CHAPTER I

The Research Problem and Its Background

1.1 - Education in Ancient India

The India education system has a very rich and interesting history. It is commonly believed that in the ancient day’s education was imparted orally by the monks, sages and the scholars and it spread from one generation to another by word of mouth. It took the form of writing on palm leaves only after development of letters. The system of education followed in India can be traced back to the Vedic period and Epic period. There are many examples given in the Vedas which certify that education was imparted in an organised way by Gurus in the ancient period. In one of the mantras in Rig-Veda there is an example of teaching young boys in groups. In Atharveda songs have been sung in praise of Bramcharya and light has been thrown on learning.¹ According to H.G. Wells², the Sanskrit speaking Aryans came down through the western passes into North India long before 1000 BC. They came into contact with the already existing Dravidian civilization and learned much from it. There is a linkage that another civilization, the Vanar civilization, also existed at that time. The great epics Ramayana and Mahabharata give a lively description of the development during this period. It is difficult to establish with reasonable certainty the periods of occurrence of the Ramayana and the Mahabharata
or even the historicity of the material contained in these epics. However, one may be inclined to agree with Dr. K.M. Munshi\textsuperscript{3}, when he wrote, "No poet could evolve out of his own imagination a picture at once so colossal, so vivid, and so consistent in every detail. No number of poets could do it without stumbling into total incompatibilities either of fact or of the view such as we find depicted in the Mahabharata.

In ancient period the temple, ashram and the hermitage formed the role of educational institutions. Besides the education on various aspects of religion including Vedas, politics, economics, ethics, scriptures and literature, technical education and science of warfare etc were also important subjects. Military Science education was also taught to suit the needs of the kings, rulers and their families.

The Vedas & the two Epics are the only source of early history of Indian Education System. "When the past of India becomes dimly visible to the historians", wrote Wells\textsuperscript{2}, "Indian society is already stratified into several layers and subdivisions, which do not eat together nor inter-marry nor associate freely. And throughout history, this stratification into castes continued. This makes the Indian population something different from the simple, freely interbreeding European or Mongolian communities". It is only after independence that national effort has been made to ameliorate the divisions of society on the basis of caste. In order to raise the standard of downtrodden people reservations on the basis of caste and social
backwardness for entry to technical institutions and government jobs have formed an important part of the national effort.

1.2 - Education in Medieval India

The educational system of ashrams during the Epic period slowly developed into three types of institutions: The Gurukula Schools, Temple Colleges and Agrahara Village Institutions. The Gurukula Schools owned their inspirations to the ashram style of teaching except that in contrast to the old hermitage concept, Gurukula schools were established in cities and villages in more or less secluded places away from the main settlement. A close parallel to the system were the schools maintained by the Bishops in Europe during the sixth century AD. A variation of the Gurukula School was the 'Tol', originally a place of Sanskrit learning that later on became famous for courses in other subjects also. Both the Gurukulas and Tols flourished in Northern India during medieval times, due largely to liberal land grants from landlord and local rulers.

South India with its profusion of temples led the way in the development of Temple colleges in the medieval times. The colleges offered free lodging, boarding and tuition and even paid for other personal expenses. The expense was met from the earning of land grants and endowments. In addition to the teaching of the Vedas, many colleges specialised in grammar and linguistic studies. South Indian inscriptions,
especially those from Mysore, have revealed another kind of educational institutions known as Agrahara, Ghatika or Brahmapuri. These institutions represented colonies of scholarly Brahmins who specialised in different branches of study and were free to impart education to willing pupils. Such colonies of teachers had their own revenue sources, generally from land grants and were empowered to administer their villages. In addition to Vedic studies and logic, some institutions were famous for philosophy, poetry and drama. Students received free education, including boarding and lodging in these institutions.5

When Buddhism spread in India, education became available to large many and this led to some world famous educational institutions Nalanda, Vikramshila and Takshashila. These educational institutional arose from the monasteries. History has taken special care to give Nalanda University, which flourished from fifth to thirteenth century AD, full credit for its existence. Education in Nalanda University was not restricted to religious but extended to other fields. The important subjects taught in above universities were mainly art, architecture, painting, logic, grammar, philosophy, astronomy, literature, Buddhism, Hinduism, arthasastra, law and medicine.6 Each university specialised in a particular field of study. For instance Takshashila specialised in study of medicine, while the Ujjain laid emphasis on astronomy.7
Takshashila did not probably possess any college or university and followed the traditional guru-pupil system. Politically dominated by the Hindus, the Persians, the Greeks and the Kusans, Takshashila served as the capital of a number of dominions and was exposed to many cultural influences. Hence, it inevitably assumed a cosmopolitan character. From various Jatakas and other works, Takshashila’s great reputation as a centre of learning is revealed. Students came from far-off places to study various arts and sciences, including medicines. Vocational education in several arts and crafts such as carpentry, smithy and weaving was imparted in Takshashila University.  

Medieval period saw excellent interaction between Indian and Islamic traditions in all fields of knowledge such as theology, religion, philosophy, fine arts, painting, architecture, medicine and astronomy.

1.3 – Education in the Modern Period

With the advent of Islam in India at the end of medieval period, the traditional methods of education increasingly came under Islamic influence. Pre-Mughal rulers such as Qutab-ud-din Aybak and other Muslims rulers initiated institutions which imparted prominent knowledge. Islamic institutions of education in India included traditional madrassas and maktabs which taught grammar, philosophy, mathematics and law.  

A feature of this traditional Islamic education was its emphasis on the connection between science and humanities. The education system under the rule of Akbar adopted an inclusive approach with the monarch favouring additional courses comprising of medicine, agriculture, geography and even from texts from other languages and religions, such as Patanjali’s work in Sanskrit. The traditional science in this period was influenced by the ideas of Aristotle, Bhaskara, Charaka and Ibnsina. The more conservative monarch Aurangazeb also favoured teaching of subjects which could be applied to administration. After the death of Aurangazeb in 1707 AD, the support of such education slowly declined due to disintegration of Mughal Empire. Later when the British arrived in India, English education came into being with the help of the European missionaries. Since then, western education has made steady advances in the country. During the 19th and the 20th century most of the Indian princely states fell under the British Raj. The British rulers during 19th century didn’t take adequate measures to help develop science and technology in India and instead focused more on arts and humanities.

1.4 – Vocational Education in Ancient India

During ancient period, vocational education was existing in some or the other form. People had to cut wood, weave cloth, repair their huts, work in the farm, fight the wars and perform various other similar jobs. It was necessary during the ancient period also to earn a living and protect
themselves from foreign invasion and attacks. Hence, it was important to acquire the vocational skills during ancient period. In ancient period the Gurukul system of education existed. At the Gurukuls the teachers imparted knowledge on various aspects of the religion, the scriptures, the philosophy, the literature, the warfare, the statecraft, the medicine, astrology and the history. Military science education was essential to the needs of kings, rulers and their families. The basic qualification required to gain professional education was the knowledge of language and mathematics. During the training essential knowledge of moral values was also imparted. From the description of ashrams, it seems that the art and science of food craft was also well developed as description of entertaining thousands of guests at a time are available in Ramayana.

1.5 - Vocational Education In Medieval India

It is evident from the manufactured articles e.g. fine fabrics of cotton and silk, embroidered caps, gold and silver ornaments, etc that some type of technical education was present during the medieval period. The perfection and excellence could not have been achieved and maintained for such a long period without a formal system of technical education. The technical education in medieval time was imparted through three different systems. These systems can be broadly classified into pupilage system, hereditary system and training schools which were being
run by the workshops. In the pupilage system the ustad was the master and depending on his popularity he drew trainees from far and wide. In the hereditary system the father played the role of teacher and the expertise of father passed to the son. Because of the closeness of father and sons relationship, the son acquired all the tricks and secrets of the trade and attained perfection. But the drawback of this system was that it lacked innovations and competitiveness due to which is it gradually declined. In addition to these two systems, there also existed workshops where apprentice were appointed and they were imparted technical training. 14

1.6- Growth Of Engineering And Technology In Modern India

Technical education, unlike other types of professional education, does not have a long history. Though the ancients and medieval people had built large brick and stone houses, castles, cities and huge temples, had constructed long highways and dug canals, which show considerable knowledge of what are now termed as civil and hydraulic engineering. 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 defense. The elementary form of chemical engineering is to be seen in the old metallurgical practices. But there were no organised schools for teaching apprentices the use of
machinery or knowledge of processes. Knowledge passed from generation to generation of craftsmen and artificers by word of mouth and was thus confined to castes and guilds.

The presence of Industrial Age was announced by the discovery of steam engine by James Watt in 1780. With the discovery of steam engine, it was now possible to generate and to handle large amounts of power and the dependence on human labour and hand tools shifted to large, complicated and powerful machines. Production of commodities passed from small cottage industries to big factories. Transportation by bullock-carts and horse carriages shifted to railroads and steam ships. The nineteenth century has witnessed the birth of many branches of engineering and technology in addition to the classical ones of civil and mechanical.15

Today’s technology and engineering are products of fundamental discoveries in basic sciences, and as is well known, these began to accumulate in the late nineteenth and in the twentieth century and in greater variety than in all the previous fifty centuries of civilised life. Inventive genius in Europe and America tried to utilise these science for new industries, and for other human needs. Thus new branches of engineering began to grow. To give a few examples: Electrical engineering which now claims as many as, or more professionals and students then that of the older branches of civil or mechanical, started actually from the
year 1882, when Edison built the first central electrical power house to supply electrical power to factories, and light and power for domestic use to dwellers of a city. Faraday made the discovery of the law of electromagnetic induction in 1831, but it required work of a half century to put the discovery to practical use.\textsuperscript{16}

With the multiplication of the number of electrical power houses, and with the long distance transmission of power, the demand for men trained in the use of electrical machinery acquainted with the fundamentals of the science began to grow. The universities and technical colleges began to introduce courses in electrical engineering. But only one or two colleges are known to have introduced electrical engineering courses earlier than 1882. Electrical engineering is a typical example of this change. For about 20 years it dealt mainly with electrical power generation, transmission and utilisation with Marconi’s discovery of wireless telegraphy (1898) and electrical engineering to study and watch the progress of Radio Communication. So rapid has been the progress in this field that the number of electrical engineers, technicians and craftsmen in USA is now estimated to be nearing the million marks. The same is for automotive engineering which dates from the time of the discovery of the internal combustion engine by Otto in 1870. Chemical engineering courses began to be introduced by about 1890, almost simultaneously in German Technische Hoschschules and in great American Technical Colleges like
the Massachussetts Institute of Technology (M.I.T.). The first course was introduced in England in the Imperial College of Science and Technology in 1911. In some university and technical colleges, the new science began to be pursued as a subject for post-graduate study and research. Then came the discovery of the use of triode-valve in 1914, which revolutionised radio communication, and made broadcasting possible. This led to the need for a large number of engineers trained in the fundamentals of radio communications and in the use of the necessary appliances. So universities and technical colleges were called upon to open undergraduate classes for the training of radio engineers.

Many developments of electrical engineering have emerged, such as power plant and transmission engineering, radio communication, telephone communication, electronics, electrical calculating machines, electric railway engineering, electrical recording apparatus, electricity and electronics in medicine and surgery, electrical control apparatus, servo-mechanisms and many others.

These subdivisions of the engineering field illustrate how a mature economy develops a great variety of ways for controlling and using the processes and resources of nature. The great productiveness of a country like America is due less to possession of natural resources than to the development of a wide range of skills. Thus three basic types of
engineering have developed into numerous new technologies, which have tended to become independent field.17

1.7 - Engineering and Technological Education before Independence

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 of 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 engineers were mostly recruited from Britain from the Cooper's Hill College, and this applied as well to the foremen and artificers; but this could not be done in the case of lower grades-craftsmen, artisans and sub-overseers who were recruited locally. As they were mostly illiterate their efficiency was low. It was felt that there is a necessity to make them more efficient by giving them elementary lessons in reading, writing, arithmetic, geometry, and mechanics. This led to the establishment of industrial schools attached to Ordnance Factories and other engineering establishments. Such schools existed in Calcutta and Bombay as early as 1825 and the first authentic account is that of an industrial school established at Guindy, Madras, 1842, attached to the Gun Carriage
Factory there. A school for the training of overseers was known to exist in Poona in 1854.

Meanwhile in Europe and America, colleges of engineering were growing up, which drew to them men having good education, and special proficiency in mathematical subjects. This led to discussions in government circles in India and similar institutions were sought to be established in the Presidency Towns.

The first engineering college was established in U.P. in 1847 for the training of Civil Engineers at Roorkee, which made use of large workshops and public buildings there that were created for the Upper Ganges Canal. The Roorkee College (or to give it its official name of that time-The Thompson Engineering College) was never affiliated to any university, but had been giving diplomas, which are considered to be equivalent to degrees.

In pursuance of the Government Policy, three engineering Colleges were opened by about 1856 in the three Presidencies. In Bengal, a college called the Calcutta College of Civil Engineering was opened at the Writers Buildings in November 1856; the name was changed to Bengal Engineering College in 1857 and it was affiliated to the Calcutta University. It gave a licentiate course in Civil Engineering. In 1865 it was amalgamated
with the Presidency College, Later in 1880, it was detached from the
Presidency College and shifted to its present headquarter at Sibpur.

Proposals for having an Engineering College at Bombay City
having failed for some reasons, the overseas school at Poona eventually
became the Poona College of Engineering and affiliated to the Bombay
University in 1858. For a long time, this was the only Engineering College
in the Western Presidency. In the Madras Presidency, the industrial school
attached to the Gun Carriage Factory became ultimately the Guindy
College of Engineering and affiliated to Madras University (1858).

The educational work in the three colleges of Sibpur, Poona
and Guindy has been more or less similar. They all had licentiate courses
in civil engineering up to 1880, when they organised degree classes in this
branch alone. After 1880, the demand for mechanical and electrical
engineering was felt, but the three Engineering Colleges started only
apprenticeship classes in these subjects. The Victoria Jubilee Technical
Institute, which was started at Bombay in 1887, had as its objective the
training of licentiates in Electrical, Mechanical and Textile Engineering.

The credit of starting first degree classes in mechanical and
electrical engineering and in metallurgy belongs to the University of
Banaras. This was possible due to the foresight of its great founder. Pt.
Madan Mohan Malviya (1917).
About fifteen years later in 1931-32, the Bengal Engineering College at Sibpur started mechanical engineering courses, electrical engineering courses in 1935-36 and courses in metallurgy in 1943-1944. Courses in these subjects were also introduced in Guindy and Poona about the same time.

Quite a number of engineering colleges have been started since August 15, 1947. It is due to the realisation that India has to become a great industrial country and would require a far larger number of engineers than could be supplied by the older institutions. In some cases existing lower type institutions have been raised to the status of degree-giving colleges.16 & 17

1.8- Post Independence Scenario

The last half of this century has transformed our environment, perhaps radically, and brought more changes in our lives and thinking than in any corresponding period in history. These are the consequences of discoveries of sciences and applications of technology. The concept of absolute knowledge, in the sense of storing all knowledge, is perhaps no more relevant today. Our efforts for reconciling the traditional concepts and ways with the demands of the technological age cannot provide simple solutions for our difficulties and complexities based on such stored knowledge. Frontiers of knowledge are themselves expanding rapidly.
making it possible to device newer and more efficient methods of solving problems of the society. Education must therefore make efforts for securing knowledge and mastering modern skills and methods than merely storing and distributing traditional ones. For this purpose of training of mind and mastering of skills and for harnessing science and technology to profitable and productive processes of economic growth and social well being, the technological education system has to be continuously reviewed and adopted. This has indeed been the basis of our efforts during the last three decades. The result is that there is a well-organised structure and a wide network of technical institutions offering different type of programmes: Craftsman Courses, Technician Courses, Graduate and Post Graduate Courses etc catering to the various levels of knowledge, skills and competencies were required by the economy.

1.9- Institutions of Technical Education

The institutions of technical education can be classified into following four board categories.

(a) Indian Institute of Technology
(b) Indian Institute of Science, Bangalore
(c) Regional Engineering Colleges
(d) State Colleges, University Departments and Private Colleges.
1.10- Indian Institute of Technology

These are our apex institutions for engineering education and research. Each Institute conducts a First-degree course and Master’s Degree course in a wide range of subject fields, and also offers facilities for Research and Doctoral work. These institutes are in various stages of consolidation and development. As a part of the national plan of science and technology, five centers of Advanced Study and Research have been set up in the Indian Institutes Of Technology in Energy Studies (Delhi), Material Science (Kanpur), Cryogenic Engineering (Karagpur), Ocean Engineering (Madras) and Resource Engineering (Bombay). Recently two more IIT’s have been added i.e. IIT Guwahati and IIT Roorkee. Few more IIT’s are being added in the country very soon.

1.11- Indian Institute Of Science, Bangalore

The Indian Institute of Science, Banglore is the oldest and leading post-graduate and research centre in Science and Engineering. It has facilities in special fields which include Electronics and Communication Engineering, Aeronautical Engineering, Heat and Power Engineering, High Voltage Engineering, Power Engineering, Bio-Chemistry, Chemistry, Physics and Mathematics.
1.12- Regional Engineering Colleges

Eighteen Regional Engineering Colleges have been established in various states as a joint and co-operative enterprise of the Central and State Government concerned. Each Engineering College is functioning as an All-India institution admitting students and recruiting faculty from all parts of the country. Fifty percent of the admissions of these institutions are reserved for students from other states than the ones in which they are located. In addition to undergraduate courses these Colleges also offer Post-graduate courses in various subject fields.

1.13- State Colleges, University Departments and Private Colleges

In addition to the above institutions offering courses at degree and post graduate level, there is a wide network of engineering colleges established and administered by the State Government, Universities and private agencies; they are also affiliated to the respective Universities and Private agencies and offer degree courses in variety of subject fields. Some of them are more than a century old and have been pioneers in engineering educations in the country. Many of these State Colleges and University Departments are making significant contribution in the field of technical education.
In addition to above institutions there are many specialised institutions which offer education/training in specific fields such as National Institute for Training in Industrial Engineering, Bombay, Indian Institutes of Management, National Institute of Foundry and Forge Technology, Ranchi, Indian School of Mines, Dhanbad and other such Institutions.

1.14- The Problem and Its Conceptual Frame Work

Education is an investment and it provides national growth. In the Indian way of thinking, a human being is a positive asset and a precious national resource, which needs to be cherished, nurtured and developed with tenderness and care, coupled with dynamism. The history of modern Indian Education is testimony to the fact that the need for introduction of occupational education for students was highlighted as far back as in 1854. However, no significant break through was noticeable in this regard except for a few attempts to integrate work with general education. The concept that practical skills should be taught in special schools gradually took its roots in 19th century. Infect, it was only after independence in 1947 that a comprehensive programme for development of technical education and vocational training was launched; creating a large network of technical and vocational institutions that offered a wide variety of programme in different areas. Thus, schools were sought to be set up for training people in skills, which needed some knowledge of mathematics, science and the use of scientific instruments. In India, the
earliest technical schools, organised and run on a very modest scale, were meant to train surveyors for government works.

Although the Radha Krishnan Commission (1948) and Secondary Education Commission (1952-53) identified secondary education as a complete unit in itself capable of preparing students for a variety of vocational areas, not much was achieved in terms of concrete outcomes. The most comprehensive recommendations towards vocationalisation of higher secondary education came from the recommendations of the Education Commission (1964-66). It presented a blueprint for complete transformation of the education system in the country. The recommendations of the education commission found due acceptance in the National Policy of Education Resolution 1968. The National Policy on Education (NPE 1986) gave a new impetus to the programme. The policy aimed at providing diversification of educational opportunities so as to enhance individual employability, reduce the mismatch between demand and supply of skilled manpower and provide an alternative for those pursuing higher education.

The University Grant Commission has drawn up vocational courses at the +3 level, which are likely to provide much needed practical vocational content to the highly academic curricula. The school-industry linkage, which can rightly be termed as backbone of the collaborative model, is mostly left to the local initiative thereby showing only sporadic
success. Two other areas which require major attention by way of planned efforts and actual implementation are the promotion of self employment through inculcation of entrepreneurial culture among students and adequate impetus and support to the programme of work experience in pre-secondary classes. Further the need for evolving vocational programme for special groups like school dropouts and out of school youth, girls, the disabled, the working-learners, the rural poor and others has neither been systematically assessed nor worthwhile programmes have been offered through the non-formal mode except for some innovative projects taken up by the few voluntary organisations on a local basis with partial financial assistance from the Central. Vocational education through the open and distance learning mode is yet to take proper shape on a significant scale.

A multiprolonged strategy envisaged during the Eight Plan includes: (a) a gradual expansion of the programme at the +2 stage and consolidation and strengthening of the courses already started (b) continuation of the programme of assistance to voluntary organisation for innovative projects in the area of vocational education (c) providing pre-vocational courses at the lower secondary stage (Classes IX and X) (d) providing a generic vocational core course at the higher secondary stage for the academic stream students. Emergence of vocational courses, particularly at the senior secondary level in many of the countries in the
Asia-Pacific region may be attributed to the following trends: (a) expansion of secondary education system (b) diminishing quality of higher education system (c) diminishing quality of higher education due to excessive pressure on it (d) high unemployment rate amongst the educated (secondary to degree) (e) Vocational education being viewed as the instrument for the remedy of dangerous social trends (f) the need to siphon-off a sizable segment of student population to vocational stream through proper guidance (g) inclusion of non-traditional, technology oriented course for girls in larger numbers and greater variety (h) the increasing demand for vocational courses to suit the rural context (i) promotion of self employment and entrepreneurship.

Thus, vocationalisation of education is a much broader concept of education. It tends to bring real life and education closer for meeting the national goals. Vocationalisation of education provides skills in addition to providing education for the development of personality and for successful performance of responsibilities as good citizens.

Although there had been exponential growth in the capacity and dimensions of technical education system in the post-independence era, but this number is inadequate to meet the demand of technical personnel for post-war industrial development. Though these institutions have grown in number with each passing year after independence but because of quantitative improvement the quality of education gradually
deteriorated. The existing facilities for higher and technical education in India are quite inadequate, both in quantity and quality, to meet the country's requirement for higher-grade technologists. Technical and Vocational Education is going through a period of intensive change and reorientation. A multiplicity of national models, forms and structures have emerged in an effort to cope with the rapid technological advances and the changing needs of the labour market (Unesco 1993).

Rapid strides in the sphere of technology and maintenance of a high pace of economic growth require a qualitative transformation in the work force towards manpower equipped with a high degree of skills in widely diversified vocational fields.

Where as a trend towards more widespread vocational education is common to a good many countries, vocational education has followed different paths of development depending upon each country's environmental and historical factors. Considerable rethinking has been going on in almost all the countries to either redesign or evolve the most appropriate type of vocational education suited to contemporary economic and technological changes. Although several issues in this area have been subject of much debate, today a consensus seems to be merging regarding certain essential features of a sound and progressive educational system having vocational education as an important component. It is being increasingly recognised that the scope and variety
of vocational courses should be further extended to cover much larger and varied target groups than at present. Besides the courses, content offered should neither be too specialised nor too narrowly conceived. These have led to the growing realisation that vocational education programmes should not be treated independently of the general education system; rather, these should be closely allied to it.

There are several other problems linked with the growth of technical institutions in the country. In order to face the challenges of the new millennium, some area need immediate concern such as:

- Man Power Planning
- Low level of women participation
- Linkage with industry
- Faculty shortage
- Weak Research and development culture
- Linkage of School Curriculum with selection in Professional Colleges
- Lack of education on part of the parents
- Importance of Technical pass outs and job ratio
- Allocation of funds for development of education in budget
- Rising cost of higher education in Private Colleges
- Unemployment, underemployment and unsuitable employment in Technical Field

The above areas of concern need the attention of the researchers in the fields of technical education and education in general.

The National Council of Education Reform (1986) suggested that vocational courses should be flexible enough to cope with the progress of society and the changes in the time. Technical and vocational education should further contribute to the achievement of society, goals of greater civilisation on and social, cultural and economic development, while at the same time developing the potential of the individual for active participation in the establishment and implementation of these goals. It should lead to an understanding of the scientific and technological aspects of contemporary civilisation in such a way that men comprehend the environment and are capable of acting upon it, while taking a critical view of the social, political and environmental implications of the scientific and technological change. Given the necessity for a new relationship between education, the working life and the community as a whole, technical and vocational education should exist as a part of a system of lifelong education adapted to the needs of each particular country.

Besides this, modern society is endeavoring to workout an educational system which meets the educational and vocational needs of
all students. The education system is responsible for shaping the educational process according to the needs of individual society. There is variety of occupations available for the growing up adolescents. Young men and women leaving educational institutions after doing X & XII class and entering the world of work are faced with various problems about their life vocations.

Unemployment, underemployment and unsuitable employment are some of the major problems we are faced with at present in our country. Educational institutions have the responsibility of developing vocational interest and occupational aspirations, which may solve these problems of the students. Before making an educational plan to meet the vocational interests and occupational aspiration suitable to the needs of the adolescents, we must comprehend the interests, motivational factors, sex differences, different social categories, social background, medium of instructions and linkage between academic success and academic background of the students.

As such there is a need to identify the problems, which the technical education is facing at the moment. Hence, the investigator thought it better to study growth; motivational factors and academic success in technical education in Uttar Pradesh suggest some viable solutions.
1.15- Definition of the Terms

There are four main terms, which have been used in the study. These are (i) Technical Education (ii) Growth (iii) Motivational Factors (iv) Academic Success. Any lack of uniformity in understanding the meaning of the terms is likely to introduce some elements of confusion. Hence, in order to avoid the misinterpretation and for the sake of clarity, these terms are defined as follows.

1.16- Technical Education

Oxford dictionary defines Technical Education as education provided in applied sciences and practical subjects. The term technical has been defined as that job which involves applied and industrial sciences relating to the operation of machines. The meaning of the term technical education as per the researcher is an act involving or concerned with the mechanical arts and applied sciences.

In the present investigation technical education means education being provided under the aegis of AICTE but management and Agriculture education has not been included in the present study. Moreover, the efforts in the present study have been limited to undergraduate level technical education i.e. B.E. and B.Tech in the following branches-
1. Civil  
6. Electronics  
2. Computer Science  
7. Information Technology  
3. Electrical & Communication.  
8. Mechanical  
4. Electrical & Electronics  
9. Production & Industry  
5. Electrical  

1.17- Growth

The Concise Oxford Dictionary defines the word ‘Growth’ as an act or process of growing or an increase in size or a value. Growth would also mean steady progress in particular thing or area.

To grow is to move ahead. Growth in the present investigation is defined as quantitative changes that have taken place in the past years in terms of increase in number of institutions offering technical courses such as B.E/B'Tech.

The researcher has attempted to present the growth of technical institutions/spread of technical education in our country with special reference to Uttar Pradesh. The study presents a trend analysis of development of technical institutions in Uttar Pradesh. It identifies the trend of development of technical education in Uttar Pradesh in terms of growth of engineering colleges in from 1900–2007, growth of government financed technical colleges from 1900–2007 and growth of privately managed technical colleges from 1900–2007.
1.18- Motivational Factors-

‘Readers Digests - A Guide to the English language and how to use it’, defines the term motivation in psychology as any mental force or process, conscious or unconscious, that arouses and directs action towards the achievement of a desired aim. It has acquired an extended sense in industrial psychology the inducement or incentive to employees to work hard. The Concise Oxford Dictionary defines the word motivation as supply a motive to; be the motive of; cause (a person) to act in a particular way; stimulate the interest of a person in an activity. The MSN Encarta defines motivation as following-

(a) Giving reason to act: the act of giving somebody a reason or incentive to do something.

(b) Enthusiasm: a feeling of enthusiasm interest or commitment that makes somebody want to do something that causes such a feeling.

(c) Reason: a reason for doing something or behaving in a particular way.

(d) Psychology – Forces determining behavior, the biological emotional, cognitive or social forces that activate and direct behavior.

The term motivation is used for conditions that cause one to begin an activity and pursue it with vigor and persistence. In everyday term
motivation refers to the “why” of behavior. When we question one’s motivation, we ask- why does he do what he is doing? This is an attempt to understand the reason behind an action. The reason could be the driving force behind a student to take some challenges or leave them. Several factors influence or motivate a person to act in particular direction or particular way while taking a decisions regarding pursuing higher education for shaping their future.

At the time of diversification of education several factors compel the students to choose a particular field of education like humanities, science, commerce or a particular type of career like medical, engineering, management etc. The decision to pursue further studies in a particular field may be influenced by several factors such as parental view, peer group influence, aptitude, social status, nature of work, monitory prospects, global prospects etc.

In the present study all those important factors which stimulate, motivate or influence a person’s decision regarding pursuing higher education while choosing their career path, may be called motivational factors. After passing 10+2 stage of education from a school each and every youth is confronted with the dilemma to choose a particular branch of education for pursuing higher education to earn there livelihood later in life. Some students opt to appear in the competitive examination for technical
education, some for medical, some for management and some opt to continue general academics.

The present study includes some such important motivational factors that motivate a student or influence the student’s choice to join technical education after completing class XII examination. To be more specific and precise the following important factors have been included in the present investigation to study the driving force that stimulates a student while pursuing higher education in technical field after passing 10+2 stage of education from a school -

(a) Inborn Interest in Technical Field.
(b) Aptitude in the Technical Field.
(c) Parent’s Desire.
(d) Liking for Parents Profession as Engineer.
(e) Following the Siblings, Friends etc.
(f) Social Status – Provides Dignity and Status.
(g) Monitory Prospects – Fetches Good Income.
(h) Future Prospects – Better Future Prospects.
(i) Opportunity for Creativity.
(j) Opportunity for Global Interaction etc.
1.19- **Academic Success**

Success in any field is defined as the achievement of an aim or purpose or the gaining of wealth or status. Academic success means the success or percentage of marks achieved in education or study.

In the present investigation academic success refers to the percentage of marks achieved in class XII. The researcher has attempted to establish relation between the percentages achieved in class XII board examination vis-à-vis its relation with their success in getting selected in Technical colleges. The researcher has also attempted to study linkage between success in technical education vis-à-vis social background and social categories of the students. By social background the researcher means rural background and urban background students and by social categories the researcher means the students belonging to schedule caste, schedule tribe, backward classes and general category. By academic background the researcher means the students who pass-out or take their class XII examination from Indian Certificated School Examination (ICSE), Central Board of Secondary Education (CBSE), Uttar Pradesh Board and other state boards.

1.20- **Objectives of the Study**

The present study has attempted to achieve the following objectives:

(1) To trace the historical development of technical education in Uttar Pradesh.
(2) To identify the trend of development of technical education in Uttar Pradesh in terms of number of institutions.

(3) To study the motivational factors of students who joined Technical Education in terms of gender (male and female), different religion (Hindu and non Hindu) social background (rural and urban) and medium of Instruction (English and Hindi).

(4) To study the linkage between success in selection in technical education vis-à-vis academic background (CBSE, ICSE, UP and other state boards) and social categories of students (Schedule caste, Schedule tribes, backward classes and General).

1.21- Hypotheses of the Study

To achieve the objectives of the present study, following hypotheses were formulated and tested:

(1) After Independence Technical Education has grown slowly but with a rapid rate during last ten years i.e. there is a J-shaped trend in the development of technical education in Uttar Pradesh.

(2) There is no significant difference in motivational factors of male and female students.

(3) There is no significant difference in motivational factors of students belonging to different Religions (Hindu and Non Hindu).
(4) There is no difference in the motivational factors of students of different social background (rural and urban).

(5) There is no significant difference in the motivational factors of Hindi and English medium students.

(6) There is no significant difference in the motivational factors of the students belonging to different boards of the country (CBSE, ICSE, UP and other state boards).

(7) There is no linkage between success in selection in technical education vis-à-vis different social background of the students (i.e. students belonging to rural and urban sectors of the country).

(8) There is no linkage between selection in technical education vis-à-vis students belonging to different social categories (i.e. students belonging to schedule caste, schedule tribe, backward classes and general category).

1.22- Delimitations

The present study is delimited to the first Degree level technical education (i.e. B.E./B.Tech.) programme as provided by the affiliated colleges of U.P. Technical University, Lucknow. Technical education here includes B.E. and B.Tech courses and not other technical courses such as BBA, MBA, BCA and MCA etc. The study is further delimited to technical colleges in Uttar Pradesh only. The researcher also does not base its finding on the IIT's in the country.
References


3. **Munshi, KM,** “Indian Inheritance” Vidhya Bhawan.


5. Ibid


