CHAPTER 3

GROWTH AND DEVELOPMENT OF THE POLYTECHNIC EDUCATION IN INDIA WITH SPECIAL REFERENCE TO KARNATAKA

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3.0 Introduction

Since the vedic times, if not earlier, technical training was imparted from father to son. It was also restricted in scope to certain castes. Each caste or community was specialized generally in a particular craft. In ancient time, there were considerable engineering works to their credit as we learn from recorded history. There were well-planned cities with proper roads, sanitation and drainage facilities, which can be seen even today, in whole or in part, which were exposed in Indus valley excavation. In the modern society human resource is considered to be a very vital force for national development, for which education is an essential means. So, India has been making efforts to wipe out illiteracy through various modes of education - formal, non-formal and distance.

In India, technical education was recognized as the most significant component of human resource development, since it has great potential for adding value to products and services, for contributing to the national economy and for improving the quality of life of the people. The government of India and the state governments have been making consistent efforts for qualitative improvement and quantitative expansion of the technical education system in consistent with the rapid changes taking place
in the socio-economic, industrial and technology scenario in India. Technical education in India has been operating at different levels viz., Certificate, Diploma, Under Graduate, Post Graduate and Research in different engineering disciplines.

At one end of the manpower spectrum, there are engineers, scientists, managers and other skilled workers and operators. This bottom line technical group covers a variety of job holders; and they bear different names, such as technical supervisors, foreman, section officer, and technical assistant, shift-in-charge. It is responsible for applying technology to a wide range of field operators in production and construction, testing and development, installing and running engineering plant, drafting and designing products, estimating cost, selling and advising customers on the use of the scientific equipment. The technician acts as a liaison between engineer and skilled craftsman. It is his job to interpret the engineer’s plans and designs, to determine the production and construction techniques to be used and to choose the tools and machines best suited to the job. The technician is also responsible for a host of other semi-professional functions. It is once again the technician who carries out various other jobs on his/her own initiative as well as under the general supervision of a professional
engineer or scientists. The main purpose of polytechnic education is to train the middle level technical personnel. In all fields, they should be able to communicate with their colleagues at senior and junior levels.

3.1 Industrial Revolution

With the advent of the industrial age, which was ushered in with the discovery of the steam engine by James Watt in 1780 and the ability to generate and to handle a large amount of power rendered possible by the invention of steam engine, men passed on the dependence of human labour and hand tools to a large and complicated machinery: production of goods passed from cottage workshops to factories. Transportation by bullock-carts, horse-driven carriages and man driven boats, gave way to railroads and steamships. All this necessitated the construction of large machines, engines ships and carriages, and gave rise to problem of industrial finance and labour. The Engineering skills flourished in every age and the perfection was attained by every successive generation. During the renaissance period, the demand for engineering skills increased, enormously.
3.2 Development of Technical Education in India

Technical education, unlike other types of professional education, has not had a long history. However the ancients and medieval people had built large bridges and stone houses, castles, cities and huge temples, had constructed long high ways and aqueducts and dug canals, which show considerable knowledge of civil and hydraulic engineering and of properties of building materials. This knowledge must have been derived empirically.

Beginnings of mechanical engineering are to be found in the manufacture and use of tools, means of transport, simple machinery like lathes and weapons of offence and defence. Rudiments of chemical engineering are to be seen in the old metallurgical practices. But as there were no organized schools for teaching apprentices the use of machinery or knowledge of processes, knowledge passed from mouth to mouth and generation-to-generation of craftsmen and artificers, and was confined to castes. This is the best example for informal communication of information.

If the development of technical education is examined in historical perspective, it can be discovered that the foundation of technical education in India was laid almost at the same time as in Europe, but its growth in
India was very restrictive and slow in the past till India became independent. Soon after the battle of Plassey in 1754, the status of the presence of Britishers was changed from traders to colonizers. Therefore to rule the country, it was essential that they should have the country’s topography through physical survey of the land. For achieving the objectives, the English traders established a survey school in Madras in 1794 to train Indian personnel in land survey to assist British surveyors. In 1947, there were hardly about 38 institutions offering first-degree courses in engineering and technology, and 53 institutions offering education at technical level. Realizing the importance of technical education in developing key human resources for economic growth and to meet the great challenge of the country’s natural resources in transforming a purely agricultural economy into a major industrial one within a short span, effective steps were taken by the Indian government to build up a sound infrastructure for developing a technical education system. Since technical education is directly related to industrial development, in order to sustain such development heavy investment is required.

There is a need for proper balancing of the supply and demand of technical manpower. Therefore, for scientific planning of development of
technical education, there is need for continuing assessment of trained manpower required and evaluation of the prevailing system of technical education both in terms of qualitative and quantitative aspects. For this purpose, before launching any scheme of expansion of technical education in India, a scientific manpower committee under the chairmanship of Dr. Shanti Swarup Bhatanagar was appointed in 1947 to study the problem in depth and to recommend suitable measures to meet the future challenges. The scientific manpower committee for the first time in India made a comprehensive survey of the prevailing position. It assessed the requirements for scientific and technical personnel for the period of ten years from 1947 to 1957 so as to meet the growing demand of a various government departments for scheme of expansion of industrial and agricultural production, transport etc., in accordance with the declared policy of the government. According to their estimate, the demand for technical manpower would far exceed the supply from the then existing technical institutions. The ratio between demand and supply was as high as 4:1, exclusive of the demand for the small scale sectors. If their requirements were to be taken into consideration, the ratio would have been much greater. Almost simultaneously Sir Radhakrishnan commission (The university education commission 1948-49), while considering the problems of higher
education, made a critical study of the engineering and technical education in the country vis-à-vis the global situation, and made many valuable recommendations for the improvement and reform of the technical education system in the country. Reports of these two commissions served the basis of planning of development of technical education in the country. “Since 1947, there had been a steady growth of technical education up to 1967-68, gradually over the years, over 135 institutions offering degree courses in about 35 branches of engineering and technology with an annual admission capacity of the order of about 49,000 covering 55 subject areas were established. In addition to the 284 polytechnics, there were about 22 polytechnics (in 1966) functioning through the country catering exclusively for girls. These polytechnics offer a wide range of courses. The annual admission capacity of these institutions is approximately 2,200. At the craftsmen levels, over 500 non-engineering trades with a total capacity of about 1,55,000 trainees came into existence. During 1967-68, there was only a marginal increase of technical institutions, 15 new ones were added to the number at degree level and about the same number at diploma level.”

Chandrakanth (1971)
Realising the importance of scientific and technological development of the country, the government of India set up a higher technical institutions at Nagpur, Madras. In the light of the recommendation of the Sarkar Committee, steps were taken with International co-operation to expand the facilities from postgraduate studies and research at the Indian Institute of Science, Bangalore. As regards research at doctoral level, on an average about 500 candidates register for doctorate degrees and about 350 candidates qualify for doctorate degree every year. The facilities for postgraduate studies and research offered by 65 institutions cover a wide range of fields from classical civil, mechanical and engineering, to more sophisticated fields like aeronautical engineering computer technology etc. However, the facilities created so far fall short of the actual need of India both in quality and quantity, if the country has to develop its research and development capability in order to meet the challenges of the future.

3.2.1 Development of Polytechnic Education in India

The formal education and training in the polytechnic should not only give the student the basic knowledge, skills, attitudes in his/her chosen discipline but also impart a spirit of continuing education through his/her independent effort even after the essential formal education at the
polytechnic. Hence the polytechnics have the responsibility of training the
students so as to enable them to keep themselves continuously abreast of
developments through the use of the library. The purpose of polytechnic
education is to train middle level technical personnel. In all fields, they
should be able to communicate with their colleagues at senior and junior
levels, for example, in making reports, issuing and conveying instruction and
so on. The main purposes of Technical Education are:

- To support industry and business and as a consequence to support
  national growth;
- To help their students to become fully effective in the practice of their
careers;
- To continue their personal, scientific technical and general education
  as well as their knowledge of modern industry and business in order to
  present their material in a realistic and an interesting way;
- To encourage clear thinking and flexible attitudes in their students to
  wards changing ideas in industrial organization and techniques;
- To educate students to use their technological knowledge and skills
  for the common good; and
- To encourage a worthwhile use of leisure by helping students to
  widen their horizons.
Since 1947, when India became independent, there has been a phenomenal expansion of technical education at the polytechnic diploma level. "In 1947, there were only 53 institutions which conducted diploma courses; and they admitted only 3670 students each year. The number of diploma holders trained was less than 1500 a year. Today the country has about 1250 polytechnics capable of admitting about 1,60,000 students a year. About 50% of these polytechnics are running through private managements. The total financial outlay on these institutions so far exceeds a billion rupees for their campuses, buildings, hostels, equipments and other capital items. Their annual budget for maintenance expenditure is over 100 million rupees. Today, more than 10,00,000 diploma holders who have graduated from these polytechnics are working in various departments of public life. This is the magnitude of our technical education enterprise at the middle level. The development of technical education may be divided into two parts, development of polytechnic education in India before independence and after independence". Natarajan and Swamy (1999)²

3.2.1.1 Polytechnic Education in India during Pre Independence Period:
The impulse for creation of centers of technical training came from the British rule in India, and it arose out of the necessity for the training in overseas for construction and maintenance of public buildings, roads, canals and ports, and for the training of artisans and craftsmen for the use of instruments, and apparatus needed for the army, the navy and the survey department. The superintending engineers were mostly recruited from Britain from the Cooper's Hill College, and this applied as well as to foremen and artificers: but this could not be done in the case of lower grades – craftsman, artisans and sub-overseers who were recruited locally. As they were mostly illiterate, efficiency was low. The necessity to make them more efficient by giving them elementary lessons in reading, writing, arithmetic, geometry, and mechanics, led to the establishment of industrial training schools attached to factories and other engineering establishments.

Engineering education in India started about 170 years ago in a few selected places. It is stated that technical schools existed in Calcutta and Bombay as early as 1825, the first authentic accounts we have, is that of an industrial school established at Guindy and Madras in 1842, attached to the Gun Carriage Factory there. Meanwhile in Europe and America, colleges of engineering were growing up, which drew men having good education,
and special proficiency in mathematical subjects. This led to discussions in Governments circles in India, and similar institutions were sought to be established in the presidency towns.

The origin of polytechnic education in India is lost in the dim past of the country. Between 1830 and 1850, four engineering schools were started as institutions attached to train "Upper and lower subordinates" (Overseers, Sub-Overseers and draftsmen) for the Public Works Departments (PWD), Municipalities, etc., of the then provincial Governments. Sir. A. P MacDonnel, the then Home Secretary to the Government of India, in a memorable report writes about the nature and scope of training given at these engineering schools, and it is given below.

3.2.1.1.1 Madras Presidency: "The Madras Civil Engineering College was established in 1842 and it consists of two departments – the Collegiate and the School departments. After a prolonged discussion, the college was reorganized in 1862. The object of the collegiate Department is to train students who have received a liberal education, for employment as engineers or for the degree of B C E in the Madras University. There was also a Mechanical Engineering Class. One Engineer's appointment in Government
service is guaranteed annually to the college; but still the college is quite local in its effects, and the Public Work Department of the Government of India knows very little about its results. In all Departments the Courses seem to be wholly theoretical, which is a serious defect. *Chandrakanth (1971)*

The School Department trains students for the subordinate engineering posts under the Public Works Department, Local Funds, and Municipalities, and there are also classes for surveyors and draftsmen. The upper subordinate (i.e. School) students have a years practical training after leaving the school before appointment to the public service.

The only Engineering School in the presidency is the Junior Department of the Civil Engineering College, to which reference has already been made under the head of University Education. The course of instruction comprises elementary mathematics, engineering surveying, drawing and estimating, bricklaying and the Madras vernacular languages. The passed students of the school find no difficulty in getting remunerative employment either under Government of Local Boards or Railways, and this fact tends to make the school popular and applicants for admission numerous.
3.2.1.1.2 Bombay Presidency: The Poona College of Science, formerly the “Poona Civil Engineering College, established in Poona in 1854 by Government for the purpose of educating subordinates for the Public Work Department. The college was having four departments, viz; Civil engineering, Agriculture, Forestry and Workshops. Attached to the Engineering College are extensive workshops, which have from time to time been extended from the profits made on works executed in them. In these workshops, practical instruction is conveyed and work of various kinds is executed for Government and the public.” Chandrakanth (1971)

3.2.1.1.3 Bengal Presidency: At the Seebrope College near Calcutta, candidates for the degree of “Civil Engineering have to go through a four year course of theoretical training with which some practical work is combined. During this period, they spend three hours daily in the carpenter’s and pattern shop, smithy, foundry or fitting shop, and part of the last year course consists of practical brick-making in the Government brick-field at Akra, and of practical work in stone masonry, brick-laying, managing workmen and keeping accounts. Those who are selected for Government employment have to spend another year in the Department without pay as probationers, but they are distinguished students, who are generally in the
receipt of Government scholarship. Besides the collegiate course described above, there are courses for Mechanical Engineering, Civil Overseers and Mechanical Overseers.” Chandrakanth (1971) These courses follow generally the outlines of the course for L.C.E with appropriate modifications.

3.2.1.1.4 North-Western Provinces: The Thomason Civil Engineering College at Roorkee, founded in 1847 by Mr. Thomson, the then Lieutenant-Governor of the North-Western Provinces and affiliated to the Calcutta University in 1864, was first designated to supply the Department of Public Works and Survey Departments with Assistant Engineers, Overseers and sub-overseers. It is now, however, open to the public. The college contains three classes: Engineering Class, Upper subordinate and Lower subordinate class. The Engineering class is open to Europeans and statutory Natives of India, who have passed the Entrance Examinations of the University or other similar test. The students go through a two-year theoretical course, during which they receive practical instruction in surveying and preparing projects. After the two year course is over, students are eligible for appointment as Engineer Apprentices, so far as vacancies are available, and they are supposed to undergo a practical training. After being favorably reported on,
selected students are appointed Assistant Engineers in the Department of public works. Four or five appointments of the sort in alternate years are being attached to the college. It is stated that some very valuable Engineers have come out of this college. There instruction in surveying is most thorough. They exhibit great skill in managing native workmen and in applying the resources of the country.

The upper subordinates class also consists of students who have been qualified by a preliminary literary test. They have two a year theoretical course in the college and afterwards one year’s practical training. This class includes non-commissioned officers from British regiments as well as from India.

The Lower subordinate classes are all from India by descent, and a qualifying preliminary education is necessary for admission. Soldiers of the army, desirous of learning so much surveying as suffices for reconnoitering purposes, are received in this class without previous qualifying education. Generally the courses of study in the principal classes are varied, but include Mathematics, Civil Engineering, Surveying, Drawing and Urdu. Besides, the Engineering students learn experimental science and photography. The
college also holds examinations and grants certificates of qualification as sub-engineer, Overseer and examiner of Accounts, Department of Public Works to all the candidates who present themselves under certain rules.

According to the “Sir. A. P MacDonnel report, the importance of training to middle level technician had been realized in India as far back as 1830, though at that time modern engineering as we know it today was still in its formative stage. Efforts were made by the then provincial Governments to train these personnel to help the professional engineer on civil engineering work. The duration of the course varied from one to three years depending upon whether: “Upper subordinates” or “Lower subordinates” were being trained. Sir MacDonnel also explains briefly the contents of the courses, – that they included instruction in mathematics, engineering surveying, drawing and estimating and practical work in civil engineering construction. Though the engineering schools trained the students as overseers, sub-overseers and surveyors, the courses were generally designated as "Upper subordinates" and Lower subordinates" classes, since only engineers were eligible for the “Gazetted services” under Government. Since then, engineering education has developed in a big way, but the hierarchical structure of professional employment in government has
changed a little. Even today, only Graduates in Engineering are accepted for superior posts and services and diploma-holders from polytechnics for subordinates posts. What a sad commentary on the status of technicians after a century it is!" Chandrakanth (1971)

As the demand for "Upper and Lower subordinates" grew with the expansion of engineering activity in India, more engineering schools were established in various parts of the country. As the types of engineering activity were diversified, the schools added courses in Mechanical and electrical engineering. The schools also became more popular among students, because of the readily available employment opportunities in their respective regions. In course of time, all engineering schools, many of them established as separate and independent institutions from engineering colleges, came to occupy a definite position in the technical education system of our country. They also came to be called polytechnics since they offered courses in textiles technology, Chemical Technology, radio engineering, fisheries technology and other fields in response to demand for technical personnel from local industry.
As polytechnic schools and colleges multiplied, the duration, content and standard of the courses conducted by them varied widely from institution to institution. There were courses of one, two, three and four years duration. While science, Mathematics and technology were integrated in some courses, the curriculum of others was scrappy and uncoordinated. Examinations were held by different authorities in different provinces – Department of Education, Public Work Departments, Industries Departments and so on – depending upon which particular Department is administratively in charge of polytechnics in a province. The students were awarded Diploma in Engineering at some institutions and at others certificates. Instructional facilities, like accommodation, equipment and teaching staff also differed widely, and those differences in turn were reflected in differing academic standards of institutions. The development of polytechnic education before independence was very slow.

3.2.1.2 Polytechnic Education in India During Post Independence Period

The development of technical education before independence, i.e. till 1947, was slow and haphazard. During the post independence period, India witnessed considerable changes in the objectives and pattern of technician education. The establishment of All India Council of Technical Education
(AICTE) in 1945 and of Scientific Manpower Committee in 1947 paved the way for effective systemization of technical education. In the years that followed, some significant efforts were made for the development of technical education, including the setting up of a National Working Group (1959), Kothari Commission (1964), Damodaran Committee (1970) and National Education Policy (1986). The recommendations of these committees and policies aimed at the qualitative development of technical education. These developments are as follows;

3.2.1.2.1 Setting Up of Technical Teachers Training Institutions: The Government of India initiated a number of steps for the qualitative improvement of polytechnic education. One such step was the establishment of four regional Technical Teachers Training Institutions at Bhopal, Calcutta, Chandigarh and Madras, in 1967. These institutions have, since their inception, been assisting the polytechnic education system through various activities in the areas of staff development, curriculum development, instructional materials development, research and development, extension services and consultancy.
3.2.1.2.2 Professional Body of Technical Teachers: At the same time, the establishment of “Technical Teachers Training Institute (TTTI) is a landmark in the development of technical education. Indian Society of Technical Education (ISTE) came in to being in 1967.” Agarwal and Raina (1996) It provides a forum for teachers and other professionals involved in technical education whereby they discuss/share ideas about management and administration of technical institutes, curricula, methods of teaching, laboratory development, planning for the future, in fact, all matters of relevance to technical education, thereby providing inputs to the government for policy formulation regarding various aspects of technical education”.

3.2.1.2.3 Reorganization of Polytechnic Education: On the advice of AICTE, a special committee headed by “Prof. G R Damodaran was set up in 1970 to report on the reorganization and development of polytechnic education and for recommending all such steps as might be introduced to improve the quality and relevance of polytechnic education. Some of the salient recommendations of the Damodaran Committee” Agarwal and Raina (1996) were;
- Polytechnics to extend facility of short term and part time courses to working technicians and craftsmen;
- Selected polytechnics to offer part time degree courses for working technicians;
- Curricula to be reviewed and revised regularly to meet changing requirements;
- Including in the curriculum topics such as industrial organization, materials management, industry safety etc.;
- Project work requiring design and/or fabrication to find an important place in the final curriculum;
- All polytechnics should have well-stocked and well-staffed libraries;
- Autonomy to polytechnics is considered essential for growth and development of polytechnics;
- Continue student assessment should be emphasized, including assignment and periodical tests;
- Industry must be adequately represented in policy making and at the level of curriculum design and student evaluation;
- Industry to approach polytechnics for the solution of their problems.
All the above recommendations have, by and large, been implemented. An expert committee headed by Prof. P.J. Madan followed this in 1972. This committee produced a report on the revision of staff structure in engineering institutions in consistent with the expectations from teachers and institutions. The recommendations of the Madan committee inter alia, laid emphasis on removing dichotomy between the teaching of theory and conduct of practical work and the minimum level of teachers in polytechnics should be corresponding to that of a lecturer.

3.2.1.2.4 **Direct Central Assistance:** Another major step for "quality improvement was taken in 1976, when the Government of India instituted a scheme for direct central assistance to the polytechnics" [Agarwal and Raina (1996)] with the following aims:

- Funding institutes for purchase of special items of equipment for effective functioning;
- Funding introduction of courses in new and emerging areas;
- Promoting innovations in classrooms and laboratory instruction with industry, product design and development, instructional materials development, resources generations through consultancy and testing services etc.
3.2.1.2.5 Community Polytechnics: Being conscious of the fact that bulk of India's populations lives in villages, and, in an attempt to use the knowledge upliftment of rural populations, the government of India in 1978 introduced a scheme of community polytechnics with the object of promoting total development on scientific lines. Under this scheme, 347 polytechnics were identified as community polytechnics to interact with the environment. 31 polytechnics were identified to promote transfer of technology to rural areas. The scheme of community polytechnics provides for:

♦ Training of school drop-out, women and other disadvantaged groups in technical skills for gainful employment; for these training programmes, there is no requirement of previous education qualifications.

♦ Transfer of technology for improving the local capabilities of production and for generally improving the quality of life of the rural population.

3.2.1.2.6 National Policy on Education (1986): In the year 1986, National Policy on Education (NPE-1986) was formulated and approved by Indian parliament, which inter alia, defined government policy in the area of technical and management, expansion in the infrastructure facilities in new
and emerging areas of technology and making technical education accessible to special sectors of population, consisting of rural populations, women, handicapped and other weaker sections of the society. Subsequently, a programme of action was developed for implementing the national policy as also for providing a broad strategy for drawing up detailed schemes of action.

In the same year, i.e. 1986, as a follow-up of the NPE-1986, as a mark of response to the concern for qualitative improvement, certain polytechnics in the country were selected as Quality Improvement Centers (QIC), which were provided central assistance for development. The QICs were to function as focal institute for innovation and development with the assistance of Technical Teachers Training Institute. The major thrust area was to promote and internalize innovation and development in the QICs and to cause spread effect by networking between TTTIs, QICs and other polytechnics. A number of projects aimed at improving teaching-learning and developing necessary infrastructure were started in these polytechnics. This went a long way towards encouraging the development of academic leadership within the polytechnics Agarwal and Raina (1996).
3.2.1.2.7 Autonomy of Institutions: Autonomy of institutions and organizations has been emphasized by various commissions and committees on education from time to time. Autonomy is now considered a vehicle for quality. For the proper development and growth of technical education and its improvement in quality, institutions should have complete freedom to experiment with much needed reforms, restructure their courses, establish cooperative relation with the industry, develop new curricula consistent with societal needs, evolve new methodology for education and training and set in motion a new system of student evaluation.

A welcome development in recent years has been the autonomy which is being increasingly granted to the State Boards of Technical Education in the various states in the country as envisaged in the NPE – 1986. These are flexibility and autonomy in matters relating to academic development of the polytechnic education system, as autonomous bodies are responsible for regulating and controlling the quality of technical education by laying down norms and standards for affiliation and accreditation of courses, programmes and institutions. Besides these, they are also responsible for the conduct of examinations and issuing certificates. Some polytechnics, over the years, have also reached a stage where they have been granted full autonomy to
develop their own curricula and conduct their own examinations, subject to overall superintendence by the State Board of Technical Education who continue to be the certification authority.

3.2.1.2.8 Project For Strengthening Technical Education Assisted By World Bank: In 1990, the Government of India took up the project of strengthening technical 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:

- **Capacity Expansion** by expanding and diversifying the programmes in the polytechnics; setting up of new polytechnics(co-educational and residential women) and continuing education centers and departments; strengthening community polytechnics and establishing polytechnics for the physically handicapped.

- **Quality improvement** through modernizing equipment and facility of polytechnics; intensifying teacher training and updating curricula.

- **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 resources generation in polytechnics and establishing facilities for maintenance of equipment and buildings.

Capacity expansion is mainly aimed at reaching the technical education to remote areas and for including in its ambit weaker sections’ and women’s interests. Efficiency improvement is aimed at strengthening the management system at all levels by creating and strengthening structures, like the State Boards of Technical Education and State Directorate of Technical Education, Learning Resource Development Centers, Maintenance Cells, Industry- Institute Interaction Centers and cells at the state level and the Bureau of Technical Education at the national level etc. The most important aspect of the World Bank assisted project for strengthening technical education is the quality component.

3.2.1.2.9 Promotion of Women’s Technical Education: Special polytechnics have been set up for women in all states. More and more hostel facilities and special scholarships are being provided. In addition, all polytechnics, other than those meant especially for women, have been thrown open for admission to women. A special drive is also on for encouraging the requirements of women teachers in polytechnics.
## TABLE 3.1
STATE WISE DISTRIBUTION OF POLYTECHNIC (DIPLOMA LEVEL) INSTITUTIONS (AS ON 31-03-2004)

<table>
<thead>
<tr>
<th>S. No</th>
<th>State / Union Territory</th>
<th>No of Institutions</th>
<th>Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Andra Pradesh</td>
<td>92</td>
<td>16175</td>
</tr>
<tr>
<td>2</td>
<td>Andaman &amp; Nichobar</td>
<td>02</td>
<td>170</td>
</tr>
<tr>
<td>3</td>
<td>Arunachal Pradesh</td>
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<tr>
<td>5</td>
<td>Bihar</td>
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<tr>
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<td>Daman &amp;Diu</td>
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</tbody>
</table>
The Indian Technical Education system has developed very rapidly over the last five decades. It has provided the middle level technical manpower which has contributed significantly towards establishing an impressive infrastructure in the manufacturing, construction and service sectors, enabling India to move forward from a position when it imported even a torch bulb 5 decades ago, to a position, when the country designs and manufactures its own ships, aero planes, automobiles, electronic equipment, computerized machines, etc.

The world of technology is in a state of rapid change. India is witnessing major changes in its economic and industrial policies. The
polytechnic education system will have to respond to these changes that must be reflected in the programmes they offer.

3.3 Development of Polytechnic Education in Karnataka

One of the most remarkable achievements during the post-independence period in Karnataka state is the phenomenal growth of the technical education. Before independence, there were only one post-graduate center, four engineering colleges and two polytechnics in the rest while Mysore state. After independence and reorganization of states, there are now one full fledged post-graduate center of international reputation, (i.e. Indian Institute of Science, Bangalore), four colleges offering post-graduate courses, 16 colleges offering degree courses, one school offering post diploma courses, 33 polytechnics offering diploma level courses and 6 schools offering certificate courses at higher secondary level. This has helped considerably in the growth of the technical manpower required for the establishment, maintenance and advancement of industries, irrigation projects and exploitation of mineral resources of the state.

Karnataka State can rightly be considered as one of the most progressive states in education in our country and especially a pioneer in the
field of technical education in India. Even as early as 1892, a few industrial schools were established in the state to train craftsmen in carpentry, smithy, fitters and similar other trades. By 1910 there were seven such schools in the state. On the one hand, stalwarts, like Sri. M. Visveswaraiah, were advocating the opening of more technological institutions to develop the technically skilled man power requirement, and on the other hand, the government was not in a position to open additional institutions, due to huge investments involved in establishing various categories of institutions. It was late Sri. M. Visveswaraiah who gave a clarion call to industrialize or perish, and then set an example and gave a lead by donating two lakhs of rupees for establishing Sri Jayachamarajendra Occupational Institute (Later named as Sri Jayachamarajendra Polytechnic) at Bangalore, and thereafter we notice a number of institutions springing up by contributions and participations of individuals and societies.

In order to provide trained personnel for textile industries and research, The Sri Krishnarajendra Silver Jubilee Technological Institute (SKSJTI) was established at Bangalore in 1938, offering Degree, Diploma and Crafts courses. In view of the vast industrial growth in the state and outside, there was a great need for the training of personnel to take up
various technical jobs, and as a result, Sri Jayachamarajendra Occupational Institute was started in Bangalore in 1943. This pioneer institution, to which the late Dr. M Visveswaraiah was responsible, has laid down the pattern of development in the subsequent years for establishment of the various polytechnics in the state as well as in India. Dr. M. Visveswaraiah made a magnificent contribution for establishment of this polytechnic which encouraged private participation for the development of the technical education in the state. This institution was later renamed as Sri Jayachamarajendra polytechnic.

During 1949-52, four more polytechnics (originally called as “Occupational Institutions”) were opened one each at Davangere, Hassan, Chintamani and Mysore. With the merger of Bellary District in New Mysore state, the Rayalseema polytechnic, Bellary came under the control of Department of Technical Education, Mysore in 1953. The Mysore Iron and Steel Works, Bhadravati started a polytechnic in 1950, offering training for Diploma and Certificate courses.

After the re-organization of states in 1956, a few more technical institutions came under the control of the Department of Technical
Education, such as the Karnataka polytechnic, Mangalore from old Madras state; The Gulbarga polytechnic and the technical training center from old Hyderabad state; Four technical high schools and B V Bhoomaraddi college of Engineering, Hubli from old Bombay state. During the first five year plan period, the central government came out with financial assistance to the state to augment the facilities in the existing institutions. In the second five year plan period there was enormous increase in the number of technical institutions in the new state of Mysore. In 1958, five new Government polytechnics at Tumkur, Channapatna, Chikkamagalur, Belgouam and Karwar were opened. Later, four more polytechnics, one each at Raichur, Krishnarajapet, Kusalnagar and Bidar, were opened.

Under the private sector, Acharya pathashala polytechnic, Bangalore; Mysore Engineering Institute Polytechnic, Bangalore; K H Kabbur institute of Engineering, Dharwad, Basaveswar Vidyavardhaka Sangha Polytechnic, Bagalkot were also started. The polytechnic for Women, Bangalore was opened in 1961 for the benefit of women exclusively; in 1964, School of fine Arts and Crafts, Davangere was opened, which also came under the perview of Department of Technical Education. It is very significant to note that several philanthropists and public men and organizations have either
contributed or shouldered the responsibility in establishing and running the polytechnics in the state.

As pointed out earlier, the Karnataka state had a few technical institutions in the pre-independence period. However, these early institutions were hardly adequate to meet the industries needs of the state which abounded with natural resources in plenty. Not only did old technical education require expansion, it also had to be broad-based with changing conditions and adopt the latest techniques and developments in science and technology. Similar to All India Council for Technical Education and training has been established by Government of Karnataka to suggest ways and means of improving technical education in the state. The board is presided over by the Minister of Education and the Director of Technical Education is the Secretary. After independence a separate

Directorate of Technical Education has been established for administration. With the establishment of this separate Directorate, there has been a considerable progress achieved in consolidating, coordinating, reorganizing and promoting the technical education in the state. A separate Board of Technical Education is established with the Director of Technical
Education as its Chairman. This board is responsible for conduct of examinations, maintenance of standards and other matters related to academic aspects in respect of Diploma, Certificate and Craft level courses under the jurisdiction of Department of Technical Education.

The Directorate of Technical Education (DTE), which comes under the Ministry of Education, Government of Karnataka, is the regulating authority for the polytechnic education in Karnataka. The polytechnic education in Karnataka is a three-tiered structure, namely, Government, Government Aided and Self-financing institutions. The government, through DTE, funds the government polytechnics. The Government Aided institutions acquire funds partially from the government and partially from their own resources. Self-financing institutions derive their funds on their own, but are governed by the rules and regulations of the DTE/AICTE. At present (As on 31-03-2004), there are 39 Government polytechnics, 34 Private Aided polytechnics and 106 Private Unaided polytechnics existing in Karnataka state.
The map shows the location of polytechnic colleges in Karnataka (Fig. 31.1). The details of three groups of polytechnics has been given in (Appendix – A) and the name of the district and the number of institutions are has shown in the table 3.2

**TABLE 3.2**

**DISTRICT WISE DISTRIBUTION OF POLYTECHNIC (DIPLOMA LEVEL) INSTITUTIONS IN KARNATAKA. (AS ON 31-03-2004)**

<table>
<thead>
<tr>
<th>S. No</th>
<th>Name of the District</th>
<th>Government</th>
<th>Private Aided</th>
<th>Private Unaided</th>
<th>Total</th>
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<tbody>
<tr>
<td>1</td>
<td>Bangalore (Urban)</td>
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<td>05</td>
<td>40</td>
<td>54</td>
</tr>
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<td>2</td>
<td>Bangalore (Rural)</td>
<td>02</td>
<td>01</td>
<td>04</td>
<td>07</td>
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<tr>
<td>3</td>
<td>Bagalkot</td>
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<td>03</td>
<td>Nil</td>
<td>03</td>
</tr>
<tr>
<td>4</td>
<td>Belgaum</td>
<td>01</td>
<td>03</td>
<td>06</td>
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<td>Bellary</td>
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<td>01</td>
<td>05</td>
<td>07</td>
</tr>
<tr>
<td>6</td>
<td>Bidar</td>
<td>01</td>
<td>01</td>
<td>02</td>
<td>04</td>
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<td>Bijapur</td>
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<td>03</td>
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<td>8</td>
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<tr>
<td>9</td>
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<td>02</td>
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<tr>
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<td>Chitradurga</td>
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<td>03</td>
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<td>05</td>
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<td>Davangere</td>
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<td>02</td>
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<td>02</td>
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<td>09</td>
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<td>Nil</td>
<td>02</td>
<td>03</td>
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<tr>
<td>22</td>
<td>Mysore</td>
<td>01</td>
<td>04</td>
<td>05</td>
<td>10</td>
</tr>
<tr>
<td>23</td>
<td>Raichur</td>
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<td>Nil</td>
<td>01</td>
<td>02</td>
</tr>
<tr>
<td>24</td>
<td>Shimoga</td>
<td>03</td>
<td>01</td>
<td>03</td>
<td>07</td>
</tr>
<tr>
<td>25</td>
<td>Tumkur</td>
<td>01</td>
<td>01</td>
<td>05</td>
<td>07</td>
</tr>
<tr>
<td>26</td>
<td>Udapi</td>
<td>Nil</td>
<td>01</td>
<td>03</td>
<td>04</td>
</tr>
<tr>
<td>27</td>
<td>Uttara Kannada</td>
<td>01</td>
<td>01</td>
<td>03</td>
<td>05</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>39</strong></td>
<td><strong>34</strong></td>
<td><strong>106</strong></td>
<td><strong>179</strong></td>
</tr>
</tbody>
</table>
FIG. 3.1
MAP SHOWING DISTRICTWISE LOCATION OF POLYTECHNIC COLLEGES IN KARNATAKA STATE
3.4 Organizational Structure of Technical Education in Karnataka State

The organizational chart of technical education at national and state levels is briefly described below:

- All India Council for Technical Education
- All India Boards of AICTE
- Regional Committee of AICTE
- State Department of Technical Education
- State Directorate of Technical Education
- State Boards of Technical Education
- Polytechnics
3.4.1 At National Level

3.4.1.1 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 functions of AICTE are:

- Assessment of technical manpower needs – present and future;
- Reconciliation of differing perceptions of needs at different levels;
- Striking a balance between demand and supply;
- Coordination and integration of technical and management education development plans at Central/Regional level;
- Effective quality improvement through scientific curriculum processes, instructional materials development and teacher training;
- Formulation and periodic review of norms and standards for programmes, resources, staff etc.;
- Formulating guidelines for promoting innovations, research and development;
- Toning up management structures and granting autonomy to institutions;
• Establishing mechanisms for enforcing maintenance of norms and standards;

• Accreditation and recognition of institutions and programmes;

• Continuous monitoring and evaluation of planned thrusts.

The AICTE, assisted by its Boards and Regional Committees, has been vested with statutory powers by an Act of parliament, in order to ensure pursuance of its policies more vigorously.” (www.aicte.ernet.in)¹¹

3.4.1.2 All India Boards of AICTE: AICTE in turn has constituted several Boards of Technical Studies to promote qualitative technical education in India. They are as follows;

- All India Board of Architecture Education;

- All India Board of Computer Science, Engineering, Technology and Applications;

- All India Board of Hotel Management and Catering Technology;

- All India Board of Management Studies;

- All India Board of Pharmaceutical Education;

- All India Board of Technical Education;

- All India Board of Under Graduate Studies in Engineering;

- All India Board of Post Graduate Education and Research;
• All India Board of Town and Country Planning Education;
• All India Board of Vocational Education.

Each of the above boards takes care of planning, promoting and regulating education in the respective areas in the country.

3.4.1.3 Co-ordination Committee/ Regional Committee of AICTE:
AICTE has set up a coordinating committee, which acts as an 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 for supervising the work of technical institutions in the region in cooperation with state governments.

3.4.1.4 Bureau of Technical Education: The Bureau of technical education in the Ministry of Human Resource Development, Government of India, has a dual role to play. The first and foremost role is of advisory in nature regarding proper growth and development of technical education in the country. This department takes care of the policies of government and finances the AICTE and represents on its various boards. The other
important role is executive in nature and relates to the processing, implementing, monitoring, controlling and evaluation of programmes and projects in central institutes, centrally sponsored schemes etc.

3.4.2 At the State Level

The state government is also very much eager to provide qualitative technical education, for which it has established many, and they are as follows;

3.4.2.1 State Department of Technical Education: The state departments 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 coordinated integrated development fall under the purview of AICTE/ department of technical education.

3.4.2.2 State Directorate of Technical Education: The state has a State Directorate of Technical Education. The responsibility for planning and development of technical education rests with the state government, while the responsibility for guidance, for development and maintenance of
standards is with the government of India. As such, on a suggestion from the Government of India based on the recommendations of the AICTE, each state has to set up a state Board of Technical education and to establish Directorate of Technical Education. The polytechnics are under academic jurisdiction of relevant State board and under the financial control of the respective directorates.

3.4.2.3 State Boards of Technical Education: State Boards of Technical Education are generally functioning as part of state directorate of technical education. All polytechnics are affiliated to state boards of technical education. Their main functions are:

- Designing and reviewing of curricula;
- Laying down norms and standards for technical education;
- Conducting examinations;
- Awarding certificates for various diploma, post-diploma and advanced diploma programmes;
- Maintenance of quality of education and training imported in polytechnics.
3.5 Conclusion

Technical Education is a laudable profession, which has contributed significantly to improvement in the quality of life of the common man. While non-engineers demand social relevance and accountability from engineers, it is quite evident that engineers, technology and society have a symbiotic and synergistic relationship. Technical education is a crucial ingredient in a country’s industrial, economic and social development. The Indian Technical Education system has come a long way over the last five decades. It has provided the middle level technical manpower which has contributed significantly towards establishing an impressive infrastructure in the manufacturing, construction and service sectors, enabling India to move forward to design and manufacture its own ships, aeroplanes, automobiles, electronic equipment, computerized machines, etc.

References:


3. op. cite (1)

4. Ibid
5. Ibid

6. Ibid


8. Ibid


10. op. cite (7)

11. All India Council for Technical Education. web site www. aicte.ernet.in.