

Science Education for a Different India

M. P. Parameswaran

Education today is reinforcing the forces leading the species into self destruction. Instead, it has to play a liberative role, a transformative role, a creative role - a humanistic role.

Animals train. Humans educate. Formal education had already become a well developed activity by the time of the Great River Valley Civilisations. The earliest records of history show that there were ‘teachers’ and ‘students’. This formal education was available, however, only to a select section of the society – ‘the higher ups’. From that time onwards education was consciously used for two purposes:

- (i) To help carry out the routine activities of the society more and more efficiently.
- (ii) To help the hegemony of a few over the many.

In India the Brahmins constituted the ‘few’. The contents of their education were, Sanskrit language, the Vedas, Upanishads, etc; Astronomy, Logic, Mathematics, and Medical Sciences. Architecture, metallurgy, instrument making, etc. were left to ‘lower’ castes - mostly in the form training. Advances in these branches of knowledge came from practitioners. This was true for the rest of the world too: a few hegemonised and a multitude of hegemonised.

Textbooks on astronomy, life sciences, medicine and mathematics began to emerge roughly 2000-2500 years ago. The professional category of ‘Teacher’ (Guru) must have become important more than 4000 years ago. However, at any time, all teaching is not done by teachers. It is said that “one learns a quarter from the teacher, a quarter from fellow students, a quarter by themselves and the final quarter from life experience”. What the student learns from the teacher is, essentially, the capacity to learn by himself and from life.

Every learning process has two components - learning to think and learning to do. An apprentice to a carpenter, a plumber, an electrician learns, essentially to do. A student of mathematics learns essentially to think. In between there is a continuous spectrum of different combinations of doing and thinking - starting from ITI and vocational

education to university education and pure mathematics.

However today education is a Big Industry, a Big Business Enterprise. In India it involves about 4 million teachers and 200 million students.

Education Enterprise

In 1999 the findings of a study by James Tooley (1999) of the University of New Castle, UK 'Investment Opportunities in Private Schools and Universities in Developing Countries' were published as *The Global Education Industry* (a concept that would have been sacrilegious to many, had it been two decades ago). In June 1999, the International Finance Corporation – a member of the World Bank Group – organised a two-day conference on "Investment Opportunities in Private Education in Developing Countries" in Washington DC. The argument of the study encompasses five major points:

- (i) Educational enterprises were profitable, even when financed entirely from student-fee and still were open to the masses and not merely to elites.
- (ii) Many entrepreneurs have expanded into education companies with chains of schools and universities. Parents trust them because they had acquired a brand identity.
- (iii) Private education can extend to all, not only to the elites. It is equitable.
- (iv) Private sector is hindered in what it does by the regulatory regime and the investment climate.
- (v) Public - private partnership is an emerging model.

The study found 'huge untapped markets for education', but felt 'the regulatory environments in these countries ... somewhat of a hindrance.' They just could not understand why "the issue of profit-making in education is a stumbling block for many governments, several of which make it illegal." Still, the education industry has flourished. Objetivo/UNIP started as a tuition centre for pre-university courses for 20 students in 1962 has grown into a vast empire with more than 500 campuses and 500,000 students by 1996. Educuer in South Africa started as 'crammy college' in 1943 has today 127 campuses and over 300,000 students. NIIT India, started in 1979 has now 400 Centres. All these are 'for-profit' institutions.

The purpose of 'human existence' is to make profits, according to proponents of capitalism. The most unique characteristic of human species, as different from other animals, is its propensity to make profit! Corporate Watch on its web <http://www.corpwatch.org/teature/education/index.html> regularly publishes corporate projects in the field of education industry.(3) Edu Ventures, an investing banking firm, which coined the phrase "education industry" estimated "its worth in USA to be about \$630 and \$ 680 billion and that the stock value of, 30 publicly traded educational companies is growing twice as fast as the Dow Jones average. Countless tricks and tactics like

“de-funding public education”, “Educational Maintenance Organizations-EMOs”, “Corporate Sponsorship,” “Voucher System”, etc. are used to transform education from “a social investment” into a tradable commodity. The net result is an increasing marginalisation of the majority in India. Conservative economist Milton Friedman, who first proposed school voucher system as early as 1955, argued that public education needs to be radically overhauled to accommodate the free market. In a 1995 piece in the Washington Post Friedman (1955) suggests that such reconstruction can be achieved only by privatising a major segment of the educational system i.e. by enabling a private ‘for-profit’ industry to develop that will offer effective competition to public schools.

Today we live in an era in which ‘education’ is accepted as a commodity. So also is the job of a teacher, the educator. One has to ‘purchase’ it at high prices.

Any commodity should have a ‘use value’. Then only it can be sold and profit realised. What is the ‘use value’ of education? It enables the student to sell her/his labour power at a higher price and earn a better livelihood. The capitalist buys educated labour power to produce new commodities, to sell and to make larger profits. This view of education as production of labour power as a commodity, this capitalist’s view of education, is more than two centuries old. However no textbook as yet, defines education as a commodity. Instead, they give lofty objectives like:

- i) To impart knowledge and skills required to function as a member of the society around them, in the production of necessary goods and services (commodity element)
- ii) To impart attitudes and skills to be part of the spiritual or non-material life of the society.
- iii) To help develop the individuals potential to the fullest extent. There is a fourth objective, conspicuous by its absence in most of the ‘standard’ textbooks of education, namely
- iv) To develop the student’s ability to transform the society, or rather to subvert the society.

Education and development

There is a conflict between objectives (i) and (ii) on the one hand and objectives (iii) and (iv) on the other side, a tension between Being and Becoming. Objectives (i) and (ii) serve the purpose of stabilising the status quo, of strengthening the Being, of preventing it from Becoming - a new one. Objectives (iii) and (iv), especially (iv) is to use education as a weapon for social change to aid the process of becoming. We have several examples of education for becoming in our history, mostly in the informal mode. The leaders of Freedom Movement gave to the people a subvertive education for a new India, a Free India.

But, what should Free India look like? The political leaders were not united on this issue. The vision Gandhiji had, on the future India was a union of lakhs of self reliant village republics with focus on agriculture and livelihood. He conceived an education plan suitable for it, the Nai Taleem and started experimenting with it in Wardha and elsewhere. Nehru had a totally different view of future India. He saw an India as modernised as Europe - industrialised and urbanised. The rising bourgeoisie in Bombay, Calcutta etc. shared his vision sans the rhetoric on secularism, democracy and socialism. The left parties supported Nehru's vision, but giving much more emphasis to socialism. There was practically nobody to uphold the Gandhian vision of Free India. The Gandhian concept of development, both theory and practice, was rejected together with that Nai Taleem.

The first few years of independence were years of adaptation to 'freedom'. In 1951 Nehru started right in earnest to modernise India. From socialist Russia he borrowed the idea of economic planning. He began to construct 'modern temples' - power stations, industries, Universities, Institutes of Technology, Research and Development Laboratories, Atomic Energy and Space Research Departments and so on. The growth in education and research facilities, industrial establishments, power industry etc. was phenomenal. Even more impressive were the achievements in Nuclear Energy and Space Science. All these required appropriate human power, Universities, Colleges, Institutes of excellence. A multi frontal action programme was executed. The Department of Atomic Energy set up its own Training School to train nuclear scientists and engineers. (The present author was an engineer trainee of the very first batch).

India and Bharat

However, all these were concerned with only a small section of the community. Slowly two different streams of education began to develop - one an education for the Europeanised or Americanised, urbanised, rich upper class, normally referred to as India, and the other for nearly 70-80 per cent of the population which lives predominantly in the country side - which is generally known as Bharat. Universal free and compulsory education was projected as the Boat for BHARAT to cross the sea of poverty and deprivation and to reach INDIA. Elementary Education should have become Universal by 1965. But even today, even after passing the Right to Education Act, crores of children are outside the education system. Even among those who are enrolled in schools, only a small percentage gets any sort of education.

Inequalities existed in feudal India, in British India and in free India. Inequality is an essential precondition for capitalism. Education too developed in two streams - one for the elites, the 'public' schools and the 'model' schools, another for the ordinary people. The differences are only too well known to demand any further treatment. Several Commissions had been constituted and they had given recommendations on

what should be done to improve education. But their recommendations were used to serve purposes contrary to their very spirit. One of the simplest but potentially powerful recommendation was the institution of the common (neighbourhood) school system. This was never implemented. The other was on medium of instruction. Contrary to the spirit of their recommendations, English medium schools have been steadily growing. Versatility in English is important to gain admission to ‘elite gang.’

The year 1990 was a turning point in post-independence India. It became, formally, a part of the global market, part of the neoliberal economy. It was this, and such transitions in the other developing countries that led the World Bank and Corporate power to the afore mentioned conference, to transform education from a ‘social’ good or service to a commercial one. The phenomenal growth of educational enterprises in India during the past two decades does not require any proof.

Today, more than ever, education, the increasing divide in education, is strengthening and expanding the income and social divide. India and Bharat are being torn apart more and more sharply, leading to increasing conflicts. The Maoist movements and other reactions are only one form of expression of this. Though politically wrong, because it will not lead to success, their anger is morally justified, Bharat against India.

This conflict has to be resolved. The divides are to be bridged. India and Bharat will have to become one united nation. A society based on welfare and culture, a society liberated from forced alienation necessitated by consumerism, a society with ever increasing leisure to be spent as one desires, a society with increasing health and longevity, with increasing control over one’s own life can be built. Only thus we can serve ourselves and the humanity from the near possible destruction of our human culture and even the species itself, towards which the present global development path is leading us.

This is, and should be the objective of education. Education has to be liberative and hence subvertive. It will take a long time to transform the mainstream submissive education into a liberative one. But we can start at the process in the individual class rooms and by individual teachers, all inspired by the grand dream of liberation. It is against this general framework and objective of education that we have to think of Science Education.

Science education is nothing but part of general education. It gives added capability to the students to understand and transform nature, to produce goods and services for the community. However the communities in which the students will have to work after education are widely different - from Africa to America, from India to Europe, from Japan to China. Education, also science education, has to prepare the students to work in these unimaginably different communities. It will have to be different for different community. However, when we look into the curriculum and text books of the countries all over the world, one can find an astounding similarity of contents, not only in thinking but also in doing. A teacher from India can go to Africa or China, Europe or America

and soon can teach there. The basic subject and pedagogic trainings they have received are the same. True there are differences like behaviourism and constructivism, banking and discovery and so on. But essentially they are all being prepared for almost identical societies, while actual societies are wildly different.

In India the general content and pedagogy of education, including science education, is basically addressed to the requirements India and not Bharat, which is grossly neglected. However, even in the process of addressing India, in reality there is a tendency to address US and Europe. All the education given in the elite institutions, schools and colleges, are aimed at making the student to be useful for US and Europe. Bharat is summarily neglected. There is nothing in the curriculum or syllabus or pedagogy which will help the farmers, the artisans, small entrepreneurs.

A different science education

We have to redefine the objective of education and as a part of it, of science education too. Without teachers playing a leading role, education will not be reoriented in favour of BHARAT and thereby in favour of India (not INDIA) too. Only very few organisations are working with teachers with such an objective. Ekalavya was one of these groups. The Kerala Sastra Sahitya Parishat is another one.

In 1976 KSSP asked for the first time the question: what for formal education and answered in the following manner:

- (i) To develop the capabilities of the new born baby to such an extent that by the age of 18 it can undertake the varied responsibilities that the then society may put on it - productive, administrative educative, knowledge generative and cultural. It is to be futuristic and society specific.
- (ii) To enable it to appreciate the cultural heritage of the society it lives in and human society at large and contribute to its advancement.
- (iii) To provide it with the ability and also 'will' to overcome the hurdles before the society as it moves forward to progress and transformation.
- (iv) Thus to draw out the best in every child, to develop its human potential to the fullest extent.

It is to 'draw out' and not 'put in'. It was a spontaneous understanding - not a 'banking' model but a constructivist model. Based on this understanding the KSSP conducted a variety of experiments both inside the classrooms and outside, and in 1982 came out with a formal Document on Education (1982). It was built upon the abovementioned objectives of education. The Document, amongst other materials, contained one chapter - a critique on the then existing curriculum. It did not deal with the entire gamut of education, but only curriculum for classes 1 to 7.

On Natural science it wrote

primary (1-4) general science books give some idea of life, air, water, nutrition, health etc. But one can see no attempt to build up a scientific world outlook. The objective at this stage should be more cultural than informational. The child should get an overall picture of the objective universe around it, living, non living, the small and the big, the changes constantly taking place, evolution, interrelatedness and diverseness.

In the elementary (5 - 7) school, children are taught in biology - plants and its parts, growth and reproduction, metabolism, etc. as well as animal diversity, animal cell, mammals, reptiles etc. Again no attempt is made to view life as something holistic. Very little is given about the plants and animals which the child sees every day around it.

The same is the case with sections on human body, chemistry, physics and mathematics. Very little attempt is made to relate what the child learns in the school and what it sees and experiences, around it, daily. The two, the school and the society, are two different worlds. This is absurd. Education should be life related.

Conspicuously absent is anything to improve the psycho-motor skills of the child in the entire curriculum. Thus, later, the KSSP floated another organisation called National Association for Developmental Education and Training, to transform teachers, to enable them imparting skills and attitudes to the children. It envisaged a 120 hour course for teachers which provided for their skill upgradation and knowledge upgradation. KSSP saw that, the values imparted to students in schools, consciously or unconsciously, are those of competition and consumption - a one upman ship value. KSSP felt that school education should help children to acquire values of co-operation, sharing and caring, equity and sustainability.

For the following ten years KSSP carried out a large number of field experiments in pedagogy and curriculum. They experimented with activity based, child centred, life related and environment oriented pedagogy. It attempted to transform a fragmented science syllabus into a holistic (integrated) science education. The sum total of nearly ten years of experimentation had gone into the formulation of the new curriculum for Kerala schools in 1996. However, it met with severe criticism, basically from the elite who felt that education should help their children in competition. Even the less advantaged people (of BHARAT) felt so, because the entire society is competitive. This brings us to the question of the objective of (science) education once again. Is it,

- (i) to strengthen their competitive ability? or
- (ii) to impart to them transformative ability

Education for Transformation

Currently both are required - ability to compete with India and ability to transform Bharat. The National Curriculum Framework 2005, prepared by a committee with Yash Pal as Chairperson was an attempt in this direction. He had relied heavily on the Kerala curriculum, but has gone beyond it. However, the spirit of NCF was never understood by the teachers or parents, and was not to the liking of the dominant classes in India and the rulers of India. So what we have today is an illusory curriculum in most of the states. The concept of “local curriculum” has been rejected in practice. Without it education cannot be related to life. A transition from education for India to education for India (including Bharat) will demand the following:

1. Enhancing the capability of children of Bharat to compete successfully with children of India. This would demand imparting high level of proficiency in the use of English language and the computer, to access the world store house of knowledge.
2. Equal or higher proficiency in the ‘International Science’ – i.e., ability to compete in all competitive examinations including IAS, IFS, etc.
3. Ability to relate the science they learned to the variety of life supporting activities - agriculture, industry and services around. It is here that the importance of local curriculum comes in
4. Imparting a multitude of skills which the children of India lack and refuse to master. This gives Bharat a competitive edge.
5. Impart the ability and desire to unite India and Bharat to make a Grand India and finally,
6. Impart an irresistible zest for life - a sense of optimism that tomorrow can be made better than today that they can do it.

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