriving at a given skill level in order to permit a more rational strategy for the development of human resources (for an early evaluation attempt in this regard, see Zymelman, 1976a).

A comprehensive external evaluation of a school system must take into account the allocation of its graduates into the different "sectors" of the economy, the latter including unemployment, family work, or voluntary nonparticipation in the labor force. *Tracer studies* are now used more in Bank research to find out not only the initial state but also the "career" progression and change of employment status of the graduate a few years after leaving school.

The effect of education on the economy has been mostly studied by means of wage surveys in the modern sector of the economy and, to a very limited extent, in agriculture. In developing countries, however, an increasing flow of new graduates are engaged in the so-called *informal sector*. This comprises casual employment, self-employment, and nonorganized family businesses. It is thought that because of its competitiveness, the educational wage differential in this sector would better reflect the true difference in marginal productivity between graduates of different levels of schooling. This area has not been thus far researched, mainly because many ambiguities surround the definition of the informal sector of the economy.

Finally, a new direction, in general, is the shifting of the locus of the Bank's research from Washington, D.C. and other industrialized capitals to developing countries. In education, perhaps more than in other sectors, such a change is handicapped because of the scarcity of institutions and of know-how in developing countries to conduct research locally. An explicit effort is now being made to promote educational research capacity in developing countries so that local scholars are increasingly involved in project design, survey techniques, and analysis of a variety of educational policy issues.

References

Anderson, C. A. 1982. "Social Selection in Education and Economic Development." The World Bank: Education Department.

Arriagada, A. M. 1983. "Determinants of Sixth Grade Student Achievement in Peru." The World Bank: Education Department.

Balderston, J. B.; Wilson, A. B.; Freire, M. E.; and Simonen, M. S. 1981. *Malnourished Children of the Rural Poor -- the Web of Food Health, Education, Fertility and Agricultural Production*. Boston, Massachusetts: Auburn House Publishing Co.

Behrman, J. R., and Birdsall, N. 1983. "The Quality of Schooling: The Standard Focus on Quantity Alone is Misleading." Country Policy Department Discussion Paper No. 1983-1. The World Bank.

Birdsall, N. 1982a. "Child Schooling and the Measurement of Schooling Standards." Living Standards Measurement Study (LSMS), Working Paper No. 14. The World Bank.

_____. 1982b. "The Impact of School Availability and Quality on Children's Schooling in Brazil." Population and Human Resources Division Discussion Paper No. 82-8. The World Bank.

Birdsall, N., and Cochrane, S. H. 1982. "Education and Parental Decision-Making: A Two-Generation Approach," in L. Anderson and D. M. Windham, *Education and Development*. Lexington, Massachusetts: D. C. Heath.

Blaug, M.; Dougherty, C. R. S.; and Psacharopoulos, G. 1982. "The Distribution of Schooling and the Distribution of Earnings: Raising the School Leaving Age in 1972," in *The Manchester School* (March 1982):24-39.

Bowles, S., and Levin, H. M. 1968. "The Determinants of Scholastic Achievement -- An Appraisal of Some Recent Evidence," in *Journal of Human Resources* (Winter 1968):3-24.

Bowman, M. J.; Millot, B.; and Schiefelbein, E. 1982. "The Empirical Assessment of Public Support of Higher Education: Studies in Chile, France and Malaysia." The World Bank: Education Department.

Chernichovsky, D. 1981. "Socio-economic and Demographic Aspects of School Enrollment and Attendance in Rural Botswana." Population and Human Resources Division Discussion Paper No. 81-47. The World Bank.

Clark, D. H. 1982. "Labor Market Outcomes for New Senior Secondary School Graduates in Indonesia." The World Bank: East Asia and Pacific Regional Office.

ECONOMICS OF EDUCATIONAL FINANCE

Professor P.R. Panchamukhi

I. The Objectives of the Case-Study

Most of the changes in education ultimately get reflected in the volume, composition and mode of financing of educational expenditure. When education in India has witnessed a large number of changes over the past several decades, one would expect that an analysis of the trends in the volume, structure and mode of financing of the expenditure on education would provide an interesting and useful supplementary basis for the analysis and interpretation of educational reforms themselves. Trends in financing of education also reflect the innovations or reforms introduced in the modes of educational finances also.

2. The objective of the present study was to present a critical analysis of the changes in the volume, composition and modes of financing of education during the post - Independence period.

3. The available data on educational expenditure incurred from the formal sources and made in the formal institutional framework conceal the magnitude of the total resource efforts involved in the country for the purpose of education. These unrecognised resources for education consisting of resources within the institution of family, religious organisations, employing agencies (in the form of learning by doing or on-the-job training), defence services, etc. may be significantly larger than the recognized resources in the formal framework.

However, no data are available on such resources to the Indian context. Therefore, while we make occasional references to such resources, the analysis contained in the study relates, by and large, to the recognized sources of educational finance.

II. The Structure of the Study

4. The study is divided into ten chapters. After outlining the major questions of educational finance in the first chapter, an attempt is made in the second chapter to review the general trends in educational finances in the Indian context. Chapters III, IV and V deal with the analysis of educational finances according to the source of finance namely, private and public sector sources. Chapters VI to IX review and analyse the trends in educational finances according to the level of education. Chapter X briefly summerises the main issues arising out of this case -study and indicates the further research possibilities. The two appendices to the study give the salient statistical information on educational finances and also a select bibliography on the subject.

III. Major Conclusions of the Study

5. In the system of educational finances obtaining in India, one comes across a conspicuous feature of a general dychotomy between the providers of finances for education, spenderss on education, supplier of education and benefiary from education. Each of these four agents on the process of the integrative role of education have found to have made its own contribution to the role of

education. There seems to be non-neutrality particularly in respect of the source of funds and spending agents.

6. In the course of a quarter of a century, the total educational finances in the formal sector increased more than eithteen times. The annual average rates of growth are also showing an increasing trend over a period of time.

7. It is found that the educational expenditure have shot up significantly after the recommendations of the Education Commission (1964-66). The rate of growth and absolute magnitudes of educational expenditure after the mid-fifties seem to have been displaced by the significant expansion as a result of several recommendations of the Commission. Hence, we may say that the recommendations of the Commission can be considered as the source of Displacement Effect, in educational expenditures. Another factor for the Displacement Effect during the mid-1960s seems to be the inflationary force which caused a tremendous spurt in the money-value of educational expenditure.

8. Significant expansion in the educational sector reflected in the tremendous growth of educational expenditure, was also associated with the economics of large scale. The educational expenditure is found to be fairly responsive to increases in population and increase in enrolment.

9. Fees as a major private source of finance are declining in importance. The current rates of fees, though pegged at a low level, make the entire system of pricing of education highly regressive for there is no mechanism of altering the fees in accordance with the socio-economic circumstances of the students and/or the parents. At the higher educational level, the low level of fees indicates a high degree of subsidisation, particularly of the socio-economically advanced aspirants of education. It has been found in the Indian context, that the elasticity of substitution of enrolment with respect to fee-rate is fairly high as between general education and professional education. This implies that the fee-rate at the level of higher education, in particular, can be used not only as a source of educational finance but also as a useful instrument of enrolment allocation. At present, this potential of the tuition fees has not received any attention by the researchers and policy-makers.

10. Examination-fees belonging to the family of fees in education have been treated as a major source of educational finance, particularly at the higher educational level. In the major universities in Maharashtra, for instance, the examination fees contributed to the extent of 28 to 48 per cent of the recurring income of the universities. It is intriguing to note that over the period of time the importance of examination as a source of income to universities has been significantly declining.

In the case of universities in Maharashtra, there is a steep fall in the examination-surpluses as a percentages of income over a short period of a decade during the seventies. Eventhough the question as to whether the examinations can be treated as a sources of income or not may be highly debatable, the low level of examination-fee fixed in the distant past cannot be justified particularly in view of increasing material costs and remuneration cost associated with the conduct of examinations.

11. The post-Independence development in the educational finances have witnessed the evolution of system of financing education through capitation fees. The pioneer in respect of levy of capitation fees seems to be the State of Karnataka. There is some merit in the system of cost-based pricing of higher education in particular with the necessary adjustments made for the system for the purpose of equity considerations. Viewed in this background the system of capitation fees may be considered as a system of payment of fees in advance. The capitation fees linked with the system of subsidization for the underprivileged would amount to dual pricing of the service of education. The principle of dual pricing can be justified on the grounds of benefit principle and ability-to-pay principle.

12. On the basis of the benefit principle and ability-to-pay principle, the other system of fees in education that

can be justified, may be termed as the system of postponed-fees which may be collected from the alumni for thrie educatiOn received in the past. The two systems of fees in advance and the postponed fees have been examined in the study in the background of inadequacy of financial resources from the current system of tuition- and examination-fees. Eventhough on account of lack of reliable data on the capitation fee, a detailed empirical investigation could not be undertaken, the relevant chapter attempts to examine the major theoretical and policy issues involved in the implementation of these two innovations in educational finance.

13. The benefit principle of pricing of education suggests that the cost of education has to be recovered not only from the student and/or the parents but a major portion of this cost has also to be recovered from other major beneficiaries namely, the employing agencies. The analysis of the trends of private sources of educational finance brings out this lacuna namely, the basence of the role of the employing agencies in the present system of education. The Study suggests a mechanism of integrating the system of mobilization from the students/parents and from the employing agencies on the benefit principle and the ability-to-pay principle.

14. The endowments and donations which happen to be the major dependable sources of educational finances till recently have been found to be drying up fast. The Study has made an attempt to present a behavioural model of donations for education highlighting the major elements

which motivates the donors to make donations for education, and also the factors governing the behaviour of the donee educational institutions. The aggregative, quantitative analysis of trends in donations and endowment for education suggests that the increasing degree of government intervention in the field of education has sapped the flow of the private donations. In this sense there seems to be a substitutive effect between the private endowment finance and public grant-in-aid. The declining importance of private charity in education has been further strengthened by the general inflationary trends in the economy and less attractive provisions in tax laws concerning the donations to education. The brief empirical study in the background of a theoretical model of donations, thus suggests the urgency for introducing certain changes in the tax laws for facilitating the promotion of donations to education at different levels.

15. We have examined in the Study another innovation in the educational development in the country which has been witnessed particularly during the post-Independence period. This inovation has a significant bearing on the system of educational finances as a whole. This innovation in the field of private enterprise in education may be termed as the system of parallel educational institutions consisting of the coaching classes, tuition classes etc. A brief preliminary study of coaching classes in Bombay revealed that the parallel educational enterprise plays a significant supportive role in education at all levels. In fact, the strength of the private educational

institutions to have been derived from the weaknesses of the formal educational institutions. The preliminary study referred to above, suggests that there is a system of differential pricing, and a high degree of competition among these institutions. The high levels of fees have not detracted the flow of students to these classes, and the quid pro quo relationship is very strong and firm in the parallel educational system. Even though the preliminary study provided insights into the working of the coaching classes particularly with regard to their finances, we feel that a large-scale study of the finances and the growth of such parallel educational institutions in different regions of the country may be helpful in understanding the factors behind the resistance to high fees in the formal system and the other weaknesses of the formal system of education.

16. The Study has sttempted to examine the present institutional framework for the flow of public funds to education. The public finances to education are found to be flowing under two broad categories, namely, the plan-finances and the non-plan finances. The plan finances flow on the recommendations of the Planning Commission through the agency of the University Grants Commission in the case of higher education and through the State Government to all levels of education. The non-plan finances move to the institutions of education through the agency of the State governments on the recommendations of the quinquennial body of the Finance Commission. In the case of education, the non-plan

expenditures are predominantly larger than the plan-expenditure indicating the overriding importance of the Finance Commission. The examination of this dual institutional framework suggests that there is no one-to-one correspondence between the plan and non-plan needs of the institutions perse and the recommendations of the Planning Commission and the Finance Commission. In view of the absence of the needs of the educational institutions cannot be effectively ensured. Also the recommendations of the central agencies do not seem to be in line with the financial needs for the development of education in the respective states, Since the estimate of the needs as submitted by the State governments before the Planning Commission and the Finance Commission invariably undergo a change under the scrutiny of these central agencies, the entire system of public financing of education seems to be characterised by a high degree of mistrust and distrust. The Study has attempted to estimate the coefficients of distrust over a period of time so far as the non-plan financial needs of the educational sector are concerned. Perpetuation of inter-State inequities in education and a high degree of distrust characterizing the public grant-making machinery and in turn the State governments and the educational institutions has introduced an element of uncertainty in respect of educational finances from the public sector and in respect of the educational development among different States on the principle of inter-regional ecuity.

17. A review of the trends in educational finances of different levels of education brings out some of the important weaknesses of the system of educational finance. Educational institutions at all levels experience inadequacy of the finances. In the case of higher education, it is found that there is a differential and discriminatory treatment of different types of institution of the hands of the present system of educational finance. For example, the financial conditions of older and bigger universities have been highly disappointing as compared to those of the newer and smaller universities. Even the flow of plan - and the non-plan grant seems to have discriminated against elder and bigger universities and also the State-universities as compared to the Central universities. In view of this, a suggestion is made in the Study to establish one central university in each State to claims a favourable treatment from public grant-making agencies.

18. The financial soundness of educational institutions is found to be governed by the degree of autonomy that the institutions enjoy with regard to the use of the financial resources. A study of the university acts (recently passed) in some States (especially in Maharashtra) reveal that there is an increasing erosion of the financial autonomy of the higher educational institutions and increasing intervention by the government. It has been found that there are a number of negative externalities associated with increasing interventionism in the field of education.

19. A study of the finances of college-education revealed that over past two and half decades the colleges have been experiencing serious financial strins. The priorities in respect of the educational policies of the country do not seem to have been reflected in college-finance because the professional college-education seems to be under greater stresses and strains compared to the general college-education. A large number of non viable colleges and a relative increase in their number over a period of time points to the role that the non-economic and non-educational factors play in the establishment of colleges. The stickiness of fees and endowments, lack of the initiative and drive on the part of the colleges to mobilize funds from unconventional sources, uncertain and inadequate flow of public funds, the practice of using grants-in-aid as an instrument of governmental control have all contributed to unhealthy trends in college finances in our country. Sofaras the flow of funds for meeting the Constitutional commitments of the provision of Universal Elementary Education below the age of 14 is concerned, the past experience has shown that the efforts are disproportionately indaequate in relation to the requirements. There does not seem to exist any systematic rationale in the funding policies of different State governments so far as funding of the first level education is concerned. The States with low literacy levels have not made correspondingly big effort to spend more on this level. Even richer States have, not mobilized funds

for this purpose even though they seem to be capable of doing so. Eventhough the problem of general resource constraints cannot be overlooked, the policy lacks a unified and comprehensive perspective on the part of all the States. In view of the national commitment with regard to this level, it may be worth considering whether inter-State agreements can be reached about the flow of funds to the first level education with a provision for inter-State cross substidization. The State in which achievements regarding the UEE are fairly and the resource-position is also satisfactory, might assist backward States through the inter-State loans for this purpose. A central agency of the Finance Commission and Planning Commission may have to take upon themselves the role of coordinating agencies for such inter-State agreements.

20. Following the same principle of cross-subsidization of the underprivileged by the privileged, the affluent institutions may be required to subsidize the less privileged low-standard institutions in the region where the government has not been effective so far. A suitable mechanism to introduce such an innovation needs to be devised.

21. The present failure of the educational system with regard to the Constitutional commitments seems to be largely due to the reliance on a formal institutional framework; hence it is necessary to redefine the Constitutional directive in terms of the provision of the specified knowledge content equivalent to the knowledge imparted through first level education up to the age of 14

irrespective of the nature of the institutional agency involved for the purpose. The educational resources available within the family, the religious institutions and others may be adequately geared for the purpose of achieving this redefined target. Even in respect of the formal framework the reform like single-day school, one-hour school may be appropriately considered.

22. Large financial resources can be saved within the educational sector itself by introducing measures for effective, and fuller utilization of the existing facilities, reducing age use of the excessively expensive teaching methods etc. These savings can be further utilized for the purpose of first level education.

IV. Epilogue

23. On the whole, this case-study of educational finances in India reveals that the entire educational sector is undergoing a serious financial crisis. The factors governing the expension of the educational sector are not within the control of the policy-makers. on the other hand, there are deliberate policies enunciated for expanding the educational sector. However, the factors governing the flow of funds both from the private and public sources seems to be under effective control. Such a differential behaviour of the factors of sectoral expansion and of the financial flow seems to be the root cause of the financial crisis. The study has attempted to highlight the various determinants of the flow of funds -- the institutional regidities, political pressures, inertia and lack of initiative, etc.

24. In the course of such a study of educational finance in India, we come across a major problem of inadequacies of statistical information both official and non-official. The study has pointed out various limitations of the data-base for educational research. Certain research issues very much relevant for meaningful policy-formulation, need to be closely gone into. For example, there is no data regarding the profile of utilization of physical facilities in the educational institutions. Also a meaningful educational price deflator needs to be developed for understanding the trends of educational finances in real terms over the period of time. In view of such and other data limitations and the gaps in research, the present study of the economics of educational finances in India may be treated as a modest first attempt for understanding some of the salient issues in this connection.

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A MANAGEMENT SCIENTIST LOOKS AT EDUCATION AND EDUCATION LOOKS BACK

Russell L. Ackoff

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ABSTRACT[1]

First, three fundamental educational issues are identified which are usually ignored in favour of almost trival operating problems. Secondly, a description is given of the way Management Scientists could contribute to the resolution or dissolution of these problems if they stopped accepting those given to them and insisted on working on the "right ones". Finally, the author describes, some solutions proposed by a typical and irreverent Management Scientists.

INTRODUCTION

It is hardly necessary to say to a group of scientists and educators that no single discipline -- let alone an interdiscipline such as the Management Sciences -- can be spoken for by any one of its practitioners. The Management Sciences are neither monolithic nor are they always called by this name. To some, "Management Science" is synonymous with "Operations Research", or the "Policy, Organizational or Decision Sciences", to mention but a few. It is not surprising, therefore, that it is at least as hard to find a prototypical educator. Although I am involved in both activities the remarks that follow are made from a very personal point of view.

Source: Prepared for the AAAS Symposium (1974) "Research on Decision Making --Potential for Education", San Francisco.

From where I view things educators, educational administrators and educational researchers appear to be fiddling with schools while education burns. Our educational system as a whole and every part of it is being subjected to widespread criticism.[2] The indictments against it are too numerous even to list here. It is worth noting, however, that a growing number of serious and qualified evaluators find that the primary function of schools, even primary schools, is no longer educational. Schools have become institutionalized baby-sitters, publicly supported day-care centres, low-security sleep-out detention homes and places for those between infancy and adulthood to grow up without bothering their parents or being bothered by them. Although the United States has a larger percentage of its population in school than any other nation, it is the only developed nation in the world with a declining literacy rate. Little wonder that Ivan Illich (1972) suggested "deschooling" society and that so many take his suggestion seriously.

The height of higher education has not kept it from being climbed over by its critics. It is charged with ineffectiveness, inefficiency and irrelevance; with following rather than leading cultural change; with being more an apologist for the present and past than an inventor of the future; and with failing to respond to the critical needs both of the society of which it is a part and of the young who take part in it. Those

involved in higher education tend to confuse growth with life; they forget that cemeteries grow continuously.

The failure of formal education, in my opinion, derives from two sources. The first is its failure to deal with the right problems, not its failure to solve the problems with which it deals. The second is the fact that education is not carried out by a system but by an antisystem--a deliberately non-interactive set of institutions, each of which is carved up into equally non-interactive components.

Despite the need to face fundamental educational problems most Management Scientists working in this area accept less important problems posed by educators. As a result their efforts have been directed at making an ineffective system operate more efficiently. Efficiency, not effectiveness, has been at the focus of their attention.

Management Scientists have been actively engaged for many years in assisting educational administrators in solving the types of problems with which they normally occupy themselves: budgeting to and within schools; forecasting, allocating and scheduling facilities, faculty and students; trading-off between class size, teaching load and required contact hours; purchasing supplies; supplying and staffing service, administrative and academic units; locating new facilities and determining what capacity they should have; and developing automated information and budgetary control systems.[3]

The output of such studies have not been insignificant. They have reduced waste of valuable human and material resources, and they have led to greater efficiency of operations. There is nothing wrong with what has been done, but there is with what is not being done; the sins are of omission, not commission, My critique, therefore, is directed at the Management Sciences as much as it is at education.

My remarks fall into three parts. I will identify a few general educational problems which I believe are not dealt with adequately. I will say a few words how the Management Sciences could contribute to their solution. And finally, I will try to give you a taste of the types of solution proposed by atypical Management Scientists.

SOME PROBLEMS OF EDUCATION

Understanding of the failure of formal education must begin with recognition of the fact that it is less effective in general than informal education. Evidence of this is plentiful. Children learn their first language at home and on the streets more easily than they learn a second at school. Most adults forget much more of what they were taught in school than of what they learned out of it. Most of the knowledge that adults use at work and play they learned at work and play. This is even true for teachers: they learn more about the subjects they teach by teaching them than by being taught about them. University professors are not exceptions; many

of them are occupied with subjects they were never taught. None of the subjects I have taught since 1951 even existed when I was a student.

Informal learning takes place without formal teaching. Schools, however, are committed to teaching, not learning, because teaching, unlike learning, can be industrialized and mechanized; it is easier to control, budget, schedule, observe and measure. Educators appear to want what they can measure rather than try to measure what they want. Teaching is an input to education, not an output, but our educational institutions act as though an ounce of teaching is worth at least a pound of learning. Nothing could be further from the truth.

Therefore, the first question about education to which I believe educators and Management Scientists should address themselves is this: how can the educational process and the institutions in which it is embedded be redesigned so that they are focused on, and organized about, the learning, not the teaching, process?

Informal education is not organized into subjects, course, semesters, curricula, or other discrete units. A child's learning a language, for example, is not separated from its learning many other subjects. Reading and writing, geography and history, economics and arithemetic and philosophy and science may be taught separately, but they cannot be learned separately.

Subjects and disciplines are categories of a filing system, not of Nature. Our knowledge can be filed in many different ways. No way is more correct than another, only more useful; but no one filing system is the most useful for all purposes and none is organized in the same way as the reality it reflects. More important is the fact that, although it may be necessary to take knowledge apart in order to file or teach it, it is also necessary to reassemble it in order to use it. Formal education, like Humpty Dumpty, had a great fall but only a few educators, like all the king's men, are trying to put it together again.

What one learns informally is learned without benefit of either categories or certification by examination. This, one might argue, is only true for what one wants to learn, but schools must teach the young what they should learn regardless of whether they want to learn it or not. This argument is not only incorrect; it is also inhumane. Students should be motivated to learn whatever they ought to learn but never to be forced to learn anything. To do so is to take the fun out of it and this is much more serious than is the failure to learn any particular subject. The separation of work, play and learning - a consequence of the Industrial Revolution in education - was, in my opinion, a major cultural catastrophe.

Further, educators do not know what the student of today will need to know tomorrow. Most of it is not yet known. This is even true in professional schools. In a report to the Carnegie Foundation, Ireson (1959) noted that sixty per cent of graduate engineers leave their profession within ten to fifteen years after graduation. Dael Wolfle (1971) noted in Science that twenty per cent of American doctorates leave their fields within five years and thirty five per cent within fifiteen. And these trends are accelerating.

Therefore, the second question is: how can we avoid organizing education around rigidly scheduled, preselected, artificially quantized units of arbitrarily bounded subject matter, and, instead promote development of both a continuous desire to learn and an ability to do so?

Even when fine-grained filters are used to select students for admission to a school, those selected vary widely in ability, interests and knowledge. Therefore, the same input to different students does not produce the same outputs. Schools based on an industrialized model ignore or minimize the differences between students and thus require them to adapt to the educational process rather than the converse. The process should adapt to them. The individuality and creativity of the young should be preserved at all costs.

The American anthropologist Jules Henry asked what would happen "if all through school the young were provoked to question the Ten Commandments, the sanctity of revealed religion, the foundations of partiotism, the profit motive, the two-party system, the laws of incest, and so on . . . " (Henry, 1963, p. 288). Dr. Ronald Laing (1967), the eminent British psychiatrist, replied, " . . . there would be such creativity that society would not know where to turn". Aye, there's the rub: society does not want to turn. A system that does not want to turn is more concerned with precluding disruptive inquiry than with developing the ability to inquire.

Therefore, the third and final question is : how can we design an educational system that individualizes each student, that preserves his sense of self, and that encourages creativity rather than coformity?

SOME METHODOLOGICAL OBSERVATIONS

We do not have answers to such basic educational questions as I have raised. Nor are they to be found, if by "answer" we mean something that disposes of a question once and for all. Social systems, their institutions and their environments change continuously. What solves an educational problem at one time or place does not necessarily do so at others. Therefore; we need an educational system that, like the students in it, can learn and adapt quickly and efficiently. Management Scientists know enough about adaptive-learning systems

to know that they cannot rely on experience to teach them. Experience is too slow, too embiguous and too often wrong. It must be replaced by systematic and systemic experimentation.

Furthermore, such questions as I have raised are not independent of each other; hence, their solution should not be. The problems of education for a system even if education doesn't; their solutions should also. By decomposing educational problems we have obtained solutions to the parts that aggregate into what might be called an "unwholly mess". Messes cannot be cleared up by problem-solving; they require redesign of the relevant system and effective long-range planning for it. It is here that the Management Sciences can make a major contribution.

A number of Management Scientists - but far from the majority - realize that planning must replace most problem-solving. The art and science of planning are developing rapidly. The design of problem-solving and planning systems is a natural extension of the work of the Management Scientist. A still further extension, equally as "natural", is the redesign of the system being planned for, so that many of the problems with which it is engaged do not arise, and so that its overall effectiveness, not merely its efficiency, is significantly increased.[4]

When the redesign of one part of a system is undertaken independently of the redesign of the other parts, the range of alternatives which are considered to be feasible is severely limited. For example, the variety of possible changes in high schools which come to mind when we assume that no other part of the educational system is to be changed is much more constrained than it would be if we were redesigning the entire system.

There are significant benefits to be derived from considering the redesign of education as a whole. By considering combinations of changes in the parts, larger potential effects on the whole can be brought about. New possibilities are uncovered for both the parts and the whole. The focus is appropriately changed: the characteristics of the whole are not viewed as resultants of the characteristics of the parts; rather the characteristics of the parts are derived from desirable characteristics of the whole.

But even designs of and plans for a system as a whole can be severely constrained by restrictions that are perceived or assumed to exist by designers and planners. Most constraints are self-imposed. These can be removed by engaging in an idealized redesign of a system. This is a redesign "from scratch", with all constraints removed other than those of technological feasibility. In redesign of the educational system one would not assume, for example, direct transfer of the content of one mind to another

without communication of observable symbols. Such constraints do not preclude contemplation of technological innovation but they restrict it to what is believed to be possible. On the other hand, all consideration of financial or political feasibility is removed. Therefore, an idealized redesign is an explicit formulation of the designers' conception of the system they would create if they were free to create any system they wanted.

Most system redesign and planning is reactive - preoccupied with identifying and removing deficiencies in the past performance of system components. Reactive planning and design moves from what one does not want rather than towards what one does. It is like driving a train from its caboose. One who walks into the future facing the past has no control over where he is going. Idealization rotates planners and designers from a retrospective to a prospective posture. It also does the following three things:

First, it facilitates involvement of a large number of those who participate and hold a state in the relevant system. Because idealization focuses on long-range objectives and ultimate values agreement tends to emerge from apparently antagonistic participants in the system and others affected by its behaviour. Most disagreements arise from consideration of means,

not ends. Awareness of consensus on ends usually brings about co-operation with respect to means among those who would not otherwise be so inclined. Because the idealization process forces those engaged in it to make explicit their conception of the system's objectives their conception is opened to examination by others. This facilitates progressive reformulation of objectives and development of consensus on them.

Secondly, idealization leads those engaged in it to become conscious of self-imposed constraints and hence makes it easier to remove them. It also forces re-examination of externally imposed constraints that are usually accepted passively and thus makes it possible to find ways of "getting around" them.

Finally, idealization reveals that system designs, all of whose elements appear to be infeasible when considered as a whole. Therefore, it leads to subsequent design and planning that is not preoccupied with doing what appears to be possible, but with making possible what initially appears to be impossible.

For example, in the recently completed idealized design of paris carried out under the supervision of my colleague, Professor Hasan Ozbekhan, representatives of each of the many political parties in France participated

and came to agreement. The design which they approved has been submitted to the French public and is now being widely discussed. The Cabinet of France and the representative body of stake-holders who served as reviewers agreed on the desirability of making Paris a global, rather than a French, city. Having agreed on this objective they subsequently accepted means that they would have rejected summarily had they been proposed separately or out of this context. For example, they have agreed to move the capital of France from Paris and to make Paris an open and multilingual city.

No formulation of an ideal should be taken as final, as an absolute. It should be revised as we approach and get a better view of it. But equipped with an explicit ideal, however tentative, we can begin to invent efficient and effective ways of making it real.[5]

SOME ASPECTS OF POSSIBLE SOLUTIONS

At the Sixth Conference of the International Federation of Operational Research Societies held in Dublin in August of 1972, a workshop on education spent several days developing an idealized design of an educational system. Lack of time prevented completion of the effort, but the group did produce a report of some of the characteristics on which it had reached agreement. These were as follows.

A child or his parents should be able to apply for admission to any and every school in a system. Selection among applicants should be made at random. Each school should receive tuition fees from the government for each student attending. This should be the only governmental support of any school. Government should provide free transportation to any school in the system. These measures would create a competitive educational market-place.

Teachers should stop formal teaching unless requested to do so by students. They should primarily serve as resources learn, to learn how to learn, and to find good reasons for wanting to do so.

More time in early school should be spent on learning how to convert what is learned out of school into information, knowledge and understanding than in obtaining substantive inputs. Currently, the child is left on its own to convert raw material obtained in and out of school into something useful. Put another way, the emphasis of school should be on processing what is learned rather than on learning things that need to be processed.

In at least some of what are now the preschool years, parent and child should attend school together. Reading and writing, like the first language, should be learned before entering school. Schools should provide a wide variety of subjects and means of access

to them. The student should be free to choose from these but he should have available continuing advice to assist him in these choices.

Students should not be assigned and confined to homogeneious age or attainment groups, but should be a part of largely self-organizing heterogeneous student groups in which the opportunity to learn from each other is maximized and the need to learn from a teacher is minimized.

Every so-called teacher at every level of the educational system should be required to be a student at some higher level of the system. This implies that there be no highest level of education.

Now for a few observations about universities.

Universities should have no entrance or exit requirements and confer no degrees. Students should come and go as they please. They should not be examined on what they have learned unless they want to be. Examinations should be conducted so as to maximize students' learning, not unlearning, and not so as to minimize the task of grading. Records of examinations should go into a file to which only the student has access. Dissemination of its content within or without the university should be completely under the student's control. Failure should not be recorded, only accomplishments. Qualifications of students should be determined outside the university. Requalification,

even of professionals should be frequent, to encourage keeping up with developments and to encourage continuous use of the university.

Selection of faculty members should be controlled by other faculty members, but their retention should depend on students as well as faculty. Faculty ranks should be eliminated because the quest for promotion currently dominates the quest for knowledge.

Finally, there must be a more effective way than tenure of protecting academic freedom and a less effective way of protecting academic incompetence.

The workshops conclusions were considered by its members to be tentative and preliminary. We need many more, and more comprehensive and systematic, idealised educational design efforts. These should be made by educators and Management Scientists working together. Unfortunately, such efforts and the implementation of their output hardly seem imminent.

Meanwhile, there is no need to ask for whom the school bell tolls.

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A C K N O W L E D G E M E N T

While including the papers in the present status report I could not personally contact all the authors of these papers or the publishers concerned. I take this opportunity to express my sincerest thanks to those authors who had kindly agreed to extend their consent for inclusion of their papers in the status report. I hope to receive the consent from other authors shortly. In anticipation of their concurrence I would like to express my thanks to them as well.

A.K. JALALUDDIN
JOINT DIRECTOR, NCERT.

Not covered [redacted]

Teacher – attitudes
– work patterns
– organization

Absence of comments on citizenship study aspect

Lack of analysis of findings by various studies

Lack of correlation between parties in terms of non-plan allocations

Attitudes of teachers/ non involvement of communities

Description of experiment.