

Technical Education for Real India

Report of the AICTE Committee on
Mobility of Human Resources
For Coupling Education, Vocations and Society

Interim Report

II India Council for Technical Education
New Delhi
June 1996

Foreword

In order to fulfill all statutory requirements as per the AICTE Act, 1987 (52 of 1987), the Council has taken all necessary steps in last three years. One of the functions of the Council is to coordinate the development of technical education in the country at all levels. The formal degree and diploma programmes constitute only a small fraction of what is happening in the country in broad range of technical-vocational, productive and service sector of relevance to India through non-formal system of learning and working. It would be a tragedy if this non-formal learning continued by passing the skill through generations prevalent in our country is ignored. Further, the certificate level programmes of different Central and State ministries/ departments are designed to cover large number of vocations.

Is it possible for us to devise strategies and methodologies no matter how revolutionary or different they may be to interweave the skills and methods acquired through non-formal and formal system and to provide mobility for the technical personnel at different levels.

A Committee under the Chairmanship of Prof. Yashpal, former Chairman UGC, has been constituted. The Committee has submitted the interim report to be exposed to large number of people for comments. The Committee will be happy to receive your comments.

Dated : June, 1996

(S.K. Khanna)

Chairman

All India Council for Technical Education

Technical Education for Real India

An Interim Report

The Demand - Supply Misperception

Propelled by a desire to launch India into the industrial era, considerable investments were made and strenuous efforts were undertaken to build a large number and variety of educational, technical and research institutions in India. The underlying efforts were largely directed toward satisfying the needs of the growing number of modern industries. The programmes of these institutions were conceived as the necessary pre-requisites to the growth of these operations in the formal sector which employed less than 10 percent of the work force.

Despite these intentions, there are predominant assessment now, that the present system of education and training has not risen up to the expectations of building up of the capabilities in innovations, problem solving, skillful operations and hands on experiences. The supply side of the education system was more intent on paper qualifications often imitating the contents of programmes in vogue in other industrialized countries, even if these have no particular significance in India's socio-economic situation.

More seriously, this type of education and training largely ignored the demands of the unorganized sectors of the economy which provides employment to more than 90 percent of the workforce. Consequently, the skill and knowledge base available with the non - formal sector were never counted as "technical" enough in the formal sense. Hence no support or help was available to such talents and skills from the investments made in the educational system.

The All India Council for Technical Education (AICTE) which is concerned with the complex tasks associated with the promotion and regulation of a variety of fields of technical education, through the means and methods available under the existing system of the statutory bodies, there has been a growing realization that something is missing in the present system, in ignoring the demands of the vast segment of economic and social demand.

It is increasingly realised that these efforts constitute only a small fraction of what is happening in the country in a broad range of technical-vocational, productive and services sectors of relevance to India, through formal and non-formal systems of learning and working.

This committee constituted for examining the aspect relating to the missing elements of the present technical education system in relation to the crucial overall demands of the society as a whole proposed to consider these issues under the title - Technical Education for Real India.

The committee felt that if the totality of everything that could be considered as 'technical' is to be dealt with in logical manner then it becomes inevitable to embark on a treatment that covers not just the formal diploma and degree level programmes in technical education, but also to include the school level education as well as the large variety of non-formal learning that is in vogue in India.

The Ignored Part

The most prevalent education system in India is not even recognized as such. This is the system through which our farmers learn their craft, including its science and technology and skills. Our craftsmen, potters, weavers, masons, carpenters, plumbers, carpetmakers, toymakers, mechanics for bicycles, tractors and motorcars are all prepared by the same system.

Our folk musicians, folk painters, folk stage artists, the decorators and the cooks who perform during festivals, marriages and a host of other social functions are also generated by this system. Our tribal medicines and care of the forests are taught in such a system. Many of our 'Dais' (rural nurses) and health workers are produced by this system.

In addition, the system produces cultural values and norms, as also social mores and wisdom. Everyone in all walks of life and from every strata of our society feels its presence and recognizes the essentiality and worth of this system and yet we tend to ignore and bypass it. No doubt that this system has many inadequacies, especially because of the vast magnitude of functions and the enormous range of teaching and learning methodologies associated with this system. The long period of neglect of this system by the educated class and low prestige attached to its methods is causing the rapid decline and disappearance of the system.

In order to save this unique Indian system, it would need additional support, information, knowledge and skills to make it more prevalent, effective and fruitful. Continued by-passing of this system will be a tragedy particularly because we have not been able to replace it with anything far more meaningful. This non-formal system in fact can yield sufficient number of parameters to define the substance and methods of development of the formal system of technical education in "Real India".

Possible New Orientation

India with a large diversity of cultures, traditions, values and living standards has so far maintained an amazing continuity with time and contiguity with space so as to remain as one nation. This fortunate combination of varying levels of human knowledge and differing degrees of their application for growth has been sustained by an ingenious system of learning and doing the essential economic and social functions. The REAL India is where a vast majority of people are engaged in performing the life-supporting activities of the communities, rich or poor, urban or rural, expecting in return nothing more than the basic economic necessities and a dignified social existence.

The REAL India is composed of men and women who diligently perform a thousand different functions from farming and fishing to vending and servicing. They learn to perform these functions as an evolutionary process of continued transformation with the changing times. The REAL India defies a singular identity but it is there for every one to feel. It can be easily differentiated from the UNREAL India which has a mindless affinity to alien values and norms. Vast majority of people live and perform in the REAL India. Unfortunately the small minority of those who live in the other India have tended to ignore and marginalise the majority. They are variously described as illiterate, poor, ignorant, backward and unsophisticated. Terms like 'villager' and 'hill people' are used in derogatory sense unmindful of their vital role in keeping the economy of this nation moving.

The Coupling

Is it possible then for us to devise strategies and methodologies, no matter how revolutionary or different which would build on the strength which the Indian society already has, and which will interweave the skills already being imparted in terms of "Know-how" by incorporating the associated elements of the formal "Know-Why"? This would in essence mean devising or altering the formal system of education in a direction offering dignity and respect to those skills and methods acquired through the non-formal system, and building upon a system which is already in place though not in an organized form.

This system of non-formal learning and working is well entrenched throughout the country and supplies human resources to perform very many skilled and semi-skilled functions.

The non-formal system in India also covers a great deal of knowledge and practice in many areas of the so-called traditional systems of science and technology which have not found proper degree of coupling with the formal system.

The Issues and Options

During the decades after independence there have been many attempts to “Vocationalize” the school education. Several schools in the country have introduced parallel “Academic” and “Vocational” streams. More recently the desire to vocationalize has also reached the degree level institutions. In particular, the UGC has been experimenting with this idea in a selected number of areas.

These programmes have grown over the last five decades under a variety of assumptions and compulsions sponsored by different agencies. Even with these mosaics of engineering, technical, professional, vocational, job-oriented, skill oriented and other programmes in the country, there are some serious apprehensions about the validity and effectiveness in the current and emerging context of national social and economic imperatives.

Any attempt to explore in detail the scope for redirecting the educational system as a whole and the technical education in all its forms needs:

- * to identify the connections between different forms and levels of educational system as a whole and the technical education in all its forms needs:
- * to draw attention to the inherent dangers of alienation of the existing education system from the society as a whole, though some of the current educational programme may appear to satisfy part of some demand.
- * to highlight the educational experiences of many daring and genuine educational experiments which could form the basis for new orientation.
- * to indicate the principles for new structural modifications.
- * to consider possible ways through which one can attempt to modify, change or discard certain elements of the existing system.

Alienation Aspects

The most obvious deficiency in the present system of education is the alienation of the educated persons from the majority of the society. It appears that higher the level and sophistication of education, greater is the degree of alienation. The alienation process manifests itself in many ways.

The educational system provides a whole lot of information to the learner but fails to provide the knowledge base to relate the information to the social and economic reality. Serious concerns about the alienation process has been portrayed by almost all sections of the society in one form or another but hardly any improvement has occurred. The learner is left with a sterile set of facts, methods, concepts and theories which he/ she is unable to relate to the obvious occurrences in real life. This is the beginning of the process of alienation. The challenge therefore is to drastically modify the teaching and learning processes to naturally link the context with the concept. Therein lies the step towards creativity and innovation.

Arising out of the above handicap, the learners tend to drift further and further from the real society. When confronted with the problems of society, the ability acquired through the education system has no real value or meaning in solving them. Hence they tend to isolate themselves in a make-believe world of their own not concerned with their social, economic or cultural roots.

Yet another factor that causes alienation of educated persons is their incapability to work with their hand. Since learning by doing is virtually absent in the educational system and all accomplishments are measured by the ability to commit to memory (without proper understanding), the real tasks which require physical dexterity and detailed planning and organisation is shunned.

This deficiency is further accentuated by the growing system of entrance and competitive examinations whether for admissions or employment. The premium placed on memorized learning as against competency has virtually eliminated all incentives for seeking true knowledge of relevance and application. Even good quality text books are replaced by bazaar notes and tutorial colleges. Such an educational environment will surely lead to mediocracy, irrationality and incompetence even to perform simple logical functions. No doubt, the competitive examinations are inevitable, where the demand far exceeds the supply. But is there no alternate approach to this abomination of the education system as the selection criteria?.

Innovations in Education

Concerned with the growing magnitude of inappropriate teaching and learning systems in the country, many innovations have been suggested and experimented with by many institutions mostly by non-governmental agencies as well as by a few governmental organisations. These are, by and large, scattered experiments initiated by determined individuals to demonstrate the feasibility and effectiveness of these innovative approaches. Probably there is a hundred or more experiments across the country at all levels of education. Two such experiments successfully excused are mentioned here as illustrations. One is a system developed by the Vigyan Ashram in Poona, Maharashtra, with emphasis on "Learning While Doing" in a natural way offered to 9th and 10th standard students and recognised by the State as part of the curriculum.

Another is a system of training in highly sophisticated technical areas involving electronics, sophisticated materials, modern tools and gadgets offered by the Nettur Technical Training Foundation (NTTF) a private organisation in Bangalore. This system provides hands-on-skills at every stage of a product development from conceptualisation to product output. The products and subsystems resulting from the training process is directly marketed to highly reputed organisations. The trainees do not even get a degree but are grabbed by employers at a salary much higher than the degree holders.

There are many such instances. It would be helpful together all such educational experiments, analyse their philosophical, structural and organisational features and arrive at a number of small reports detailing different approaches to change the learning systems. There should be widespread debate on such innovations whether it is on preschool or post-graduate learning. Since there is a highly contagious mindset as to what is good for their children and it is measured by the score in the competitive examination or ability to get admission abroad, it is necessary to gradually gain acceptance for the changes. We may have to live with some of those whose aspirations are deliberate alienation. But the changes can make a world of difference to a majority of those who are marginalised or eliminated from the social mainstream early in their life without even the elementary opportunity to try.

As and when an analysis of the innovative educational initiatives is undertaken, it will provide a large variety of methods and means to formulate the basic conceptional foundation for reorienting the education for real India. As an initial guide a few important considerations are outlined in this section, to deal with the endemic deficiencies which seem to grow by the day.

- * Work experience linking real life operations should be emphasized from very early in the learning process. The level of sophistication and the methods used may vary as the learning process advances to higher levels of education.
- * The power of the open and flexible learning system should be adopted in a comprehensive and unified manner. The formal education should be so structured as to accommodate the features of the open learning system at all levels. No one desirous of learning more should be deprived of an opportunity to learn simply by the rigidities of exclusion principles at any stage in life as long as he / she demonstrates the potential to become a useful member of the society.
- * Competencies should be evaluated by the demonstration of abilities to perform relevantly defined functions. Hence the evaluation system should be decentralised and modularised. Irrespective of how a person acquired the knowledge and the skills, every willing person should be given a fair opportunity to demonstrate the ability to perform and adjudged on increasing scales of competencies for different vocations and functions.
- * Teaching of science should be freed from too many abstractions at too early an age forcing children to resort to rote learning. The joy associated with learning science through simple discovery of familiar phenomenon should be encouraged.
- * Gandhiji had envisioned a practical model of education with “craft as the medium of instruction and learning” and where the schools have self-sufficient resources. The present system of formal education should be reoriented in a way to integrate skill and literacy and to coordinate mind and hand.
- * Much of the essential skills needed by the Indian society are learnt outside formal academic institutions. The “Ustad” system wherein a person without any formal qualification imparts his knowledge and skill to his “assistants” is practised in an amazing variety of economic activities of production and service. This does not require large public funds. This process should be inserted into the formal system in a calculated manner.

The school system should be willing (even eager) to identify local skills and knowledge and associate local people whether agriculturists, craftsman or industry workers to demonstrate their abilities and practices and relate them to the curriculum in arts and sciences.

- * In order to recognize the skills acquired outside the formal system, and to involve them in the formal system a certification system for such persons will be useful. Based on established standards for different skills and levels, testing methodologies could be

evolved so that any person with the required knowledge and skill can take the test and get certified. The standards and methods of tests should not be bureaucratised and avoid built-in biases. In particular this will serve as a major incentive for those who drop-out of the formal system rather early to re-establish themselves in the mainstream economic activity.

Possible Scope for Restructuring

The basic principle behind the restructuring process should be a strong recognition that the entire education system from elementary to the highest university level is one continuous chain with each link exerting a vital influence on others. The nonformal education and the education of the working children, school dropouts and the host of other workers who have not had the benefit of formal schooling should all be considered as part of such a chain. However, in actual process of implementation a coherent strategy should be evolved that will remove all artificial impediments in establishing practical coupling between the links of the chain, even as the responsibility for execution may fall within the mandates of several different agencies in the Centre and the States and the voluntary bodies.

Since a large number and variety of participants are associated with different aspects of designing and imparting education, any major reform, especially if it strikes at the existing roots, is likely to meet with stiff resistances. Even with the high degree of dissatisfaction with the present system, as is evident today, successful reforms are not easy to accomplish. The Central Government with a variety of its agencies, the State Governments with a similar variety and private organisations, parents, teachers, employers are all to be sensitised to the scope and advantages of any major reform.

Therefore it will be prudent to make the maximum use of the existing system and strive to reorient their direction and methods. Considering the possibilities of significantly higher levels of national investment from public and private funds, now is the opportune time to influence the existing system in order to avoid their mindless multiplication.

The School System:

During the twelve years of schooling a great deal of opportunity exists to introduce most of the basic propositions outlined in the previous section. This requires concerted efforts in altering the nature of text books, examination, and introduce a variety learning materials and resource persons especially with local specificity.

The elements of literacy and numeracy and science need not be sacrificed. These should be so altered and the sequence of learning reordered in a way to encourage impartation of basic skills in communication, expression and craftsmanship.

The first eight years of schooling should be treated as one unit emphasizing local content and *local learning material and resource persons*. While the curricular context of literacy component could be statewide, the craftsmanship component should be local specific as for instance within a district.

During the first eight year stage of learning, larger weightage should be given for field work, observation and interpretation of local objects, activities and phenomenon, be it agriculture, water, geology, plants, animals, industries, environment as well as local sociological features such as religion, castes, poverty etc. Since the individual profiles of the students will vary a great deal, the learning system should be designed in modules wherein force-feeding is minimized. Each district could evolve its own curricular content keeping the broad educational objectives in view.

The three dimensions in which the educational development of the individual takes place are 1.) the physical / natural environment; 2.) the social environment and 3.) the productive work environment. These are generally location specific and as such should be incorporated by the decentralized curricula.

The evaluation of the student at the end of eight years of learning should be based on the cumulative performance of each student at his/her own pace.

From the ninth to the twelfth year of schooling should constitute the second stage of learning. In order to provide the flexibility in the curriculum design and pace of learning, the four years should be treated as a unit abolishing the tenth class stage.

The so-called "board examination" at the 10th and 12th classes should be abolished. The distinction between the so-called "academic" and "vocational" streams should be eliminated.

During the second stage, the curriculum should be such as to give a balanced education consisting of fifty percent craft orientation and fifty percent subject orientation to all students. The final evaluation should be such as to provide weightage for their performance during the four years plus their ability to link the "subjects" with "crafts". This will require examination methodology not strictly based on text books alone.

Technical Training Centre

The school should be the hub of the community life whether in rural or urban area. Besides the teaching functions associated with the education of children, the school should serve to 1.) solve the technological needs of the community; 2.) involve the knowledgeable experienced and talented people of the community in imparting knowledge to the younger generation and 3.) inculcate the awareness about social cohesion, ecological balance and economic upliftment.

The principles of Nai Talim by which the students and artisans worked together has become even more important today than the past and should be appropriately modified to suit the present *conditions of technology and social demands*.

The pre-secondary technical and vocational training centres such as CTI, ITI and polytechnics and arts and science by providing the necessary ambiance, tools and facilities.

- * Prepare a compendium of arts and crafts for each district which have the potential for insertion at the first stage of school system.
- * Eliminate drudgeries in learning the crafts and skills consistent with the advances in sciences and technology by introducing modern materials and processes.
- * Establish schemes wherein workers can acquire advanced knowledge and skills while being employed in order to improve their phe arts and science by providing the necessary ambiance, tools and facilities.
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Post-Secondary Education

If the above changes are reasonably successful in the school stage, the college education whether in arts, sciences or engineering will find the students with very different attitudes and skills profile which will be conducive to *reorganisation of the post-secondary education*.

Since the degree of autonomy enjoyed by the post-secondary institutions is very high, it will be difficult to prescribe any coherent approach to their educational system and evaluation. We can only hope that the basic principles enumerated earlier are kept in view by the agencies regulating and funding these institutions.

Integrated Technical Education

The process of alienation discussed earlier could set in at the professional level just as early as in the school education stage. This would result in an inherently inefficient system of professional activities since it is now known that successful management of enterprises, large or small, requires a deep sense of participation and team-work among all levels of personnel on one side and their sensibility to the demands of the side on the other. An engineer or technician educated through the formal system should have the frame of mind to participate effectively in such an environment.

Scope for Decentralization

The demands of different parts of the country vary in terms of the technical talents to be coupled with the local socio-economic needs. For instance, the essential technical skill needed in the drought prone Ramnad District in Tamil Nadu is related to matchworks, fireworks, printing and limestone. The economic activities of a coastal district like Tirunelveli are based on fisheries, cement, salt and fine chemicals and fibres. It does not make sense to have an educational or vocational system of a state or national character which are not associated with the essential economic activities.

There have been many valuable suggestions for educational reforms in India by Committees of eminent educationists and scholars. One of the most recent recommendations contained in Learning without Burden emphasizes the importance of decentralization of curriculum framing and textbook preparation suited to the needs of the local environment; setting up of education committees at village, block and district levels (taking advantage of the Panjayathi Raj and Nagar Mahapalika institutions); and adequate preparation of teachers for the new role.

These measures will require a strong incentive system for recognizing skill development and problem solving capabilities as the vital ingredients of the educational process. The distinction between 'academic' and 'vocational' streams should be eliminated. The skilled worker can be recognized as a teacher even without a formal diploma or a degree.

The introduction of the Panjati Raj system provided the much needed opportunity for implementing the decentralization process. However recent experiences in some parts of the country show deliberate attempts on the part of state level administration to scuttle this process by taking away from the local bodies all responsibilities in formulating and managing the school programmes. In one State the Government Order clearly spells out the removal of participation of local bodies in educational activities.

Role of AICTE

The AICTE which has oversight responsibilities for a large variety of programmes could consider a system of incentives and persuasions to introduce innovations which will eliminate the process of rote-learning in technical education and alienation of trained personnel from the real needs of the society.

The AICTE functions through several Boards with responsibilities for evolving norms, standards and models. Each of these Boards could be persuaded to reflect on the scope for introducing the coupling processes (a) between the vocational content in the school stage to the engineering degree level and (b) between the formal and informal system of engineering and technologies.

Among the norms of the AICTE, the learning experience obtained by associating with the craftsmen from the non-formal sector or the agricultural or industrial operation should be reflected into the College or University curricula involving the theoretical and analytical methods of problem solving. The rigidity and compartmentalisation of the engineering curricula as available now do not facilitate this process.

The options to introduce one extra year of field training in industries, construction sites, rural areas, panchayats and local bodies could be encouraged as part of the degree programmes. People oriented projects with of high technological caliber could be supported. Design of courses and projects in traditional technologies could be recognized and supported.

There are many such schemes which could be introduced by the different Boards of the AICTE keeping the overall goals of ushering in a climate for the integrated development of Technical Education in India.

The AICTE should liberalize the eligibility criteria for gaining admission to the various skill related diploma level programme enabling lateral entry for all those who for one reason or the other

could not pursue formal school education but are otherwise engaged or capable of engaging in productive vocations and could benefit by understanding the “know-why” of their respective activities.

The AICTE should develop guidelines for artisan involvement in the technical education process. Similarly the AICTE could help to set up training schemes for locally relevant occupations for different levels of education levels. In this way, the AICTE could play a major role in the revival of the traditional systems of *technically oriented occupations* by selectively incorporating the elements of traditional practices in the curricula of the various degree and diploma level programmes under its control.

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