3. A Brief History of the Development of Technical Education in India
3. A BRIEF HISTORY OF DEVELOPMENT OF TECHNICAL EDUCATION IN INDIA

Technical education in India, started as early as in 1824 when ‘the Engineering Class’ was started in Bombay but its subsequent record is not available. In the year 1844 ‘a class trainee Engineers’ was started in Eiphiston Institute at Bombay but for want of suitable candidates for admission to the class, it was closed at the end of 1847.

As per information available in the reports particularly in the ‘Educational Records of Government of India at the National Archives office of India, an issue of ‘Technical Education’ was raised first when the Court of Directors of East India company in the ‘Historical Dispatch on the Education of 1854’ asked to the government to consider, how useful and practical knowledge could be provided to the people in India. However, no action was taken to carry the wishes of Directors.  

The early development and expansion of technical education in India was based on the actual requirements of Public Works department and industrial growth in India. In the middle of the 19th century there was great demand for trained Engineers and subordinate in various staff industrial sectors and Public Works department. To meet the demands, the following Engineering Colleges were started in some parts of India.

(1) Thomson Civil Engineering College, Roorkee in 1847.
(2) College of Engineering, Poona in 1854.
(3) Engineering College at Guindy - Madras in 1857 and at Shibpur in 1858.

3.1 MACDONNEL EDUCATION COMMISSION 1886:

The Macdonnel Education Commission was appointed in 1880 to study and to recommend better Engineering Education. The commission felt that, the training in the Engineering Colleges was theoretical and was completely isolated from practical side and

recommended that the proper technical education should help in manufacturing and industrial developments and it should be based on the sound principle 'Supply should follow demand'.

3.2 Sir E. C. Buck Commission 1901:

This commission was appointed to discuss with Provincial government for inclusion of handwork in curriculum of Primary Schools. It's important recommendations are:

(1) Standardization of nomenclature of schools and courses.
(2) Separate department for technical and industrial education.
(3) The Technical Education should be practical based.
(4) Further it is stated in the report that the curriculum of Technical Education should include teaching of everything that is not taught in ordinary schools.

This is the first report where it is mentioned that the textbooks should be prescribed for drawing subject. 40

3.3 Simala Education Conference 1901:

This conference reviewed existing condition and recommended some effecting changes in the methods of imparting Technical Education. One of the important achievement of this conference was recommendation of ten foreign scholarships for study in Industrial Science and Industrial Research. The government of India accepted the recommendation of the Conference to establish Industrial Schools to encourage the local Industries and trades.


(3.2)
3.4 INDIAN INDUSTRIAL COMMISSION: REPORT 1916-18

This commission was appointed in 1916 to study the following aspects:

(1) New openings to professional employment in Commerce and Industry.

(2) Encouragement to Industrial Developments.

(3) To study closer touch of Technical Institutions with the employers of manpower and to consider the relation between Research activities & Industries to promote the facilities in India and abroad. The Indian Institute of Science, Bangalore, was the outcome of this idea.

The commission had examined the reasons as to why India did not shared in Industrial Revolution. It also pointed out the defects in the existing Technical Education system and proposed new changes.\(^45,46\)

3.5 MR. ABBOTT AND WOOD REPORT 1936-38:

This report gave a good sight to education-alist for designing a technical and Vocational Education for rapid Industrial Development of the country. They have proposed that the primary function of Technical Education is to satisfy the need of Commerce and Industry.

3.6 WARDHA SCHEME -1937

All India National Conference was held at Wardha in 1936 under the presidency of Mahatma Gandhi. 'Wardha Scheme' was proposed by Dr. Zakir Hussain and the plan was known as 'Post-war Industrial Training of Engineering personnel - A plan for India. It is revealed from the various reports of the Committees and commissions, that constant efforts have been made since 1854 onwards for the development and improvement of Technical Education in India.

\(^45\). INDIA - a reference manual, New Delhi, Ministry of Information and Broadcasting 1971.

3.7 PRESENT POSITION IN INDIA

Even though the first Technical Institution in India was started in the middle of 19th century, the progress of Technical Education was static up to world war second. Much attention was paid to the problem of advancement of Technical Education and training to meet the needs of country particularly commerce and industries. To achieve this aim "All India Council for Technical Education" (AICTE) was established in 1946 to advice, direct and coordinate the development of Technical Education in the country. It carried out a Survey of Technical Institutions in India and formulated a scheme for immediate improvement and development. Similarly, four ‘Regional Committees and seven Boards of Technical Studies’ were set up to survey the needs and to prepare syllabi of different courses and levels. The organizational structure of technical education in India is shown in figure No. 3.1.

The scope of the Technical Education is enlisted in the table given below

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>diploma, degree and post graduation</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>diploma, degree and post graduation</td>
</tr>
<tr>
<td>Architecture</td>
<td>diploma, degree and post graduation</td>
</tr>
<tr>
<td>Hotel Management</td>
<td>diploma, degree and post graduation</td>
</tr>
<tr>
<td>Master of Business Administration</td>
<td>diploma, degree and post graduation</td>
</tr>
</tbody>
</table>


3.8 RAPID GROWTH OF TECHNICAL INSTITUTIONS

There are 400 Polytechnics with annual intake of 65,000 students, 47 Polytechnics for girls with 6,000 intake. There are 160 degree Colleges with annual intake of 30,000 students. There are 96 Institutions which are imparting Post Graduate Education in

* Education is an ornament in prosperity and refuge in adversity.
Engineering, five Indian Institute of Technologys which are providing undergraduate, Post-graduate degree Courses in Sciences and Technology and facilities for Doctoral Research till 1970.

There are 70 other Engineering Colleges and University Departments which offer facilities for Post Graduate courses in Engineering and Technology with an annual intake of about 3,500 students. There are 15 Regional Engineering Colleges and number of other Technological Institutions providing facilities for Engineering and Technological Education in India. There are 4 Technical Teachers Training Centers at Calcutta, Bhopal, Chandigarh and Madras for providing training to Technical teachers in India.

3.9 CURRICULUM IN ENGINEERING

In the early history of technical education the scope was limited to Civil, Mechanical and Electrical Engineering. Similarly, subjects like Agriculture, Forestry were also taught whereas the picture has now changed. In 1979, 55 courses were conducted in different technical institutions and 18 courses were taught in women’s Polytechnics in the country.

3.10 APPOINTMENT OF SCIENTIFIC MANPOWER COMMITTEE

A Scientific Manpower Committee was appointed in 1947, to find out the requirements of various categories of Scientific and Technical personnel and to recommend some measure to meet them.

3.10.1 STRUCTURE OF TECHNICAL EDUCATION

The Technical Education in India is rendered usually at four levels Diploma, Degree, Post Graduate and Doctoral Research. The objective of Degree Course is to train technologists/Engineers, whereas the Diploma Courses are designed to train technicians who usually supervise the work as overseers.

* IN ORDER to succeed we must first believe that we can — Michael Korda
FIG (3.1) ORGANISATIONAL STRUCTURE FOR TECHNICAL EDUCATION
The duration of various courses are given below

<table>
<thead>
<tr>
<th>Course</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diploma</td>
<td>3 years after X, 2 years after XII</td>
</tr>
<tr>
<td>Degree</td>
<td>4 years after XII</td>
</tr>
<tr>
<td>Architecture</td>
<td>5 years after XII</td>
</tr>
<tr>
<td>Post Diploma</td>
<td>1 1/2 years after diploma</td>
</tr>
<tr>
<td>Full time Post Graduation</td>
<td>1 1/2 years</td>
</tr>
<tr>
<td>Part time Post Graduation</td>
<td>2 1/2 years</td>
</tr>
</tbody>
</table>


3.11 ROLE OF INSTITUTION OF ENGINEERS (INDIA)

The Institution of Engineers (India) was established by Sir Thomas Holland on 3rd Jan., 1919 at Calcutta. The aim of this Institution is to form a society for the advancement of branches of Engineering in India, and to facilitate the exchange of information and ideas among the members. The Institution carried out its activities through its local centers in different states all over the country. It conducts examinations in May and November every year for students and associate members. The examinations are recognized as requisite qualification for Engineering services by Union Public Service Commission (UPSC). The members of Institution can appear directly for examinations without joining any academic Institution. So in a true sense this is a first ‘Open University’.

The Institution also publishes Journals and Bulletins in most of the Engineering branches. Similarly, paper discussed in the meeting and conferences are also published in

* The more you study the more you discover your ignorance.
these journals. This Institutions plays a vital role for continuing Education in Engineering and Technology in India for those who are in service.

3.12 A BRIEF HISTORY OF TECHNICAL EDUCATION IN MAHARASHTRA STATE (M.S.):

In the year 1844 a class for trainee Engineers was opened in Elphinstone Institute at Bombay. This was the first technical Institute in India and also in Maharashtra, but it was closed in 1847 for want of suitable candidates. The Poona Engineering class and Mechanical school was established in 1854 to meet the demands of Public Works Department.

This class was converted to Engineering College in 1863 due to handsome donation of Rupees Fifty Thousand by Sir Cowaji Jahangir Readymoney. The College was affiliated to Bombay University. Later on classes in Agriculture and Forestry were added. The name was changed to the College of Science in 1890. In 1912 it took the name 'Poona Engineering College'. Since 1909, Bachelor of Engineering (B.E.) Degree courses in Civil, Mechanical and Electrical Engineering were started in the same College. Various eminent engineers like Sir Vishveshvariya were the students of this College.

The historical background of Technical Education in Maharashtra is tabulated in the following table.

<table>
<thead>
<tr>
<th>Details</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey school in Madras</td>
<td>1794</td>
</tr>
<tr>
<td>Bombay Native Education Society</td>
<td>1824</td>
</tr>
<tr>
<td>Elphinstone institutions</td>
<td>1844</td>
</tr>
<tr>
<td>Thomson Civil Engineering College Roorkee</td>
<td>1847</td>
</tr>
<tr>
<td>Victoria Jubilee Technological Institute Mumbai</td>
<td>1887</td>
</tr>
</tbody>
</table>

* Culture is to know the best that has been Bachelor said and thorough in the world. (3.8)
<table>
<thead>
<tr>
<th>Details</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>College of Engineering Jadavpur (Bengal)</td>
<td>1908</td>
</tr>
<tr>
<td>College of Engineering Pune with Civil Engg</td>
<td>1912</td>
</tr>
<tr>
<td>Directorate of Technical Education</td>
<td>1948</td>
</tr>
<tr>
<td>Kothari Commission</td>
<td>1968</td>
</tr>
<tr>
<td>National Policy on Education</td>
<td>1986</td>
</tr>
<tr>
<td>All India Council for Technical Education Act</td>
<td>1987</td>
</tr>
</tbody>
</table>


3.12.1 THE VICTORIA JUBILEE TECHNOLOGICAL INSTITUTE (VJTI) : PREMIER INSTITUTE

VJTI was established at Bombay in the year 1886. Due to major interest and influence shown by His Excellency the late Lord Reay, then Governor of Bombay, with the cooperation of trustees and leading capitalists of Bombay city. This Institute was established to meet the demands of textile and Mechanical Industries. Later on in 1901 Electrical branch was introduced. From June 1913 VJTI was recognized as a Central Technical Institute for Bombay and given power to control the Technical and Industrial Education in the Bombay Province.

3.12.2 J. J. COLLEGE OF ARCHITECTURE : BOMBAY

The J. J. College of Architecture Bombay was established in 1896 to provide instructions and training for the students wishing to become practicing Architects, the curriculum of this College was based on the Board of Architectural Education of Royal Institute of British Architects U.K. This course is of 5 years duration and 70 students are admitted to this course every year.

* Education can train but not create intelligence.
3.12.3 SIR VISHVESHAVRIYA COMMITTEE REPORT 1921-22

This Committee submitted a report to Bombay Government proposing a very comprehensive scheme for Technical and Industrial Education for the Bombay Province. One of the important consideration was to introduce part time courses under the apprenticeship scheme and also the formation of joint directorate for Technical Education.

3.12.4 NEED FOR PRACTICAL TRAINING : REPORT OF THE ATKINSON DONSON COMMITTEE 1912

This surveyed the position of outgoing Engineering students and recommended that such personnel should be sent for an apprenticeship training for two years after completion of formal education in the Technical Institutes.

3.12.5 NEED FOR EXPANSION OF TECHNICAL EDUCATION

The Government of Bombay issued a resolution in 1947 and expressed the need for expansion and coordination of Technical and Industrial Education in Bombay. The opening of Engineering College at Ahmedabad was the outcome of Dalal Committee recommendations.

3.12.6 TECHNICAL EDUCATION AFTER INDEPENDENCES

After independence the Government of India recognized the importance of Technical Education to provide trained manpower for industries for economic development of the country. Similarly, the Government revised syllabi, curriculum of courses to maintain the uniform standard, and made provisions for adequate industrial training facilities for providing practical training. A uniform scheme of examination was introduced for all Polytechnics in the Country. According to new policy, many Technical Institutions are established in the State. The Walchand Hirachand Engineering College was established in 1947 at Sangli.

* You are never a loser until you quit trying.
3.12.7 PRESENT POSITION

Today in Maharashtra there are six Government Colleges located at Poona, Karad, Aurangabad, Amravati, Chandrapur and Jalgaon and one Regional Engineering College at Nagpur, one technological Institute at Matunga, Bombay, one Architecture College at Bombay. Three Aided Private Colleges at Sangli, Bombay and Nanded and about 47 private non Aided Engineering Colleges in the State. Similarly, at IIT Bombay Education from first level degree to Doctoral Research is imparted. Now Technical Education is available right from conventional branches such as Civil, Electrical, Mechanical to the most advanced course such as computer Engineering, Polymers, Petrochemical Engineering and so on. Over a period of time technical education in Maharashtra have had a tremendous growth as depicted in the following table.

Table (3.4) - Growth of Technical Education in Maharashtra

<table>
<thead>
<tr>
<th>Year</th>
<th>Engineering</th>
<th>Pharmacy</th>
<th>Architecture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Degree</td>
<td>Diploma</td>
<td>Degree</td>
</tr>
<tr>
<td>1947</td>
<td>5</td>
<td>21</td>
<td>1</td>
</tr>
<tr>
<td>1960</td>
<td>8</td>
<td>33</td>
<td>3</td>
</tr>
<tr>
<td>1970</td>
<td>10</td>
<td>42</td>
<td>4</td>
</tr>
<tr>
<td>1980</td>
<td>10</td>
<td>44</td>
<td>6</td>
</tr>
<tr>
<td>1990</td>
<td>69</td>
<td>143</td>
<td>13</td>
</tr>
<tr>
<td>1998</td>
<td>103</td>
<td>168</td>
<td>44</td>
</tr>
</tbody>
</table>


* Master the previous before leaping to the subsequent. - Richard S. Stoma (3.11)
With the increase in number of technical institute technical education is now no more a privilege of the intellectual few which can be seen from the increasing intake as shown in the underline table.

Table (3.5): Intake for various courses in Technical Education.

<table>
<thead>
<tr>
<th>Course</th>
<th>Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diploma in Engineering</td>
<td>27985</td>
</tr>
<tr>
<td>Diploma in Pharmacy</td>
<td>3650</td>
</tr>
<tr>
<td>Diploma in Hotel Management</td>
<td>5486</td>
</tr>
<tr>
<td>Diploma in Correspondence</td>
<td>400</td>
</tr>
<tr>
<td>Part time diploma in Engineering</td>
<td>920</td>
</tr>
<tr>
<td>Post diploma</td>
<td>5486</td>
</tr>
<tr>
<td>Part time degree in engineering</td>
<td>600</td>
</tr>
<tr>
<td>Degree in Engineering &amp; Technology</td>
<td>25799</td>
</tr>
</tbody>
</table>

* First be effective, then devise ways to be efficient. - Richard S. Sioma (3.12)
<table>
<thead>
<tr>
<th>Course</th>
<th>Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree in architecture</td>
<td>1217</td>
</tr>
<tr>
<td>Degree in Pharmacy</td>
<td>2050</td>
</tr>
<tr>
<td>Degree in hotel Management</td>
<td>280</td>
</tr>
<tr>
<td>Post graduation in engineering</td>
<td>750</td>
</tr>
<tr>
<td>Post graduation in management</td>
<td>5400</td>
</tr>
</tbody>
</table>


The current statistics of the number of the courses available is given below

Table (3.6) - Number of Courses Under Technical Education.

<table>
<thead>
<tr>
<th>Course</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree courses</td>
<td>47</td>
</tr>
<tr>
<td>Diploma courses post SSC</td>
<td>61</td>
</tr>
<tr>
<td>Diploma courses post HSC</td>
<td>05</td>
</tr>
<tr>
<td>PG Diploma courses</td>
<td>13</td>
</tr>
<tr>
<td>Post Diploma courses</td>
<td>19</td>
</tr>
<tr>
<td>PG Management courses</td>
<td>09</td>
</tr>
</tbody>
</table>

(PG - Post Graduate)


* Either find a way or make one.
3.12.8 INDEPENDENT DIRECTORATE

The Technical and Industrial Education in the State was formerly under the Director of Industries. In order to provide for more effective control and development of Technical Education, the Bombay Government set up a special organization since June 1948 known as 'Department of Technical Education'.

In view of vast development and expansion in this department, in this field in the State, two separate directorates were formed. One for Vocational and Industrial training and another for Polytechnics and Engineering Colleges since 1984-85. From the literature referred so far it is observed that the major stress was given on linking the education with the industry to satisfy the growing demands and the improvements in implementation of the various schemes were suggested. In doing this the emphasis is laid on the infrastructure.

3.13 RESPONSIBILITIES OF ENGINEERING ACADEMIC INSTITUTIONS

The Engineering Academic Institutions have an important role in providing qualitative education to Engineers of the country. The education which is being provided to an Engineer must be able to develop a firm foundation upon which the Engineer can build his professional career and social competence after learning. The selection of the areas of learning and the depth of treatment to be given to each of these is the most difficult task. Hence those who are policy makers of engineering education, should clearly understand the true nature of Engineering education, suitable to our conditions, country and industry with a keen sense of Indian values. Engineering education must be sound in curriculum and course contents, good in instructions, administration and it should be able to direct to the engineer towards the service to humanity. The knowledge provided to the engineers should be concrete, tangible, usable and with the systematic background for straight thinking. The Engineering Education should, therefore, be provided to the students with the basic scientific knowledge to

* Be silent unless you have something better to say. - Pytha gorus
support the superstructure of specialization encountered in engineering practices. In the process of learning opportunities to learn the subjects beyond the syllabi should be made available. The thoroughness of engineer is only possible if sound knowledge of advancement is made available to him through the Library and Laboratory. The engineering educational process is one of the team work which includes students, faculty members and infrastructure.

Secondly industry and engineering education are dependent on each other. They have been experiencing great value in collaboration on Research in Scientific and Technological fields, and linkage between Research and Development sector of industry and the scientific Research Institutions is quite common in all parts of the globe. In advanced countries, a massive overall impact of technology on production is visible. But in Asian countries with exception of Japan, this impact tend to be relatively limited to the narrow model sector of industrial production.

The quality of manpower is one of the most important factor that determines the rate of economic progress of a country. Hence it is the responsibility of the engineering Academic Institutions to provide suitable, adequate and skilled manpower for the economic progress of the country. The rapid industrial progress of some countries like Japan, Netherlands etc. clearly indicates that, a country possessing a highly skilled work force can attain a very high level of economic development even if it is not rich in natural resources of it’s own.

3.14 ROLE OF VARIOUS AGENCIES IN THE DEVELOPMENT OF TECHNICAL EDUCATION IN INDIA

Technology is concerned with the development and application of knowledge and experience to satisfy human needs, and involves the production and use of goods and services. One of it’s important consequences is the fragmentation of the tasks into it’s component parts so that they may be addressed by the established areas of scientific or

* Power and fame are hard to maintain if erected on the basis of error and lies. - G. B. Shaw
engineering knowledge. Most of the consequences of technology, as it is practiced today, derive from this reductionist methodology, which involves the investigation of the properties of the isolated parts in order to obtain an effective understanding of a complex system. It is being increasingly realized that reductionist bias tends to isolate scientific disciplines from each other, and all of them from each other, and all of them from the real world, shielding basic science from a concern for real-life problems, such as environmental degradation.

3.14.1 THE BASIC CHARACTERISTICS OF TECHNOLOGY

There are several basic features of Technology. It is primarily and ideational process involving the ideas to transform the material and non-material world. Technology is behavioral as it implies the use of skills in both tool creation and tool use. It becomes organizational and institutional. Technology, as ideas or knowledge, and as material artifacts, is transmitted through culture. The dynamic nature of Technology can come into conflict with the restrictive institutional beliefs and practices. Technology is cumulative and combinational once the process of Technology is under way, it gains momentum from the ability to combine, recombine, and modify existing Technology. It is an interactive process incorporating feedback loops with other social activities. Technological development creates pressures for change in society. In order to meet the needs and aspirations of a creates demands for technological changes. The management of technology is the art of reconciling these pressures and demands. It is concerned with the development of capabilities of individuals, and the characteristics of institutions, to match the potential benefits, and to overcome the hazards, resulting from technological change. Its essence is to enable society to keep its options open by continually adding to the sum of technological knowledge. Technological change is an accelerating process. The opportunity for new techniques increases geometrically as the number of basic ideas increases arithmetically. Technology is a problem solving process. The selection of Technology depends upon cultural, environmental and economic criteria that define a problem and the characteristics of its solutions.

* It always works when you know what you are doing. 

- Richard Bach

(3.16)
Technology, is likely to bring about cultural change, since it involves behavioral aspects. Management of technology includes the methods and mechanisms through which the development and application of technology is organized, conducted and controlled. In order to exercise effective control, it is necessary to know and comprehend the consequences of technological changes.

3.14.2 BRING NEW TECHNOLOGY IN INDUSTRIAL ESTATES

A large scale program is undertaken by Central and State Governments to set up industrial estates, and growth centers. Large investments are being made in them to provide infrastructure like land, water, electricity etc. Huge amounts of Loans and subsidies, in backward areas, are being given to entrepreneurs. Young enthusiastic persons are taking up to entrepreneurship, working hard day and night with a dream to become industrialist. However, many of them, in the course of time become sick. Some enterprises are born sick due to wrong conception and absence of maternity homes for industries. Some choose wrong technology and their future in spite of big market and hardwork is not bright.

3.14.3 ROLE OF HIGHER EDUCATION INSTITUTES IN INDUSTRIAL ESTATES

The academic institutes, college, IITS and Council of Scientific and Industrial Research (CSIR) Laboratory should have to show concern as to why many industries become sick technology, the existing systems and procedures of industrial estates will have to be altered. It is not enough now to have money and raw materials to run an industry. Appropriate technology has assumed high importance.

3.15 ROLE OF PROFESSIONAL SOCIETIES IN TECHNICAL EDUCATION

World Bank Report \(^{86}\) comments that "The key for developing countries is not to produce knowledge but to acquire, adapt and use it effectively".

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86. Wagbodekar P. H. 'Educational Technology In 2000 A.D.' Proceedings of the 23rd Annual International Conference by All India Association for Educational Technology (AIAET), New Delhi, 31st Oct. - 4 Nov. 91.
The world of today belongs to professionals and specialists. They have undergone systematic training which is necessary to solve a class of problems. These problems and problem situations are integral parts of our society and of our developmental process. Solutions to such problems are to be obtained from professionals in that field.

Professional societies consist of groups of professionals who have more or less similar background and interests. Every professional society has a code of Conduct and Ethics for its members which will emphasize the dignity of the profession. The society gives them opportunity to work together for the common goal of the profession and ultimately the society. Let us examine how a professional society differs from a commercial organization or specialist department.

3.15.1 UNIQUE POSITION OF A PROFESSIONAL SOCIETY

Professional societies have a unique position in which specialists and experts have associated themselves voluntarily for achieving common objectives. Because of this the professional society is able to call upon from a large reservoir of highly variable and competent expertise which is not likely to be available even to a large consultancy/commercial organization or a specialist department. Because of this and more important, because the specialists and experts agree to contribute their time and expertise at little or no cost, many processes of evaluation, expert assessment, monitoring, accreditation etc. are being easily facilitated through the professional societies. Any person representing an organization has to necessarily represent the views and interest of the organization. For example, a government employee representing the government in a forum cannot deviate from the laid policy of the government. However, the same individual called upon to serve as expert under a professional society is free from such constraint because he will be serving the professional society or its committee/group in a private capacity and as such is free to give...

* Success is a journey, not a destination. - Ben Sweetland.
his objective views on the task in hand. This was followed by another policy statement by the Governor General in 1913 a decadlater, stressing the importance of Technical Education. It said: "No branch of education at present evokes greater public interest than technical and industrial instruction... an Indian Institute of Science designed on a large scale has been established at Bangalore in 1911. The establishment of a Technological Institute for sugar manufacture and leather Technology, Textile Engineering etc. at Kanpur has been sanctioned. Industrial schools have been opened in several provinces." Altogether, the number of technical and industrial schools have risen by then to 218 in different states and the number of pupils attending them to 10535. No attempt had, however, been made to regulate and control standards of technical education. All these institutions were managed by the State Governments and the user agencies viz. Railway etc.

The reports of the Technical Education Committee of the Central Advisory Board of Education, 1943 and the Sargent Report, January 1944, however, stressed the need for the development of technical institutions as an integral part of the national system. The Sargent Report went on to say:

"... Any scheme for the development of technical instruction as an integral part of a national system must have a two-fold character. It must both be a link between education and industry and it must at the same time receive quite separate consideration as a form of mental training which is especially suited to certain types of intelligence, irrespective of their future occupations".

3.16 DEVELOPMENT IN TECHNICAL EDUCATION

Since 1948 to 1960 till bilingual, state of Maharashtra and Gujarat were together, an engineering college at Ahmedabad, a separate polytechnic at Pune and two model polytechnics one at Bombay and other at Ahmedabad were started. Alongwith this

* The sharp intellect is a better weapon than the the rough tongue. - Graville Janner (3.19)
Technical High Schools & Technical High School centers were also started to orient the students towards Engineering Profession. The concept of centers were also started to orient the students towards Engineering Profession. The concept of Technical High School center was novel concept in that, it could cater to needs of the purely academic schools in the locality of very low cost in terms of infrastructure and running expenditure. Formation of State of Maharashtra in 1960 opened a new chapter in Technical Education and the activities of the directorate increased manifold. With industrial development, the need of technical manpower grew to a large extent. To cater to this need new industrial training institutes, polytechnics and engineering colleges were started. These institutes produced skilled workers, artisans, technically qualified supervisors, shop-floor and design engineers. By 1978 the number of degree level institutes rose to 16, the Diploma level institutes to 50. Also post graduation facilities were developed in 9 institutions. Similarly the Industrial Training Institutes and Technical High Schools also increased in large numbers. By 1987 almost every district, excepting the four districts viz Ahmednagar, Wardha, Gadchiroli & Riagad had a government polytechnic.

However the demand for the Engineering Degree and Diploma Courses was on the rise. Many deserving students were unable to get admission to these courses due to limited seats available in government and government Aided Institutes. Therefore with a pragmatic view to give opportunities to the aspiring students, the government decided to grant permission to private Social and Educational Managements to start un-aided Engineering Colleges and Polytechnics. Similarly new Industrial training institutes and Technical High School Centers were also started.

3.17 EXPANSION OF TECHNICAL EDUCATION

Due to the very large growth and in order to facilitate monitoring and development of Technical Institutes and courses, the Directorate of Technical Education was

* Delay is the deadliest form of denial.
bifurcated and Directorate of Vocational Education and Training was formed. This new Directorate was given the charge of Industrial Training Institutes, Technical High Schools and certificate course institutions in the state.

The Directorate of Technical Education was given the charge of Degree and diploma level Institutions in Engineering and Technology, Architecture, Pharmacy, Allied Technologies like Hotel Management and Catering Technology, Printing Technology, Surface Coating Technology, Leather Technology, Sugar Technology, Textile Technology, Computer Technology etc. The Directorate was also entrusted with the monitoring and control of Management Institutions imparting Degree and Diploma level training in various branches of management.

The advancement in Technology and Developments in new areas of Technology has made it necessary to start new courses in the new and emerging areas to cater to the needs of the industry and society. Therefore the permission to the non-aided institutes was granted for courses in new and emerging technologies or as it was at that time termed "Non-Conventional Courses". Thus new degrees and diploma courses in Industrial Electronics, Computer Technology, Chemical Engineering, Bio-medical Engineering, Construction Technology, Production Engineering. The Diploma Courses such as in Packaging Technology, Man-made Textile, Fiber Optics, Information Technology, Telematics, Foundry Technology, Tool Design, Plastics and Polymer Engineering etc. were also started in Government institutions under World Bank Assisted Project.

3.18 EVOLUTION OF NATIONAL POLICIES AND THEIR IMPLEMENTATION

Professional Societies have easy access to large number of their members distributed all over the country. These members are professionals working in various positions, but with a common professional interest. So, whenever a national policy on a particular issue

* Trouble is opportunity in work clothes.
has to be evolved, it will be quite easy for the Government to seek the assistance of professional bodies which are concerned about the issue. The Professional society can get the issue discussed and proper guidelines evolved at the chapter level, state level and national level through it's network of regional centers and local chapters.

At many instances, the initiative to evolve new policies can come from the professional society itself. Whenever there is a degradation in standard in the profession or in the performance of it’s members, it will be easy for the professional society to feel the same and suggest remedial measures to the concerned authorities.

Another area where a professional society can play a great role is in the implementation of various programs relating to the profession. Here also accessibility to a large number of experts and institutions are the main strength of the professional society. Generally the experts contribute their time and expertise at no or little cost.

The tasks before the technical education sector has been well identified and detailed in various documents such as National Policy on Education - 1986 and Program of Action - 1987. However, it can be mentioned briefly that the improvement and advances in this sector of education will primarily consist of the following:

(a) curriculum updating including incorporation of technical advances in the professional curriculum.
(b) updating the competency and skills of the engineering faculty in a rapidly changing technological scene.
(c) modernizing laboratory and instructional methods including removal of obsolescence, use of multi-media instructional packages.
(d) providing management inputs at various levels for optimum utilization of resources.

* All running is useless if you have not started in time. - Charles Buxton.
These tasks require more or less the sustained help assistance and inputs from highly competent experts and specialists. Professional societies such as the Indian Society for Technical Education (ISTE) which has membership of all engineering disciplines and specializations, can such play a unique role in supplying such inputs at very low cost and in the least possible time. Evaluation of academic environment in an institution is very important in assessing the overall potential and capability of the institution. This can be done effectively only by an outside competent body, such as professional society consisting of experts and specialists who will interact with various elements such as students, faculty, administrative staff, alumni, supporting staff, parents, employers, etc.

3.18.1 THE INDIAN SCENE

In India, we have a large number of professional societies concerned with engineering and technology. However, most of these engineering societies have been totally ineffective in contributing to the quality and standards in technical education. Most of them seem to be pre-occupied with their membership drives and their own examination systems. A few day-today activities are undertaken with no specific long range goal or aim. They have exhibited minimum interest or concern in the field of technical education. When a large number of technical institutions sprung up in the country in the last one decade without proper infrastructure and faculty, the professional societies have not expressed their views for or against these phenomenon. When the salary scales of engineering teachers were very low compared with those in the industry and field, no professional society put pressure on the Government to revise the pay scale of engineering teachers. When there is continuous erosion of the standard of technical education, these societies have not taken up a single step to rectify it.

* Failure is just a bent on the road, it is not the end of Journey.
3.19 VARIOUS AGENCIES

3.19.1 INDIAN SOCIETY FOR TECHNICAL EDUCATION

The only exception to the above stated non-involvement of professional societies in contribution to the quality and standards of technical education is the Indian Society for Technical Education (ISTE). ISTE is the only national professional society of engineering teachers and administrators. First started in 1941 as the “Association of Principals of Technical Institutions,” it was converted into “Indian Society for Technical Education,” in 1967 with a view to enlarge its activities to advance the cause of technological education. Its membership is now open to any person who is actively interested in or concerned with technical education.

Being the only national organization of educators in the field of engineering and technology, ISTE is being represented in various technical committees and boards formed by the Ministry of Human Resource Development (HRD) and AICTE. They have also been involving the ISTE in many of their important programs and activities relating to technical education.

ISTE has contributed much in promoting the quality and standards of technical education. It had played an important role in the formulation of the National Policy on Education 1986, formulating the AICTE (All India Council for Technical Education) Norms and Standards for Engineering Colleges and polytechnics in organizing project review meetings for thrust areas in technical education, in preparing directories on technical personnel and expertise, in arranging conferences and workshops on various topics of importance to technical education, in preparing teacher-manuals for most of the engineering subjects, in preparing and updating model curriculum for various courses and in conducting a variety of continuing education programs for upgrading the skills and knowledge of engineering teachers and other working professionals.

* Participation works on the integrative principle of decision making.
3.19.1.1 OBJECTIVES OF ISTE

1. To provide support to technical institutions in the country in effecting the necessary changes in the various policies concerning the different aspects of establishment, development and management of technical institutions.

2. To assist Technical Institutions in the development of their faculty and staff by way of co-ordinating and organizing staff development programs both in the offering practical training, exchange of personnel etc.

3. To collect information on all aspects relating to technical education including manpower needs and transfer the same to institutions members and other agencies for their use.

4. To provide expert services to technical institutions relating to project formulation, establishment of new institution, introducing new programs, planning infrastructural facilities, accreditation of programs/institution etc.

5. To act as a catalytic agent in the development of the institution’s own capabilities and potentialities in respect of curriculum, semester schedules, examination reforms etc. through supportive activities for self development.

3.19.1.2 STRATEGIES FOR MEETING OBJECTIVES

1. (i) Study teams/seminars workshops
   (ii) Working Groups/Task Group on specific issues
   (iii) Intervention for example dialogue with Government by ISTE

2. (i) Identify and organize staff development programs for faculty and support staff based on the assessment of the common needs of Technical institutions.
   (ii) Facilitate technical institutions in the planning and implementation of their staff development programs.
   (iii) Strive to introduce new programs for faculty development

(iv) Strive to promote case studies/action research in the area of teaching & learning.

3. (i) Formation of a Cell specifically for the purpose of collecting and transferring information on all aspects related to technical education through establishing linkages with various organizations.

(ii) Periodic publication of the information collected to the members & institutions.

(iii) Facilitate analysis of information collected.

4. (i) Assist in the documentation of case studies on institutional development taking the assistance of collaborative agencies.

(ii) Provide consultancy services to technical institutions in matters such as project formulation, establishing new institutions, introducing new programs, planning infrastructural facilities, accreditation of programs institution etc.

(iii) Provide assistance to AICTE, Government of India and State Governments in the formulation and implementation of programs relating to technical education.

5. (i) Bring out publication relating to curriculum of courses, examination systems, strategies for staff development etc.

(ii) Form study groups to provide assistance to institutions in the self developmental programs.

(iii) Provide assistance to technical institutions in the area of Accreditation/Evaluation.

(iv) Organize workshops & seminars at Institution/State/National levels for discussing problems of interest to technical institution.

3.19.1.3 FUTURE PERSPECTIVE FOR ISTE

ISTE has rendered 24 years of service to the cause of technical education in the country. It has entered the 25th Year in 1992. Nearly 60% of all technical institutions and their teachers are now members of the ISTE. ISTE has a national Executive Council of 32 members, 12 State level sections. 261 Chapters, 640 institutional members, 8400 yearly members and 10,600 life members. It has emerged as a strong representative organization of

*A satisfied need is not a motivator of behaviour.
technical teachers in the country. It has to play an effective advocacy role for its members and for technical education in the years to come. It lies in the fact that a very large number of its members are teachers in the field of technical education, which is a unique feature of ISTE. In this way, it is a reservoir of intellectuals. It is really a powerful think-tank. Being composed mainly of teachers, it may be weak in influencing potential decisions, but it can afford to be impartial in its assessment and judgment. It can command a certain degree of respectability. It can influence other engineering societies to make a definite stand and assert their views. It can help in formulating an action plan. ISTE will also be getting assistance from the Canadian International Development Agency (CIDA) in the next 4 years to strengthen ISTE as a national professional organization. It is also hoped that the Ministry of Human Resource Development (HRD) and the AICTE will continue to involve ISTE in all policy making and implementation processes relating to technical education. However, for a professional society to be really effective and strong, it should become financially independent.

3.19.2 ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

It was in response to the challenges of the post-war period that All India Council for Technical Education was set up by the Government of India in November 1945, on the recommendation made by the central Advisory Board of Education that “.... stimulate, co-ordinate and control the provision of educational facilities which industrial development in post-war period as well as existing industry will need; there must be an All India body in supreme charge”.

This recommendation arose out of the belief that Technical Education at higher stages could not, in modern time be effectively organized on a local or provincial basis. The Government recognized the need for the planned and balanced development of Technical Education and considered that as a preliminary to such development, a survey by

* Mutual respect and cooperation is a product of equal power.
competent body, of the existing facilities and probable post-war requirements was necessary and decided that the All India Council for Technical Education itself be assigned the task of this survey and advice.

3.19.3 ISTE and AICTE

There is a tremendous task before the AICTE with regard to planning, implementing, monitoring and coordinated development of technical education in the country. AICTE is now quite ill-equipped to perform these tasks satisfactorily. Almost all institutions and State Governments are expressing dissatisfaction over the performance of the AICTE. Even by strengthening the AICTE with additional staff and resources, it is doubtful whether AICTE will be able to improve its performance significantly. It is necessary for the AICTE to get the assistance of professional societies like the ISTE in performing many of the tasks assigned to it. Being a professional society of technical teachers and institutions, ISTE has at its control necessary expertise and organizational capability to carry out many of the tasks assigned to the AICTE.

The following are some areas where the AICTE should make use of the assistance of ISTE in improving its performance:

1. Organizing continuing education programs for engineering teachers using conventional and distance education modes.
2. Preparing model for various courses and keeping it updated from time to time.
3. Providing travel grant to teachers for presenting papers. Chairing technical sessions or delivering invited lectures in international and important national conferences and seminars.
4. Providing assistance to teachers and other experts for writing textbooks, laboratory manuals and monograms.

* Genius is merely a great aptitude for patience.
5. To constitute a National pool of Eminent Teachers in Engineering especially selected high technology areas and making the services of these teachers available to various smaller institutions for short periods. This will help transfer of technology and improve the standards of technical education.

6. To help AICTE in the Accreditation of various programs in technical institutions.

7. To maintain a comprehensive data base of technical education facilities and expertise in the country and keep it updated.

8. To assist in Technology watch and Forecasting and based on this to modify the engineering curriculum and provide training facilities to ensure availability of trained manpower for technologies of the future.

9. To organize conferences, workshops, and working group meeting on behalf of the AICTE.

10. To help in "Technical Education Research" on a continuing basis on specific aspects of technical education such as manpower needs training methodologies socioeconomic impact of various programs etc. and give feedback to AICTE which will help in planning for future.

3.19.4 ENGINEERING STAFF COLLEGE OF INDIA, HYDERABAD

The institution of Engineers(India) established the engineering staff college of India (ESCI) in 1981 at Hyderabad for providing continuing education and training to practicing engineers for raising their levels of efficiency and effectiveness. ESCI's goal is "to assist the engineering profession to manage technology and to absorb the advances in technology and to enhance their productivity." The stated objective of ESCI is to help engineers to fight the obsolescence danger. Retired engineers from universities and industry coordinate various courses. Instruction is mostly given by guest faculty drawn from Industry and Universities.

* Knowledge has to progress to remain knowledge.
3.19.5 INDIAN SOCIETY FOR CONTINUING ENGINEERING EDUCATION, ROORKEE (ISCEE)

It came into existence in Jun'93 at University of Roorkee. Its main objective is to provide continuing education for technical manpower. The various activities performed by ISCEE are:

1. Organization of Short term courses.
2. Resource sharing.
3. Maintenance of the data bank of eminent personalities in the specialized technical areas and their services to the required institutes as well as industries.
4. Provision of consultancy services.
5. Organization of Symposia, Conferences and Workshops.
6. Publication of the quarterly newsletter.

3.19.6 TECHNICAL TEACHER'S TRAINING INSTITUTE (T.T.T.I)

In the mid sixties four Technical Teacher's Training Institutes (T.T.T.I.) were established by the Government of India under their ongoing scheme of Quality Improvement in Technical Education, which are located at Bhopal(Western Region), Calcutta (eastern Region). Initially these institutions were expected to primarily to meet the scarcity of trained technical teachers due to expansion of polytechnic education. Over the years the nature of activities and the role of T.T.T.I. has expanded far beyond the teacher development concept. As a consequences of the transformation, T.T.T.I. has now become a resource institution of excellence for the technical education system of the country. It has also demonstrated it's potential for catering to the needs of allied education systems like degree institutions and vocational education, to industry training centers as well as to the needs of developing countries in technical education development.

* It always works when you know what you are doing. - Richard Bach.
3.19.6.1 OBJECTIVES OF TTTI:

1. To conduct Human Resource development programs for the staff of technical institutions at different levels.

2. To develop and supply teaching-learning resources, including print material, multimedia learning packages, educational television programs, video programs and Computer aided instruction packages.

3. To conceive and help in installing infrastructures in stages and institutions for facilitating:
   a. Curriculum development and course design.
   b. Linkage with industry.
   c. Technical manpower development for the unorganized and rural sectors.
   d. Distance learning.
   e. Instructional resource development.
   f. Student testing and evaluation and certification.
   g. Management development including project formulation and implementation, project program monitoring and evaluation.
   h. Educational research.
   i. Community development.
   j. Computer center establishment and utilization.
   k. Laboratory design and innovations.
   l. Continuing education.
   m. Manpower planning.

4. To establish network relationships with industries & communities, statesystems, other technical and management institutions, Research and Development organizations and professional bodies appropriate technology centers, non-governmental service agencies and international organizations.

5. To explore the advent of hi-tech in industry and to prepare the technical education

* A man is known by the company that keeps him.  
  - L. J. Peter.
systems to the introduction of hi-tech programs and learning experiences.

6. To innovate and develop new models and approaches in areas like methods, curriculum design, education and training technology, teacher development, establishment of linkages, student assessment, institutional management.

7. To review the performance of the state systems and help conceive & implement measures to enhance effectiveness of performance.

8. To chart out performance trends & developments in technical education, to disseminate information to technical education systems & network institutions and states for the purposes of idea and resources exchange.

9. To conceive & develop models & processes for managing change & innovations and assisting systems to bring about change and innovations.

10. To undertake policy analysis and research for facilitating policy formulation, implementation and review at all levels.

In this the researcher made a cursory attempt to find out how the technical education has been developed and to what extent it has helped in building a strong competent as well as qualified force of manpower. There are a good number of institutions that are working for improving the condition of technical education.

The present state of technical education is shaped as a result of many complementary policies of technical education and definitely it has contributed a sound techno-economic growth of India.

The technical education though has a historical background of four to five decades after independence and still it has many achievements to its credit, but still there is enough scope for its advancement and utility. In this research, the researcher has tried to find out how a right technical education policy help in formulation of appropriate manpower planning of skilled and intelligent workforce in India.

* When everyone is somebody then no one anybody.