

IMPROVING QUALITY OF TECHNICAL EDUCATION

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1. INTRODUCTION :

There has been a phenomenal growth of technical education in India since independence, perhaps unparalleled in quantitative terms anywhere in the world during the same period. Whilst a few institutions have developed comparable to the best in the world, on an average, the quality of the instructional process and of the product leaves much to be desired. This short-coming in quality became increasingly evident over the years and, therefore, became a cause for concern. Further, the world of work is critical of the considerable gap between the job requirement and the performance ability of many of the job aspirants coming out of technical institutions. The degree and diplomas offered by many institutions and universities in India are not acceptable internationally on a mutual basis. The Govt. of India, since 1970's, has been focusing increasing attention towards improving the quality of technical education.

2. INTERVENTIONS MADE BY THE GOVT. OF INDIA FOR QUALITY IMPROVEMENT OF TECHNICAL EDUCATION :

Some of the following interventions were made through the efforts of the Govt. of India for improving the quality of technical education :

(i) Statutorisation of AICTE :

Statutorisation of All India Council for Technical Education took place through an Act of Parliament in 1987 for the planning and coordinated development of Technical Education in the country. Further, a major step for improving and regulating quality and standards of education in technical institutions was taken by establishing a National Board of Accreditation.

(ii) QIP :

Quality Improvement Programmes (QIP) have been launched for improving teacher proficiency by providing opportunities for higher

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education in frontier areas of technology as well as in the methodology of teaching.

(iii) Industry Institute Partnership :

Partnership between the industry and the institutions has been receiving increasing focus. The Government is providing tax incentives for industrial and business organizations for contribution in upgrading and developing research facilities in technical institutions. Industry-Institute cooperation is achieved through visits to the industry by students, industry participation in curriculum design, continuing education programmes offered by the institutions for working personnel, consultancy by institutions for problem solving and for research to improve the processes, practices and the products of industry, joint R & D activities, exchange of personnel between industry and institution, etc.

(iv) Technology Development Mission:

Technology development mission is a new experiment in institute-industry synthesis. Under this IITS and IISC, Bangalore are jointly taking up, with the industries, technology development projects in generic technologies. Industry provides upto 40% of the budget and the rest comes from the Government.

(v) Linkage Mechanisms :

New innovations for linkage mechanisms are being worked out. One such is the FITT at IIT Delhi.

These innovative linkage mechanisms perceive the role of the industry not only for financial, technical and advisory support but also for devising employment strategies to accord with global quality levels.

(vi) Autonomy to Institutions :

Autonomy is now recognized as an important vehicle for achieving excellence and continuous improvement of quality. It enables creation of new institutional vision, new ideas, new programmes and offers new services in most efficient and cost effective manner. Autonomy means decentralization of authority and decision making aimed at promoting growth. Autonomy is freedom to innovate, freedom to experiment with new idea, freedom to network with other institutions, organizations and the industry and, in other words, freedom to take all developmental actions through institutional initiative. Autonomy, however, does not mean freedom from accountability. The concept of autonomous institutions has been accepted and incorporated in the National Policy on Education (NPE) - 1986. A number of institutions have now become autonomous and development of autonomous institutions and laying guidelines for the grant of autonomy is in progress in various states.

(vii) Modernization and Removal of Obsolescence :

Consistent with the emphasis laid by the National Policy on Education - 1986, efforts are made for

periodic modernization and removal of obsolescence of laboratories and workshops of engineering colleges and polytechnics in order to enhance functional efficiency. This scheme, interalia, covers IITs, RECs and engineering colleges, faculty of engineering and technology in the universities and the polytechnics.

(viii) Strengthening of Technician Education Through World Bank Assistance :

A massive project for strengthening technician engineering education through World Bank Assistance was undertaken for capacity expansion, quality improvement and efficiency improvement of polytechnic education in the country, involving 19 major states. The most important objective of the project is quality improvement thorough faculty development and introduction of new and emerging subject areas in polytechnics education, modernization of laboratories and workshops, improving relevance of polytechnic education through industry-institute partnership and promotion of technical education for women and other thus far neglected sections of society. As a result of this project the polytechnics, on their part, are reaching out to industry and business offering them consultancy services and running continuing education programmes for working personnel, introducing use of computers, revising and updating curricula on a continuing basis to meet

the changing needs of the world of work, creating learning resources to improve teaching, learning process, etc. At policy level each state is committing to the future sustenance of the gains of this initiative.

(ix) Canada- India Institutional Co-operation Project Oriented Manpower with Appropriate Competence and Training (IMPACT) Project :

The project in collaboration with CIDA, aims at strengthening 12 polytechnics in the southern region of India and to foster linkages between Indian and Canadian Institutions.

Another project funded by Govt. of India, the Swiss Development Corporation and World Bank is being implemented in 14 engineering colleges, 12 polytechnics and 6 centres for electronics design and technology across the country. The goal of the project is to upgrade the quality of education and training in the field of computers and electronics engineering.

(x) Indo-UK Technical Cooperation Project :

Through this project assistance is provided to eight RECs in four themes, namely, Design, Energy, Information Technology and Materials Engineering. The project is jointly funded by Overseas Development Administration of UK and Govt. of India. The project aims at improving the quality and relevance of REC graduates, in-service training, consultancy and R & D

services. This is being achieved by improving teaching skills, curriculum development, equipping laboratories, developing MIS and strengthening linkages with industries.

(xi) NTMIS :

A National Technical Management Information System was established with a large number of nodal centres throughout the country for generating a strong data base to monitor supply and utilization of technical manpower at the national, regional and state levels with a view to ensuring planned development of technician education consistent with the evolving needs of the country.

(xii) New and Emerging Areas :

Over the years the Govt. of India, taking note of rapid advances taking place in engineering and technology, took the proactive action of determining thrust areas from a futuristic point of view and promoted introduction of a number of training and research programmes in emerging / crucial areas of technology in selected institutions across the country.

3. FUTURE PERSPECTIVE :

In the last few years, with the changes that have come about in the economic and industrial policy, leading to greater liberalization of economy and increasing globalization, the challenge of being competitive has been thrown to the Indian industry. The strategic sector also is adopting new technology envi-

ronment towards self sufficiency. This calls for the highest quality of technical manpower, with relevant competencies, in large numbers, who have to face global challenges. This requires the creation of leadership positions in key strength areas. Simultaneously, it will have to be ensured through technology development, adaptation and training that benefits of technology reach where these are needed most-in backward and unaccessible areas.

3.1 Training of Teachers :

In the recent past, the issue of the reach of technical education has been addressed through the establishment of a large number of technical education institutions. This sudden expansion has created some distortions in respect of quality and standards. The situation becomes worse in many an old institution having outdated equipment which hinders the implementation of upgraded curricula. Apart from obsolete equipment and facilities, the shortage of qualified teachers and consequent poor quality of teaching methods and curricula delivery need immediate attention. The relevance of teaching and other curricular experiences to live problems is often missing, resulting in inadequately and improperly trained engineers. Very little hands-on experience is included in the curriculum and what little does exist is delivered without any excitement and involvement. Practical training, as a part of curriculum, hardly exists and at best is a mere formality. Many of these engineering graduates, either willingly or by force of circumstances, are becoming faculty members immediately after graduation without any experience in

the world of work. They have to be exposed to the problems of the industry to make them confident to deal with the subjects to be taught and to make them enterprising and innovative.

The situation in respect of availability of quality books, innovative laboratory manuals and other learning resources is none-too encouraging. This results in lack of motivation among students for self learning; instead, it perpetuates the culture of tutored style of learning. The annual system of examinations too does not encourage regularity in study and leaning and honing of skills for solving live problems. The exposure to modern and emerging technologies is absent.

The teacher, in any technical institution, is the key to produce appropriate graduate engineers and technicians. Fresh recruits in the colleges and polytechnics as teachers must be required to undergo induction training, educational technology appreciation training and periodical training programmes specially designed to chisel the skills of teaching and to bring the real practical engineer out of him / her, to bring him / her close to the world of work in his / her field and at the same time to train him / her as a life long learner. Only thus will engineering education system become self-developing and only thus can the engineering institutions develop links with industry and ultimately turn out relevant engineers.

3.2 Environmental Protection :

Whilst it is important for us to produce quality goods to face fierce world competition and to deliver them at competitive prices by improving the effi-

ciency of our industries, the quality of our work force and the ethics of our work style, we have yet another formidable challenge in front of us : Environmental degradation. The existing laws regulations to prevent pollution are being blatantly violated. There is need to examine and understand the issue and develop an approach based on training. It is time to incorporate in our curricula the hazards of environmental degradation, not necessarily as a separate subject, but something which runs as a common thread through all the subjects and all the curricular activities. The prospective engineers must be oriented to learn, through case studies and statistics, the resultant price that they and their children will have to pay if they should become partly to allowing unethical practices to continue. The teachers, by using appropriate methods and by actual site visits, will very likely succeed in awakening among the students their sense of responsibility and role in preventing environmental degradation. Such efforts of our teachers will not go in vain.

3.3. Entrepreneurship Development :

It is well understood now that the government alone cannot create and provide jobs for a large section of India's population. Similarly, although industry does offer great scope for employment generation, yet wage employment cannot be a source of livelihood for all our youth. We must arrange the delivery of technical education programmes in such a manner as to promote amongst our youth the traits of entrepreneurship.

3.4 Rural Development :

Increasing emphasis has, over the

years, been laid on rural development. A large number of polytechnics are involved in community development work in rural areas. It is suggested that institutions which are working on rural development may consider integrating rural development programmes within the regular training programmes that they offer. Thus will emerge a thorough involvement of the teachers of these institutions and their students in rural development programmes, leading to synergetic efforts towards rural area development. Concerted efforts by the institutions will have to be made by institutes to open dialogue and interaction with village bodies. Through this interaction projects and live problems for faculty and students will evolve.

3.5 Increasing Reach :

The productivity of the country and the quality of life of its people will depend upon the opportunities that are created for enabling all people of India, bulk of whom are underprivileged and unorganized, to have gainful employment. As mentioned elsewhere all sections of the people must be provided with appropriate skills and, where necessary, knowledge, to enable them to make useful contribution towards the growth and development of the communities in which they live. For this purpose increased attention needs to be focused on the development of skills among women and among those belonging to unorganized and rural sectors of society. Technical institutions at all levels must work out training and extension programmes for this purpose. Involvement of technical institutions with the development of rural communities,

women and other deprived sections of society will enable these institutions to play their role with greater relevance and objectivity. Considering that almost 80% of the work force in India comes from the unorganized sector, efforts by technical institutions to improve the skills and attitudes among people belonging to this sector of society will go a long way towards improving the quality of our products and the quality of life of our people.

3.6 Creativity :

The concept of design "creativity" is an important element, whichever may be the level of engineering we are working at. Design may involve calculating the size of a beam or the value of a capacitor for a given application. It may involve inventing new components and processes. At all these levels an engineer has an opportunity to be creative. Our engineers are engaged in production, construction, maintenance, testing, marketing and so on. In all these areas of work they face the challenge to be creative. This is in fact the most important trait among the students that technical institutions should aim at bringing out and strengthen to enable them, in the actual world of work, to design, to innovate to increase efficiency by keen observation and thus improve on the existing methods and thereby help industry to compete globally and be a source of high class manufactured goods to the world. We, the teachers, need to inculcate and promote the inner, but often hidden, strengths among student engineers and thus play our rightful role as agents of change. That is today's challenge and the curriculum makers must

face it, study it and, through serious efforts, ensure a curriculum which turns out such engineers and technicians.

3.7 Maintenance of Quality and Standards :

With increasing participation of the various stake holders in the technical education system, the managements, in future, of all government, government aided and private self- financed institutions, are likely to take a diversity of approaches in education delivery. This will call for greater emphasis on ensuring standards and quality.

Further, because of more rapid changes that will take place in technological development and in order to ensure producing technical manpower consistent with these changes, continuous curriculum evaluation, revision and updating will have to become a regular feature which should be correspondingly backed up by removal of obsolescence of equipment, and ensuring the quality and commitment of teachers. Thus steps on a continuing basis will have to be taken for modernization and removal of obsolescence of laboratories and workshops and for staff training and retraining, both pre-service and inservice. Future teachers will be required to play, as envisaged in NPE - 1986, multiple roles, including teaching, research, consultancy, extension work and planning. This will call for new steps and strategies to attract bright young people for teaching in technical institutions.

Further, new technologies for delivery of instructions, such as Computer Assisted Learning, Satellite Based Interactive Distance Learning, Internet, etc

have to be introduced and intensively utilised.

3.8 Linkages Between Institutions and Stake Holders :

To ensure the relevance of technical manpower development, intensive mutual involvement of the institutions users and the funding agencies is necessary. To cause this involvement on an ongoing basis, some mechanics must be institutionalized. Some of these could be :

- Undertaking jointly marketable technology research and development programmes.
- Networking of resources, physical and intellectual, for mutual benefit of all stake holders.
- Granting autonomy top institutions to enable them freedom in decision making at the institute level on issues such as establishing linkages with industry and other organizations, generating and utilizing resources, forging international linkages, introducing changes in curricula developing and introducing new evaluation systems etc.

3.9 Continuing Education :

Steps have been taken for the last more than two decades to provide opportunities for teachers as well as practising engineers to undergo higher education programmes in engineering institutions and universities. However, emphasis on providing short-term continuing education programmes for updating technical personnel in modern technological developments needs to be substantially improved. The relevance and success of continuing education progr-

ammes will remarkably increase if a close collaboration is sought between the concerned industries and the institutions in offering such programmes.

3.10 Integrated Technical Education System :

The existing four tier system of technical education has provided technical manpower at various levels which has usefully contributed to industrial development over the years. The developments in the industrial scenario and changes in technologies have brought about changes in the industrial manpower structure. The interaction between the various levels of technical manpower is becoming increasingly more important, as also the need to develop an integrated technical education system by linking the four tiers in the same institutions and where necessary across different institutions.

4. CONCLUSION :

The authors have highlighted some of the areas which need to be addressed to train high quality technical man-

power which are the key to ensuring that goods and services marketed by India conform to the highest quality standards so as to become international competitive.

Attention has to be focused on the highest quality of curriculum delivery and the promotion of creativity amongst students. Training and retraining of teachers must become a regular feature during their career progression. Environmental protection, development of entrepreneurship, synergic efforts towards rural development, extending the reach of technical education to the deprived sections of society and continuing education for working professionals are areas which the colleges and polytechnics should incorporate as important part of their activity. Efforts in these directions will indeed enable the technical education system to meet the rapidly changing industrial needs as these emerge while India forges ahead in becoming an important player in world economy.

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