CHAPTER I

GROWTH AND DEVELOPMENT OF POLYTECHNIC EDUCATION IN INDIA

1.1 INTRODUCTION:

Before we go into the details of technical education system prevailing in India, it will be worthwhile to have an overview of the total education system of which technical education is a part. The total education system has been represented in fig 1.1 (page 2).

The Primary Education starts at a age of 5+ and after a schooling of 5 years, students join secondary education for next 5 years and pass out boys and girls are called matriculate or 10+ certificate holders. A sizeable number of students dropout from the schools due to various socio-economic reasons and join unorganized sector as petty wage earners. The successful ones go for higher secondary education which is divided into academic and vocational streams.

The students who join academic stream pursue their BA / B.Sc. / MA / M.Sc. and Ph.D. Degrees and join the world of work at appropriate level as educated (socially useful) work force. Those who opt for engineering/technology courses complete their B.E. / ME degrees and join the world of work as Managers/Scientists/Engineers/Designers/Technologists etc.

A part of students enter into polytechnic after 10+ or after higher secondary and receive education / training for 3 years to earn a technician diploma and join industry as middle level shop floor managers or supervisors. Some students join Industrial Training Institutes (ITI) after 10+ and earn trade certificates and join world of work as skilled craftsmen.

Technical human resource is one of the most significant components of the human resource spectrum, contributing towards socio-economic development and improving the quality of life of the people. In recognition of the importance of this sector, successive Five Year Plans laid great emphasis on the growth and development of technical education in the country.
Fig 1.1 Representation of the Education System in India
Technical Education in India, can be considered essentially operating at 3 levels namely: certificate level education of engineering/technological and non-engineering disciplines; undergraduate and post graduate education in number of engineering/technology disciplines.

Certificate level education and training aims at producing skilled and semi-skilled workers for the world of work. Such training is imparted by Industrial Training Institutes (ITIs) and vocational schools. The entry of such training programmes is generally after 10 years of schooling i.e. matriculation, though in some trades, students who have completed 8 years of schooling are also admitted. This training scheme is looked after by the Ministry of Labour at the Center and certified by the Directorate General of Employment and Training (DGE&T) at the national level. Certificate level training is also supplemented by +2 vocational courses, under the 10+2 pattern of education. Vocational courses are offered in the major areas of agriculture, business, commerce, health and paramedical, home science and humanities in addition to engineering trades. The National Council for Vocational Training at the National level and Directorates of vocational education at state level manage these courses.

The second level of technical education is the diploma programmes offered at the polytechnics and aimed at producing middle level supervisory manpower designated as diploma holders/technician engineers. Admission to such programmes is available after 10 years of schooling. Diploma programmes are classified under the following three categories.

- Diploma programmes in engineering and technology like: Civil engineering, electrical engineering, mechanical engineering, electronics and communication engineering, production engineering, leather technology, textile technology, plastic technology etc.
- Diploma programmes in other vocational fields like: modern office practice, garment fabrication, beauty culture, library science, medical laboratory technology etc.
Diploma programmes in applied arts/ crafts like: interior design, architectural assistantship, commercial practice etc.

The above programmes are offered essentially through one of the following modes:

- Fixed and linear mode (Full time programmes)
- Multipoint entry and Credit System

Duration of full time programmes is generally three years after 10+. In some cases, like modern office practice, computer engineering etc, All India Council for Technical Education (AICTE) has raised the entry qualification from 10+ to 10+2. Some of the diploma programmes in vocational disciplines are of 2 years duration also. A few polytechnics offer diploma programmes on sandwich pattern. The duration of these programmes is generally three and half years with two semesters of training in industry.

Some polytechnics situated in industrial belts or big towns offer part-time diploma courses to facilitate continuing education of working craftsmen or for those engaged in industry/field having 10+ qualification. These programmes are of four year duration. Classes are held during evenings for about 15 hours of contact per week. A small percentage of polytechnics offer post diploma/advanced diploma programmes in specialized areas. The duration of these programmes is one and half years and two years respectively after a diploma programme.

The products of this sector are employed in wide ranging functional areas such as production, construction, erection, inspection, quality control, drafting, estimating, marketing and servicing. While the planning, promotion and control of this sector of technical education rests with the All India Council for Technical Education and the Bureau of Technical Education in the Ministry of Human Resource Development at the national level, it is essentially operated at the state level by the Directorates of Technical Education and the State Boards of Technical Education.
The third level of technical education at the undergraduate and postgraduate levels is available in colleges of engineering and institutes of technology; producing professional engineers and technologists. The programmes offered in broad based and diversified disciplines at the under-graduate level are of 4 years duration after higher secondary education i.e. 10+2 years of schooling. Programmes at this level are affiliated to different universities, which come under the purview of University Grants Commission or are offered by deemed Technological Universities/ Institutes.

In addition to the formal system of acquiring certificate, diploma, degree and higher qualifications, a non formal system of education run by professional bodies like Institution of Engineers, Institute of Electronics and Telecommunication Engineering, Computer Society of India etc also provide opportunities to specific target population for acquiring these professional qualifications. The technical education system in the country is represented diagramatically in fig 1.2 (page 6).

Polytechnic education system has been considered by the Government of India as an important sector of education for industrial growth and development and for production of quality products and services. Since this study deals with polytechnic education, the section to follow traces its growth and development, problems and issues and future perspective.

1.2 HISTORICAL DEVELOPMENT

1.2.1 Pre-Independence Period

The origin of polytechnic education in India can be traced as far back as 1830. Four schools of engineering were started as institutions attached to engineering colleges at Madras, Calcutta, Poona and Roorkee to train upper and lower subordinates (overseers, sub overseers and draftsmen) for the Public Works Department, Municipalities etc. in order to meet the requirements of technical personnel for the limited infrastructure existed at that time and proposed to be created to fulfill the objectives of colonial regime.
**Fig. 1.2 Technical Education System in India**

- **ITI**: Industrial Training Institutes
- **VS**: Vocational Schools
- **P**: Polytechnics
- **C/SSS**: Colleges / Senior Secondary Schools
- **EC/IT**: Engineering Colleges / Institute of Technologies
- **A**: Entrance Test

Source: Curriculum Development for Polytechnics, CDC, TTI, Chandigarh (1998)
In 1902, Indian Universities Commission was setup by Lord Curzon, which made important recommendations to the effect that universities should not undertake instructions in engineering as the Colleges of Engineering are required to train large number of students for the lower branches of the profession and a small number only for the highest branch of which alone the university takes cognizance. This also goes to indicate that diploma / polytechnic level courses, popularly known as subordinate (overseers, surveyors, draftsmen) level courses were only being offered in Engineering Colleges by the turn of the century.

The resolution of Indian Education Policy in 1904 first time recognized that development of technical education should have new approach with focus on development of Indian industry and provided scholarship to selected students for studies in Europe and America. It was hoped that technical schools in India would in mean time produce a regular supply of young engineers.

Indian Policy Resolution of 1913 brought out an expansion of technical and industrial schools from 88 to 218 and number of pupils from 5072 to 10535. A Technological Institute at Cawnpore (presently spelled as Kanpur) for Sugar, Leather and Textile was sanctioned in 1913. A matter of concern was shown about the system of technical scholarships abroad as 36 (50%) out of 73 scholarship holders sent abroad did not return.

Calcutta University Commission 1917-19, popularly known as Sadler Commission emphasized that in the sphere of technical education, practical training was most important component of education and training.

The Indian Educational Policy Resolution of 1913 and Report of Calcutta University Commission as also the Report on Vocational Education in India by Abbot and Wood in 1937 advocated the need for close cooperation between industry and technical education if the vocational education provided is to be appropriate and adequate. The Technical Education Committee of the Central Advisory Board of Education, 1943 in its Report (adopted by the Board in 1944) described the primary function of technical instruction (education) as that of satisfying the needs of industry and commerce for:
(a) Skilled craftsman
(b) Intelligent foremen and executives
(c) Research workers

It also recognized that "if technical education is to be really purposeful, it should include the study of the design and distribution as well as the actual processes of manufacture". It also admitted that technical instruction will be either pre-employment or post-employment.

According to this background, it can be concluded that in the earlier stages during nineteenth century, middle level supervisory persons were widely known as overseers and their training was organized as subordinate part (department) of Civil Engineering Colleges. Modern engineering, as we know today was in its formative stages. Training was predominantly for personnel to help the professional engineers on Civil Engineering Works. The duration of these courses was from one to three years.

1.2.2 Post Independence Period

As is evident from section 1.2.1, very little growth or development took place prior to independence. The growth of technical education at different levels depends on the socio-economic development of the country. Therefore, it is not surprising that technical education, particularly the polytechnic education, did not make much progress prior to independence.

After independence, the country was faced with great challenge of rapid industrialization, growth and development in all spheres of life, which needed technically trained persons to take care of developments in these sectors. Polytechnic education forms the back-bone of producing technical manpower to take care of job functions like, construction, erection, installation, production, quality control operations, repair & maintenance, servicing, marketing and sales etc. Therefore, after independence, the polytechnics were no more adjunct to the engineering college system.
The Government of India, soon after Independence appointed an University Education Commission in 1948 under the Chairmanship of Dr. S. Radhakrishnan. The Commission in the field of technical education made recommendations that “The aim (of technical education) should be to produce, not merely men skilled in technology, but also sound, well integrated individuals and citizens ... Also in most engineering courses, the underlying scientific and engineering studies will be common to nearly all fields. The number of engineering schools of different grades be significantly increased particularly for training of foremen, craftsmen, draftsmen, overseers etc. that engineering courses of study include general education and basic physical and engineering sciences... The first year or more of each course should in general be common to all branches of engineering.”

In pursuance of the recommendations of the National Development Council in November 1958, the Planning Commission decided to appoint working groups on different subjects for the Third Five Year Plan. The “Working Group on Technical Education and Vocational Training under the Chairmanship of Prof. M.S. Thacker formed in 1959 made significant recommendations for the qualitative and quantitative improvement of technical education and training facilities in the country.

In order to bring qualitative improvement in technical institutions, efforts need be made to improve the teacher-pupil ratio of 1:10 for degree and 1:15 for diploma institutions as recommended by All India Council for Technical Education (ACITE).

The procurement of adequate equipment for Technical institutions has to be facilitated by production of large quantities of equipment in the country and use of foreign exchange where necessary.

**Apprenticeship Act:**
The Apprenticeship act was passed in 1961. It was meant to provide for the "Regulation and Control of training of apprentices in trades and for matters connected therewith". This did very little for the development of technical
education as beside saying that syllabus of and equipment to be utilized for practical training shall be such as may be approved by the Central Government in consultation with Central Apprenticeship Board, left outside its scope engineering graduates and diploma holders. Training of diploma holders was arranged by the Ministry of Education, Government of India, under a voluntary scheme known as "Programme of Apprenticeship Training." It was only in 1973 that the Apprenticeship Act was upgraded so as to bring within its purview the training of engineering graduates and diploma holders.

Kothari Commission (1964):

The Education Commission of 1964 (popularly known as Kothari Commission after the name of its Chairman) after making comprehensive study of the facilities available for technical and vocational training made the following important recommendations in respect of polytechnic education:

i) The junior technical schools be renamed as Technical High Schools.

ii) The technical high school as well as ITI must offer production oriented training.

iii) Along with polytechnics, a wide range of courses in commercial, scientific and industrial, towards and in areas of special interest to girls be offered as terminal courses in order to vocationalise and specialize our women education system.

iv) It was desirable to diversify technical courses in order to relate engineering degree and diploma courses to the varying types of engineers and technicians, required by the industry.

v) It was recommended to set up a UGC - Type organization with adequate representation of industry and the concerned ministries. The body should have a full time chairman and funds should be allotted to it in block basis.

vi) Directorates of technical education be set up in all states.
Govt. of India, in April, 1967, set up a committee to consider the Commission's Report. The Committee in its report made the following remarks on the improvement of technical education:

In technical education, programme of qualitative improvement should be stressed... Practical training in industry should form an integral part of the various courses... Technicians should be given a better status in industry and society.

The document on "National Policy on Education" which was published by the Govt. of India in 1968 mostly reiterated the recommendations of the Committee of the Members of the Parliament.

During 1965-68, apart from selective expansion in the industrial sector, the need of the hour was consolidation, modernization and expansion of facilities, where gaps existed; optimum utilization of physical, human and financial resources; creation of infrastructure in emerging areas of technology; and to compete in the national and international market with dual criteria of cost and quality. This was a period of recession in the industry, which required technical manpower with different competencies than the one which was available. The recession greatly affected the employment of diploma holders coming out from the polytechnics.

Ministry of Human Resource Development, Government of India, initiated number of steps to revamp polytechnic education with a view to make it relevant to the requirements of the world of work. Some of important intervention in this regard are as follows:

A) Technical Teachers’ Training Institutes

Ministry of Education, Govt. of India, (now called the Ministry of Human Resource Development) on recommendation of the All India Council for Technical Education, established four Regional Technical Teachers' Training Institutes (TTTI) at Bhopal, Calcutta, Chandigarh and Madras respectively in the year 1967.
These Institutes were established to meet the requirements of developing polytechnic education in their region. These Institutes are registered under the Societies Registration Act and are managed by respective Board of Governors. Initially, the focus of TTTI's was on training of polytechnic teachers through regular long term programs of two and half year duration for diploma holding teachers and one year for degree holding teachers. Gradually these institutes were also entrusted with the responsibility of curriculum development work for the states in the region. To improve the competence of teachers for implementing new curricula, short term courses to upgrade the knowledge and skills were initiated. New curricula created the need for developing relevant instructional material for which TTTI's embarked upon a major program of preparing print and non print instructional resources. The other activities of these institutes are research and development, extension and consultancy services to the Directorates and polytechnics.

These institutes have done commendable work towards quality improvement of polytechnic education through faculty development, curriculum development, instructional resources development, enterprenureship development, promoting industry-institute linkages, computer education and guiding community polytechnics in rural development. Another feature of these institutes have been extension and consultancy services to the polytechnics for bringing quality improvement in the system. These institutes also assisted the polytechnics in creating infrastructure for the new and emerging areas of technology.

The main functions of the Technical Teachers' Training Institutes are:

i) Organizing courses on the art and techniques of teaching and special subjects teaching courses.

ii) Research and training on the methods of assessment, evaluation and grading.

iii) Research and training in teaching methods and development and production of teaching aids, charts and publications.
iv) Collection and disseminating to all polytechnics in the country information on curricula, examination systems, equipment, teaching aids, technical aids, technical literature, teaching methods, etc.

B) Damodaran Committee

Another important intervention has been the establishment of a special committee for reorganization and development of polytechnic education. This committee is popularly known as Damodaran committee after the name of its chairman G.R. Damodaran.

Some of important recommendations made by this committee are:

i) Over the next ten years, higher priority in technician education development should be accorded to the qualitative improvement of courses and consolidation of existing institutions rather than to quantitative expansion. At least for the next five years, there would be no need to consider the establishment of new polytechnics.

ii) Efforts should be made to prepare realistic estimates of the demand for technician for the fifth and subsequent plans.

iii) In industrial organizations, there is a broad spectrum of occupations lying between the craftsmen at the one end and the professional engineers at the other. Within this spectrum there are wide differences, both in specialties and degrees of expertise, educational and training programs, but the whole band represents a separate and distinct group of people who can be classified as technicians, whatever their specific functions may be. Polytechnics, in association with industry and business, should have the responsibility of educating and training persons for technician functions.

iv) Programs of technical education and training should be properly drawn-up in an integrated manner with the cooperation of industry.

v) Polytechnics should offer continuing education programs to upgrade the knowledge and skills of working technicians.

vi) Apart from these courses, polytechnics should organize special refresher and training courses as well as advanced diploma courses for technicians already employed.
vii) Certain selected polytechnics should be authorized to offer part-time degree courses.

viii) As and where relevant to the needs of technician courses, study in appropriate depth of topics from industrial organization, human relations, factory laws and labour laws, materials management, industrial hygiene, industrial safety and concepts of systems engineering should be included.

ix) Polytechnic education should develop in the students practical skills and the attitude to understand, appreciate and apply concepts to practical situations through carefully planned laboratory work, workshop practice and project work.

x) Practical work must form a substantial part of technician courses, particularly of the full time regular courses. It should reflect similar work in industry, commerce or other fields as closely as possible, within the limitation of institutional facilities.

xi) For the proper development and growth of technician education and its improvement in quality, autonomy of polytechnics is essential. Polytechnics should have complete freedom to experiment with much needed reforms, restructure their courses, establish cooperative relationships with the industries in their region in training and employing technicians, develop new curricula, evolve their own methodology for educating and training and assess and evaluate their students.

xii) The teacher - student ratio should not be more than 1 : 10. In counting this ratio only teaching posts of associate lecturers and above should be taken into account.

xiii) A crash program should be implemented for retraining at last 25 % of the existing polytechnic teaches within a period of two years. The program should consist of several courses of short duration on such subjects as assessment and evaluation technique, curriculum development, laboratory work and industrial orientation in teaching.
C) **Direct Central Assistance from Government of India**

A scheme of Direct Central Assistance (DCA) was introduced from 1976-77 to promote quality improvement in the system of polytechnic education for selected polytechnics and engineering colleges. Funds were provided to the polytechnics to remove obsolescence of equipment in laboratories and workshops and to develop infrastructure in the emerging areas of technology not covered under the state plans. Financial assistance was also provided to purchase audio-visual aids and augment library facilities in the polytechnics.

D) **Working Group on Technical Education - 1977**

Ministry of Education and Social Welfare, Govt. of India setup a “Working Group on Technical Education” in November, 1977 for assessment of qualified Technical Manpower in view of the vast expansion of technical education in India after Independence. This was to be done with reference to their demand including employment. Salient points of the recommendation of the working group report are:

i) Additional manpower needs to be met by increased efficiency and effectiveness.

ii) Introduce flexibility in program through credit system and multipoint entry.

iii) Selected polytechnics capable of acting as focal points for technology transfer to rural areas and training of rural youth to be designated as community polytechnics.

iv) Advanced technician courses with central assistance.

v) Continued review of curricula to cope with technology changes and manpower needs.

vi) Establishment of learning resource centers.

vii) Modernization of laboratories considering equipment obsolescence and curricula changes.

viii) Reorganization of Directorates of Technical Education.

ix) Administrative autonomy and powers of financial control to government institutions for effective functioning.
x) Academic autonomy to selected institutions.

xi) Setting up of National Evaluation and Accreditation agency.

E) Community Polytechnics

Based on the recommendations of the Working Group on Technical Education 1978, 35 polytechnics were initially selected to act as focal points and support agencies for improvement in productivity, lifestyle and employment in rural areas through transfer of technology and training of rural youth. These were designated as community polytechnics.

A Guideline Document on the Scheme of Community Polytechnics in India started in 1978-79 on the recommendation of the All India Council of Technical Education, published in 1981. This was a comprehensive document on the functions, activities and approaches to accelerate rural development on scientific basis. For this purpose, following areas were broadly identified:

i) Agriculture

ii) Water supply and irrigation

iii) Promotion of Agro/Tiny industries

iv) Roads and village transport

v) Training and manpower development

vi) Public Health and Sanitation

The scheme of community polytechnics proved quite useful. Some of the community polytechnics became an effective change agents in bringing about socio-economic transformation in their surrounding areas. Today, this scheme has been extended to over 370 polytechnics in the country.

F) National Policy on Education (NPE -1986)

In the year 1986, National Policy on Education (NPE-1986) was formulated and approved by the parliament, which interalia, defined government policy in the area of technical and management education. Its emphasis was on quality improvement, expansion of technical education facilities in new and emerging
areas of technology and making technical education accessible to special sectors of population consisting of rural population, working population, women, handicapped and other weaker sections of society. Subsequently, a program of action was developed for implementing NPE - 1986.

G) All India Council for Technical Education (AICTE)

The All India Council for Technical Education (AICTE) was constituted in November 1945, to advise the Government on all aspects of technical education. It consisted of representatives of the Union and State Governments, Parliament, associations in fields of business, industry, labour and education and professional bodies.

Though the council was initially an advisory body, still its recommendations were by and large been accepted in the past by the Union and State Governments. The four regional committees of the council, each covering a group of states in the North, West, South and North East have their offices in Kanpur, Bombay, Madras and Calcutta, to assist the AICTE.

The formulation of general national policy and the planning, coordination and determination of standards for technician education should rest with the central government. Otherwise, a variety of policies may be imposed from various organizations and states which may ultimately be unsuited to the national economy and the needs of industry. In this respect AICTE and its committees and Boards continued as advising machinery to the Government.

National Policy on Education -1986 envisaged that the All India Council for Technical Education will be vested with statutory authority for Planning, formulation and the maintenance of norms and standards, accreditation, finding of priority areas, monitoring and evaluation and maintaining parity of certification and awards and ensuring the coordinated and integrated development of technical and management education. Mandatory periodic evaluation will be carried out by a duly constituted accreditation board.
All India Council for Technical Education Act was passed in 1987 with the view to develop and promote technical education in the country. The council has to take all such steps, which it may think fit for ensuring coordinated and integrated development of technical education and maintenance of standard in the country.

The major functions of the AICTE are summarized as under:

- Assessment of Technical Manpower needs- present and future.
- Reconciliation of differing perceptions of needs of different levels.
- Providing for match between supply and demand.
- Coordination and integration of technical and management education development plans at central / regional levels.
- Effective quality improvements through scientific curriculum processes, instructional material development and teacher training.
- Formulation and periodic review of norms and standards for courses, resources, staff etc.
- Formulating guidelines for promoting innovation, research and development
- Toning up management structures and granting autonomy to institutions.
- Formulating guidelines for grants and funding of priority areas.
- Establishing mechanism for enforcing maintenance of norms and standards.
- Accreditation and recognition of institutions and programmes.
- Continuous monitoring and evaluation of planned thrusts.

H) World Bank Assisted Technician Education Project

In 1990, the Government of India took up the project of strengthening technician education in India with the assistance of World Bank as an important follow up of the National Policy on Education - 1986. The project has the following three major components and covers almost all the government and government aided polytechnics.
(a) **Capacity Expansion**: By expanding and diversifying the programmes in the polytechnics; setting up of new polytechnics (co-ed and residential for women) and continuing education centers and departments; strengthening community polytechnics and establishing polytechnics for the physically handicapped.

(b) **Quality Improvement**: through modernizing equipment and facilities of polytechnics; intensifying teacher training and updating curricula.

(c) **Efficiency Improvement**: Strengthening structures like state boards of technical education and directorates of technical education in the state; undertaking industry-institute-interaction programmes; encouraging internal resource generation in polytechnics and establishing facilities for maintenance of equipment and buildings.

### 1.2.3 Present Status

Presently (December 1995) there are 1484 polytechnic level institutions. These institutes have total intake capacity of 2,09,500 students per year. This includes 380 institutes with intake capacity of 19500 which offer diploma courses in pharmacy and also over 103 women polytechnics in the country. Growth of polytechnics education in India from 1940 to 1997 is given in Table 1.1

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Polytechnics</th>
<th>Annual Intake</th>
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<tbody>
<tr>
<td>1940</td>
<td>12</td>
<td>700</td>
</tr>
<tr>
<td>1947</td>
<td>53</td>
<td>3400</td>
</tr>
<tr>
<td>1960</td>
<td>195</td>
<td>26000</td>
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<td>1970</td>
<td>306</td>
<td>43500</td>
</tr>
<tr>
<td>1980</td>
<td>322</td>
<td>49000</td>
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<tr>
<td>1985</td>
<td>640</td>
<td>93000</td>
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</table>
1.3 ORGANIZATIONAL STRUCTURE OF POLYTECHNICS

Technical Education is a state subject. It is managed by national and state level bodies for meeting present and future technical demands of the country and state respectively. According to AICTE, technical education includes areas of engineering and technology, architecture and town and country planning, pharmacy, hotel management and catering technology etc.

The organizational structure of technical education at National and State level is briefly described below:

1.3.1 At National Level

(a) All India Council for Technical Education (AICTE)

At the national level, All India Council for Technical Education (AICTE) is the apex body established by the Act of Parliament in 1987 as a statutory body for providing leadership in planning, promoting and regulating technical education in the country.

The AICTE, assisted by its Board and Regional Committees have been vested with statutory powers by a recent Act of Parliament to ensure pursuance of its policies more vigorously.

(b) All India Boards

AICTE has presently ten All India Boards of Technical Studies, namely:

i) All India Board of Architecture Education.
ii) All India Board of Computer Science Engineering and Technology and Applications.
iii) All India Board of Hotel Management and Catering Technology.
iv) All India Board of Management Studies.
v) All India Board of Pharmaceutical Education.
vi) All India Board of Technician Education.
vii) All India Board of Under-graduate studies in Engineering.
viii) All India Board of Post graduate education and Research.
ix) All India Board of Vocational Education.
x) All India Board of Town and Country Planning Education.

Each of the above Boards takes care of planning, promoting and regulating Education in the respective areas.

The main functions of the respective Boards are:

- Assessment of manpower needs in the country
- Development of Educational plans to train manpower in the respective areas.
- Preparation of guidelines for states and union territories for improvement and development of respective areas.
- Design and periodic review of model curricula in existing and emerging areas.
- Formulation and periodic review of norms and standards.
- Promotion of quality improvement, innovation, research and development in the respective areas.
- Promoting autonomy to institutions
- Identifying priority areas for funding
- Monitoring and evaluation in the respective areas

c) Coordination Committee and Regional Committee of AICTE:

AICTE has set up a coordinating committee which acts as executive body of the council and discharges functions on its behalf on urgent and important matters. It has also set up seven regional committees for performing the general functions
as assigned to AICTE and to supervise the work of technical institutions in the region in co-operation with State Governments. Some of the major functions of Regional Committees are:

- To survey facilities for technical education in all the states and union territories in the region.
- To promote liaison between technical institutions and industry.
- To review critically academic aspects of training.
- To render advice and guidance to technical institutions within the region in respect of finance and other matters to make recommendations to AICTE for the expansion of technical education through provision of facilities in respect of diploma, undergraduate and post graduate courses.

As state engineering colleges are affiliated to Universities, these institutions follow the norms and standards laid down by UGC and the AICTE. To coordinate policies for the growth and development of technical education at degree and post graduate level, UGC accepts the policies of AICTE for the matters connected with technical education. Chairman UGC is a member of AICTE.

The National Technical Manpower Information System (NIMIS) at the national level with its lead center located at Institute of Applied Manpower Research (IAMR) and nodal centers in the states, supply data needed by AICTE in manpower assessment and planning.

d) Bureau of Technical Education

The Bureau of Technical Education in the Ministry of Human Resource Development, Government of India has dual role to play. The first and foremost role is of advisory nature regarding proper growth and development of technical education in the country. This department takes care of the policy of Government and financing of the AICTE and control institutes and represents the AICTE and its various Boards. The other important role is executive in nature and relates to the processing, implementation, monitoring, controlling and evaluation of programmes and projects in central institutes and plan schemes.
1.3.2 At State Level

(a) State Departments of Technical Education

The state department of technical education are responsible for planning, management, administration and funding of technical education in the state. However, providing policy directions, setting norms and standards, initiating schemes for quality improvement and coordinating integrated development fall under the purview of AICTE / Department of Technical Education.

(b) State Directorates of Technical Education

Each state has a state Directorate of technical education which undertakes the following broad functions:

- Identification of state manpower needs and programmes.
- Preparation of plans for starting new programmes under the policies laid down by AICTE.
- Working out resource requirements and planning for infrastructure development.
- Development of human, physical and instructional resources.
- Introduction of innovations and developments
- Formative and summative evaluation of institutions and programmes.

(c) State Boards of Technical Education

State Boards of Technical Education are generally functioning as part of state directorates of technical education. Their main function are:

- Design and review of curricula.
- Lay down norms and standards.
- Conduct examinations.
- Award various diploma, post diploma and advanced diploma programmes.
1.3.3 Examination And Certification

(a) For technician institutions, state boards of technical education lay down curricula, conduct examinations and award diploma, post diploma and advanced diploma for various technician programmes.

(b) All the state engineering colleges are affiliated to state Universities which conduct examinations and award Bachelor and Masters degrees for various programmes in engineering and technology.

(c) Regional engineering colleges (RECs) are affiliated to state Universities for the conduct of examinations and award of Bachelor and post graduate degrees for various programmes offered by them.

(d) Indian Institutes of Technology (IITs) are deemed Universities. These institutes conduct their own examinations and are empowered by an Act of Parliament to award their own Bachelor, Post graduate and Doctoral degrees. In addition to IITs there are some selected institutions which have status of deemed university. These institutes conduct their own examinations and award Bachelor and Post graduate degrees.

(e) ITI's come under the control of DGE&T (Director General of Employment and Training). All examinations and certifications for ITI trade curses are done by DGE&T.

1.3.4 Accreditation

At present accreditation of institutions and programmes is being done by special committees appointed by AICTE / Regional Committees from time to time. A National Accreditation Board under the AICTE has also been set up for accreditation of institutions and programmes.
1.4 TYPES OF COURSES BEING OFFERED BY THE POLYTECHNICS

The polytechnics in the country offer variety of programmes like diploma, post diploma and advanced diploma programmes.

1. Diploma programmes

Diploma programmes are classified under the following three categories:

- Diploma programmes in Engineering / Technology.
- Diploma programmes in other vocational disciplines.
- Diploma programmes in applied arts / crafts.

Duration of full-time diploma programmes is generally 3 years after 10+. In some cases like Modern office practices, Computer Engineering. AICTE has raised entry qualification from 10+ to 10+2. Some of the diploma programmes in vocational disciplines are also of 2 year duration.

2. Post Diploma Programmes:

A small percentage of polytechnics offer post diploma programmes in the specialized areas. These programmes are primarily meant for working diploma holders. The duration of these programmes varies from 1 to 1-1/2 years. AICTE recommends an intake of 20 to 40 students depending upon the area and requirements of industry.

3. Advanced Diploma Programmes:

Some selected polytechnics offer advanced diploma programmes in emerging areas and are primarily meant for upgrading professional competencies for working technicians in the respective field of study. The duration of these programs is of two years.